CAFB-00-004

FINAL REPORT

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CORRECTIVE MEASURES STUDY AT SWMUS 31, 48A, 77, AND 127 CANNON AFB, NEW MEXICO

Prepared for
U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

June 2000

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FINAL REPORT - APPENDIXES

CORRECTIVE MEASURES STUDY AT SWMUS 31, 48A, 77, AND 127 CANNON AFB, NEW MEXICO

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U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

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ACC	Air Combat Command
AFB	Air Force Base
AGE	Aerospace Ground Equipment
ARARS	Applicable or Relevant and Appropriate Standard
bgs	below ground surface
B.P.	Before Present
BRA	Baseline Risk Assessment
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CEC	Cation exchange capacities
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMP	Corrugated metal pipe
CMS	Corrective Measures Study
CO_2	Carbon dioxide
COC	Chemicals of concern or chain of custody
COPC	Chemicals of Potential Concern
CRQL	Contract Required Quantitation Limit
DQCR	Daily Quality Control Report
DQO	Data Quality Objectives
EPFC	Exposure Pathway Flow Chart
ERA	Ecological Risk Assessment
ES	Engineering Science
FS	Feasibility Study
HQ	Hazard Quotient
HSA	Hollow-stem auger
HSWA	Hazardous and Solid Waste Management Act
ID	Inside diameter
IRP	Installation Restoration Program
MCL	Maximum Contaminant Level
MCLGs	Maximum Contaminant Level Goals
MS	Matrix spike
MSD	Matrix spike duplicate
msl	Mean sea level
MSSLs	Media-Specific Screening Levels
MW	Monitoring well
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System

NWR	National Wildlife Refuge
OD	Outside diameter
OERA	Old Entomology Rinse Area
OVA	Organic vapor analyzer
OWS	Oil/water separator
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PVC	Polyvinyl chloride
QA/QC	Quality assurance/quality control
QAPP	Quality Assurance Project Plan
QCSR	Quality Control Summary Report
RBC	Risk-based concentration
RBCA	Risk-Based Corrective Action
RCRA	Resource Conservation and Recovery Act
RfD	Reference dose
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RSI	Remediation Services Incorporated
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SMCLs	Secondary Maximum Contaminant Levels
SOP	Standard operating procedure
SSTLs	Site-Specific Target Levels
SVOC	Semivolatile organic compound
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TBC	To Be Considered
TCL	Target Compound List
TDS	Total dissolved solids
T/E	Threatened/endangered
TFW	Tactical Fighter Wing
TIC	Tentatively Identified Compounds
TPH	Total petroleum hydrocarbons
TRPH	Total recoverable petroleum hydrocarbons
URSGWC	URS Greiner Woodward Clyde
U.S.	United States
USACE	United States Army Corps of Engineers

USAF	United States Air Force
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UST	Underground storage tank
UTL	Upper tolerance limit
VOC	Volatile organic compound
VSI	Visual Site Inspection
W-C	Woodward-Clyde
WHA	Walk-Haydel Associates

UNITARY ABBREVIATIONS

C	Celsius
CFU/g	Colony Forming Units per gram
cm	centimeter
cm/sec	centimeters per second
cm/yr	centimeters per year
F	Fahrenheit
ft	feet
gal/ft	gallons per foot
gpm	gallons per minute
hr	hour
km/hr	kilometers per hour
kg	kilogram
L/min	liters per minute
m/yr	meters per year
mg	milligram
mg/kg	milligrams per kilograms
mg/L	milligrams per liter
m^3/m	cubic meters per meter
mph	miles per hour
NTUs	Nephelometric Turbidity Unit
ppm	parts per million
%R	percent recoveries
RfD	reference dose
μg/kg	micrograms per kilogram
yr or y	year

1.1 PURPOSE AND SCOPE

Four Solid Waste Management Units (SWMUs) were identified as areas of concern for potential contamination at Cannon Air Force Base (AFB), located near Clovis, New Mexico. Subsequent investigations at these SWMUs, under Cannon's Resource Conservation and Recovery Act (RCRA) permit, indicated minor soil contamination at all four sites. This soil contamination required completion of a Corrective Measures Study (CMS) at each SWMU. This CMS describes activities completed at the following SWMUs at Cannon AFB:

- SWMU 31 - AGE (Aerospace Ground Equipment) Maintenance Shop
- SWMU 48A - Underground Storage Tank
- SWMU 77 - CE (Civil Engineering) Container Storage Area
- SWMU 127 – Oil Water Separator 4095

The purpose of the CMS is to develop and evaluate corrective measure alternatives and to recommend the selected final corrective measure(s) for each SWMU. A regional map (Figure 1-1) shows the location of Cannon AFB. Figure 1-2 shows a map of Cannon AFB and the locations of the SWMUs.

The report is organized as follows:

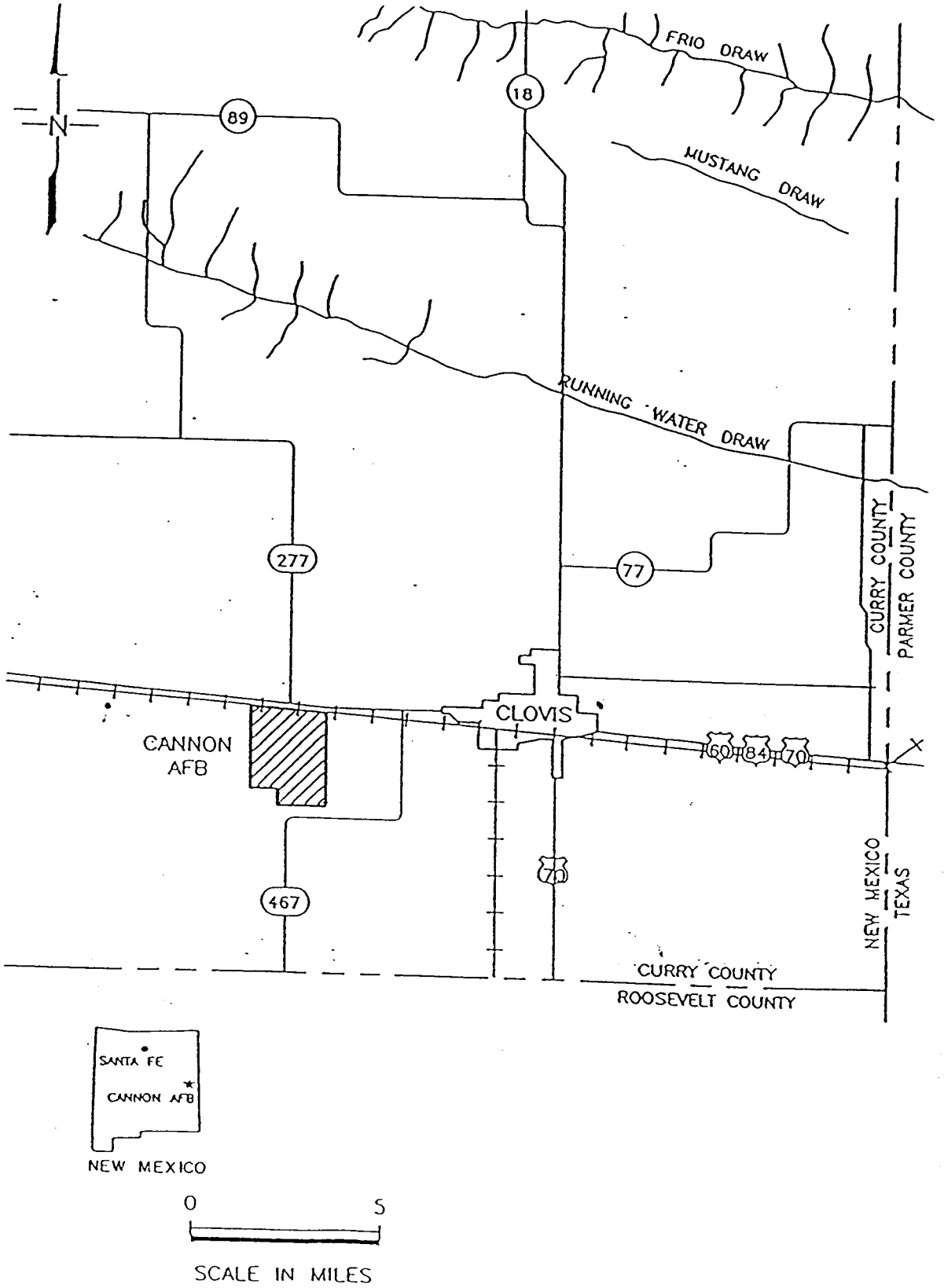
- Section Two - discusses the CMS objectives and approach for the recommendations presented in the CMS.
- Section Three - provides a facility description, including the physical setting, demographics and land use, climate, geology, hydrogeology, soils, background metals concentrations in soils and water, and biological resources.
- Section Four - presents the results of activities completed at SWMU 31, including physical and analytical results, human and ecological risk assessments, fate and transport modeling, and a discussion of corrective measure alternatives.
- Section Five - presents the results of activities completed at SWMU 48A, including physical and analytical results, human and ecological risk assessments, fate and transport modeling, and a discussion of corrective measure alternatives.
- Section Six - presents the results of activities completed at SWMU 77, including physical and analytical results, human and ecological risk assessments, fate and transport modeling, and a discussion of corrective measure alternatives.
- Section Seven - presents the results of activities completed at SWMU 127, including physical and analytical results, human and ecological risk assessments, fate and transport modeling, and a discussion of corrective measure alternatives.
- Section Eight - contains a summary and recommendations for each SWMU.
- Section Nine - contains the references.

- Appendix A - contains the Daily Quality Control Reports (DQCRs), Sample Collection Field Sheets (SCFSs), and survey data for the SWMU 77 CMS field investigation.
- Appendix B - contains the complete analytical data for the SWMU 77 CMS field investigation.
- Appendix C - contains the human health risk-based concentrations (RBCs).
- Appendix D – contains fate and transport modeling data.

1.2 REGULATORY FRAMEWORK

SWMU 48A is identified as an Appendix II SWMU in Cannon's RCRA permit, SWMUs 31, 77, and 127 are identified as Appendix III SWMUs in the permit. The CMS follows the general requirements of Cannon's RCRA permit.

REPORT PHASE: PHASE II SITE SD-11



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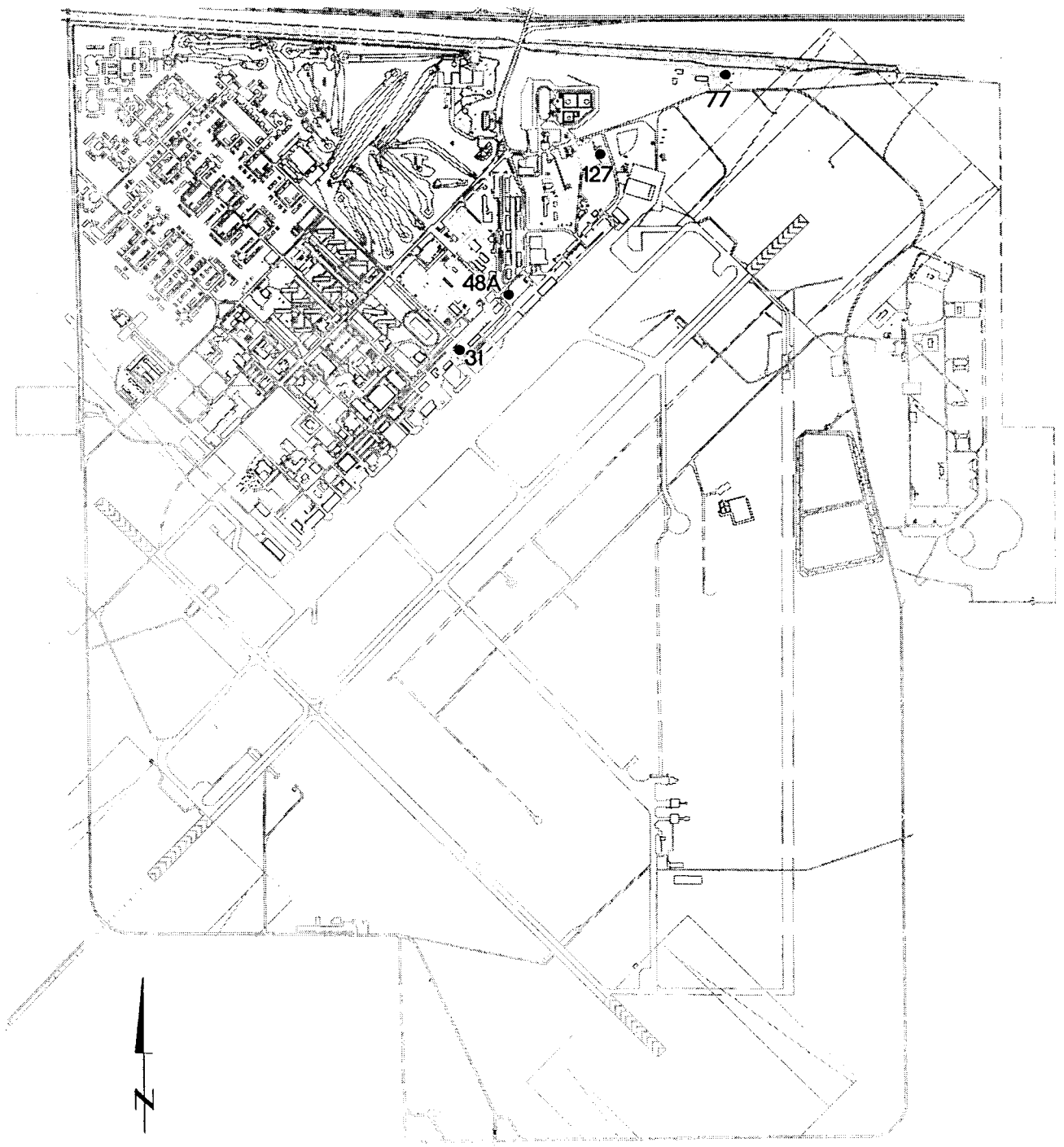
REPORT PHASE: PHASE III QSR SITE SD-11

LEGEND

3 ● SOILD WASTE MANAGEMENT UNIT (SWMU) LOCATION AND NUMBER

SWMU No.	DESIGNATED AREA
31	AGE MAINTENANCE SHOP
48A	UNDERGROUND STORAGE SHOP
77	CE CONTAINER STORAGE AREA
127	OWS 4095



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DRN. BY: TSSM	DATE: 08/06/99	APPENDIX 1 SWMUs 86-90 (SITE SD-11) LOCATION PLAN CANNON AIR FORCE BASE CLOVIS, NEW MEXICO	PROJECT NO.	FIG. NO.
CHK'D. BY:	REVISION: 0		45FM9602CC.00	1-2

2.1 CORRECTIVE MEASURES STUDY OBJECTIVES

The overall purpose of this Corrective Measures Study was to develop and evaluate corrective measures alternatives and to recommend the selected final corrective measure(s) that is most cost-effective, most reliable, and easiest to implement.

The preliminary corrective action objective for SWMUs 31, 48A, 77, and 127 was to implement the RBCA process to streamline the decision process for corrective action that is protective of human health and the environment. RBCA is the integration of site assessment, remedial action selection, and monitoring with USEPA-recommended risk and exposure assessment practices. RBCA procedures for the assessment and response to a petroleum release are outlined in the American Society for Testing and Materials (ASTM) E1739-95[E1], *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM 1996).

The specific objectives for these SWMUs were to:

- Further evaluate the extent and degree of contamination levels at SWMU 77
- Further assess the potential for contaminant migration in the surrounding environment
- Further identify public health and environmental risks of contaminants relative to applicable regulatory standards
- Based on the results of the RBCA process for the assessment and response to a petroleum release, evaluate and justify the "No Further Action" alternative or appropriate RBCA alternative

2.2 CORRECTIVE MEASURES STUDY APPROACH

The following decision process was used to assess the data needs and approach for the Corrective Measures Study at SWMUs 31, 48A, 77, and 127. The Data Quality Objective (DQO) evaluation process was designed to provide data of sufficient quality and quantity to evaluate whether a release has occurred that could pose a risk to human health or the environment and to evaluate the need for further action, such as corrective measures implementation.

A general decision diagram (Figure 2-1) was developed for the Cannon AFB CMS at these SWMUs to present a logical decision process that was used to evaluate the data resulting from the investigations and CMS to assure that objectives are met.

The decision process was designed to identify appropriate actions based on three alternative recommendations: no further action, further evaluation, or corrective measures implementation. The recommendation for the selection of alternative action depended upon whether chemicals of potential concern (COPCs) were detected in soils at levels that may pose an unacceptable risk to human health or the environment. This section provides a summary of the decision-making process that was used.

The initial steps in the decision process involved compiling all historical information and analytical data and any new information and/or data for the SWMUs. Additional fieldwork was completed at SWMU 77 to further evaluate the extent and degree contamination at this SWMU. The data was used to determine the COPCs for each SWMU and to identify potential sites of chemical release. Metals data were compared to the established Cannon AFB background (W-C, 1997). Any common field and/or laboratory contaminants that were identified in laboratory blanks and/or not considered site related based on historical information were eliminated from further evaluation.

Once all metal detected below background concentrations and field/laboratory contaminants were eliminated from the data set, the COPCs were compared to EPA Region VI Media-Specific Screening Levels (MSSLs) for residential exposure (Tier 1 Evaluation). If any COPC exceeded an MSSL, then a more site-specific risk evaluation was completed which included fate and transport modeling and the generation of site-specific target levels (SSTLs). This Tier 2 evaluation provided a more focused assessment of potential risks at the site. If the concentrations in soil were at levels that could potentially contaminate groundwater (based on comparison to USEPA Region VI soil-screening levels), fate and transport modeling was done to evaluate the potential for contaminant transport to groundwater. The Tier 1/Tier 2 evaluation process is discussed in detail in Section 4.6.1.

A qualitative screening-level ecological risk evaluation was completed concurrently with the Tier 1/Tier 2 process.

The results of the Tier 1/Tier 2 risk evaluation process were used to help evaluate the corrective measures alternative for each SWMU. Recommendations regarding the alternatives were made based on the following criteria:

- If the vertical extent and lateral extent of contamination was defined and no threat to human health or the environment existed based on the Tier 1/Tier 2 process or the qualitative ecological risk screen, then no further action was recommended.
- If the extent was not defined and there was a potential significant threat to human or ecological health based on the Tier 1/Tier 2 process or the qualitative ecological risk screen, further evaluation would have been recommended for the site.
- If there was an unacceptable threat to human health or the environment and the extent of contamination was defined, additional corrective measures alternative would have been reviewed and the appropriate measure(s) recommended for implementation.

2.3 APPROACH FOR EVALUATING CORRECTIVE MEASURES ALTERNATIVE(S)

Once extent and degree of contamination were defined, then corrective measures alternatives were evaluated. Those alternatives identified in the CMS Work Plan included:

- No further action
- Excavation and removal

- Bioventing
- Soil vapor extraction

The corrective measures were evaluated and selected based on the following criteria.

1. Technical

Performance - corrective measure or measures which are most effective at performing their intended functions and maintaining the performance over extended periods of time were given preference.

Reliability - corrective measure or measures which do not require frequent or complex operation and maintenance activities and have proven effective under waste and facility conditions similar to those anticipated were given preference.

Implementability - corrective measure or measures which can be constructed and operated to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time were preferred.

Safety - corrective measure or measures which pose the least threat to the safety of nearby residents and environments as well as workers during implementation were preferred.

2. Human Health

The corrective measure(s) must comply with existing USEPA criteria, standards, or regulations for the protection of human health. Corrective measure(s) which provide the minimum level of exposure to contaminants and the maximum reduction in exposure with time were preferred. Human health risk evaluations were completed per the methodology described in Section 2.6.

3. Environmental

The corrective measure(s) posing the least adverse impact (or greatest improvement) on the environment over the shortest period of time were favored. Ecological risk evaluations were completed per the methodology described in Section 2.7.

4. Cost

The recommended corrective measure alternative was justified using technical, human health, environmental, and cost criteria.

2.4 APPROACH FOR EVALUATING BACKGROUND CONCENTRATIONS

A comparison of SWMU sample concentrations to background concentrations was used to determine whether metals detected in soil samples are site related. The following sections describe the approaches used for each.

Soils are derived from parent geologic materials as a result of physical, chemical, and biological processes. The soil system is a highly heterogeneous matrix of inorganic and organic components. The relative proportions of these components are dependent upon factors influencing soil formations, such as topography, climate, depositional processes, and time

(Sposito and Page 1984). Total concentrations of metals in soils may vary depending upon location; for example, at the surface, soils are influenced by leaching, runoff, atmospheric deposition, and biotic uptake, as well as anthropogenic activity. The ranges of naturally occurring or "background" concentrations of metals in soils is greatly varied due to the composition of parent material and, therefore, care must be taken in the interpretation of metals data generated during an investigation.

Metals concentrations in SWMU soils were compared to background soils concentrations presented in "Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico" (W-C 1997). The approach compared the maximum concentrations detected at SWMUs 31, 48A, 77, and 127 to the 95 percent upper tolerance limit (UTL) of the background concentrations. Using this technique, individual samples at the site with high concentrations relative to background levels (i.e., which could represent a site-related release) were identified. See NOD

2.5 HUMAN HEALTH RISK EVALUATION METHODOLOGY

This section provides a description of the approach that was used in the health risk evaluation for SWMUs 31, 48A, 77, and 127. The RBCA process was used to identify human health risks at these SWMUs. RBCA procedures implemented in this report are outlined in the ASTM E1739-95[E1], *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM 1996).

2.5.1 RBCA Process

RBCA is the integration of site assessment using USEPA-recommended risk and exposure assessment practices and remedial action selection. The RBCA process was implemented in a tiered approach, involving increasingly sophisticated levels of data collection and analysis. The results and recommendations were reviewed after evaluation of each tier to decide whether more site-specific analysis was warranted. The RBCA process consisted of the following steps:

1. Initial Site Assessment - Conducted a site investigation and completed a Tier 1 Summary Report to organize available site information regarding primary chemicals of potential concern, extent of affected environmental media, potential migration pathways, and receptors.
2. Site Classification and Initial Response Action
   - Classified site according to specified scenarios and implemented appropriate initial response action.
   - Reclassified the site, when necessary, following initial response actions, interim remedial action, or additional data collection.
3. Tier 1 Evaluation
   - Identified reasonable potential sources, transport pathways, and exposure pathways.

- Compared detected site soil concentrations (maximum detected concentrations or upper confidence levels if data permitted) to risk-based screening levels (RBSLs) in the "look-up" table provided in ASTM E1739-95[E1]. USEPA Region VI residential MSSLs were used as the Tier 1 "look-up" table. Throughout this document, the term MSSL will be used when discussing risk-based screening levels. The MSSLs are discussed in detail in Section 2.5.2 and are presented in Appendix C.
- If concentrations of chemicals of potential concern exceeded the Region VI MSSLs at the point(s) of compliance, then they became chemicals of concern and either interim remedial action (e.g., "hot spot" removal), further tier evaluation (i.e., Tier 2 evaluation), or remediation to Tier 1 RBSLs was warranted.
- If concentrations of chemicals of concern did not exceed the Region VI MSSLs, the option recommended was no further action.

4. Tier 2 Evaluation

- A Tier 2 evaluation was warranted if Tier 1 MSSLs were exceeded and interim removal action was not appropriate.
- Additional site data would have been collected, if needed.
- Indirect exposure scenarios were addressed and the appropriate site-specific points of compliance were identified.
- Nonsite-specific assumptions and point(s) of exposure used in Tier 1 were replaced with site-specific data and information. Site-specific target levels (SSTLs), based on the industrial scenario and a 10-6 risk level, were calculated using the site-specific information and relatively simplistic mathematical models.
- Detected site soil concentrations (maximum detected concentrations or upper confidence levels when data permitted) were compared to SSTLs.
- If concentrations of chemicals of concern exceeded the SSTLs at the point(s) of compliance, then interim remedial action (e.g., "hot spot" removal), further tier evaluation (i.e., Tier 3 evaluation), or remediation to Tier 2 SSTLs would have been recommended.
- When concentrations of chemicals of concern did not exceed the SSTLs, the option recommended was no further action.

5. Basic Equation for RBSLs and SSTLs

- SSTL = Target Risk / (Exposure * Toxicity)

For these SWMUs, residential MSSLs were used in the Tier I evaluation. This is a conservative approach because the SWMUs are industrial sites which are not likely to become residential in the foreseeable future.

If the calculation of SSTLs was warranted, the exposure component of the equation was modified to account for the industrial exposures that occur at the sites.

2.5.2 Derivation of USEPA Region VI MSSLs

The MSSLs were taken from the USEPA Region VI table which is provided in Appendix C (USEPA 1997b). The latest available version was used. These MSSLs are based on 1×10^{-6} excess cancer risk or a hazard quotient equal to 1, assuming residential ingestion, dermal, and inhalation exposures. A maximum chemical concentration that exceeds a screening-level MSSL does not mean that a health risk exists because the maximum concentration detected is not the concentration to which people would routinely be exposed, and the exposure assumptions used to derive the MSSL are not site-specific.

Tier 1 MSSLs are based on a carcinogenic target risk level of one-in-one million (1E-06) and a noncarcinogenic hazard quotient of 1. The current NMED guidance recommends using a target risk level of 1E-05. Given this added factor of conservatism, the risks attributed to contaminants of potential concern may be overestimated. A range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) is USEPA's target excess cancer risk range for cleanup under Superfund and RCRA (USEPA 1991). Therefore, MSSLs based on target risks of 1×10^{-6} and 1×10^{-5} are conservative (protective) values, and exceedances of these MSSLs do not necessarily mean that a health risk is present. Exceedance of the MSSLs may mean, however, that further evaluation of chemical concentrations, exposure assumptions, and carcinogenicity may be warranted.

For noncarcinogens, MSSLs are the concentrations in soil that are estimated to result in a "hazard quotient" (HQ) of 1.0. A hazard quotient is the ratio of the estimated daily dose from the assumed exposure to a reference dose (RfD), established by USEPA, that is considered safe for a lifetime of daily exposure. A hazard quotient of 1 or less means that no toxic effects are likely to occur, even to sensitive individuals exposed for a lifetime. A hazard quotient above 1 does not mean that toxic effects will necessarily occur, but that further evaluation of exposures and chemical toxicity is required.

USEPA Region VI MSSLs for soil exposures are based on the ingestion, inhalation, and dermal exposure routes. Soil MSSLs are available for industrial and residential scenarios. SWMUs 31, 48A, 77, and 127 are located in industrialized areas of the Base. For the Tier 1 assessment, residential MSSLs were used.

MSSLs for Lead in Soil

USEPA withdrew the toxicity factor (i.e., the RfD) for lead in 1989, primarily due to the lack of a discernible threshold dose and because of the numerous sources of lead in the environment. However, USEPA guidance (USEPA 1994c) recommends an interim soil lead concentration of 400 mg/kg for residential scenarios at CERCLA and RCRA corrective action sites. This level is supported by USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model (USEPA 1994c), which predicts that exposures of children ages 0 to 6 years to soils with approximately these levels will not result in blood lead levels that exceed a level of concern (10 μg/dL) established by the Centers for Disease Control. The interim soil lead concentration is the level above which there is sufficient concern that a site-specific study of risks should be conducted if exposure to children is expected at the site. Based on the residential soil-screening level for lead, USEPA

Region VI set the residential soil MSSL for lead at 400 mg/kg and the industrial soil MSSL for lead at 2,000. For the Tier I assessment, the residential MSSL was used.

2.6 SCREENING-LEVEL ECOLOGICAL RISK EVALUATION METHODOLOGY

Ecological risk assessment is:

... the process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors. (USEPA 1992, USEPA 1998).

In the present context, "adverse ecological effects" are understood to be anthropogenic changes considered undesirable because they alter valued structural or functional characteristics of ecological systems (USACE 1996; USEPA 1998). The "stressors" at issue are chemical contaminants.

There was no formally-promulgated, official state guidance for performance of ecological risk assessments (ERAs) at potentially contaminated sites in New Mexico at the time of the CMS preparation. USEPA has released guidance for the conduct of ecological risk assessment, specifically USEPA (1992, 1998). The latter of these two references is EPA/630/R-95/002B, *Guidelines for Ecological Risk Assessment*, which replaces the 1992 EPA *Framework for Ecological Risk Assessment* (EPA/630/R-92-001) by expanding upon and modifying the framework concepts to "reflect Agency [EPA] experience" since 1992 and is "intended as internal guidance for EPA." These guidelines, "set forth current scientific thinking and approaches for conducting and evaluating ecological risk assessments." However USEPA (1998) does not provide detailed guidance in specific areas and is not intended to be highly prescriptive. One of its stated purposes is to provide a basis or framework for individual EPA programs and regions to develop more specific guidance "suited to their particular needs."

The U.S. Army Corps of Engineers (USACE) released *Environmental Quality Risk Assessment Handbook, Volume II: Environmental Evaluation* in 1996 that applies to ERAs "for all USACE HTRW investigations, studies, and designs under Department of Defense, Defense Environmental Restoration Program (DERP), Base Realignment and Closure (BRAC), U.S. Environmental Protection Agency (EPA) Superfund Program, Civil Works, and Work for Others" (USACE 1996). This is the primary resource for guidance in the ERA presented in the following sections. This guidance manual, like the *EPA Guidelines*, is not intended to be a "how to" document but rather to provide the concepts for performing an ERA consistent with "good science" and accepted regulatory procedures (USACE 1996).

The EPA Emergency Response Team (ERT, Edison, New Jersey), under the authority of OSWER Directive No. 9285.7-17 of August 12, 1994, has developed guidance for ecological risk application at Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, otherwise known as Superfund) sites which is also applicable for the presented ERA. The external review draft was released in August of 1996 and the interim final was released in June of 1997, which has been declared as final in October of 1999. The Superfund guidance is widely referred to as "ERAGS" (an acronym based on the title) by risk assessment practitioners outside EPA, although agency personnel (at least in formal discourse) usually refer to it as the

Process Document. For our purposes of discussion, the document was called ERAGS, and was considered to be the version dated June 5, 1997 (USEPA 1997a).

2.6.1 Overview of the Tier I Level Ecological Screening Process (ERAGS Steps 1 and 2)

The first three steps of an ecological risk evaluation (Figure 2-2) correspond to a preliminary, or screening level assessment (Tier I) wherein: (1) the presence of an ecological component is determined; (2) the contaminated media to which the ecological component(s) could be exposed are identified; and (3) the magnitude of contamination in each applicable medium is compared to a level conservatively assumed to constitute a hazard (ecotoxicological benchmark)[1]. Where an ecological component is lacking, the process concludes that chemicals of interest (COIs) are not of potential ecological concern within the site under consideration. Where an ecological component exists, but COI concentrations in applicable media do not equal or exceed the ecotoxicological benchmarks, the contaminants are not considered chemicals of potential ecological concern (COPECs). But, given the presence of an ecological component *and* at least one COPEC, the site requires further evaluation – Tier II.

The initial step in ecological evaluation of a site is determining whether the unit has an *ecological component*. This determination is based on the availability, within the subject unit, of *habitat*. Simply defined, the term habitat means the "place where a plant or animal lives" (USACE 1996; USEPA 1997a), but a more functional definition can be paraphrased as the *type of environment* where an organism (or community of similarly adapted organisms) *normally* lives.

If an ecological component is identified, COPECs will be derived from the media-specific analysis of applicable media, other existing studies, reports, and site contaminant history (Issue #1 within the ERAGS Screening-Level Problem Formulation). A COPEC is a chemical, based on an initial screening of its maximum concentration in applicable media (i.e., surface soil, surface water, and/or surficial sediment[2]), where there is at least a suspicion that the chemical may adversely interact with the environment (Issues 3,4 and 5 - ERAGS Screening-Level Problem Formulation). COPECs are selected based on comparison of maximum contaminant concentrations to ecotoxicological screening benchmarks[3]. Generally, the following criteria are used in selecting COPECs:

- If the maximum concentration of a chemical is less than the ecotoxicological benchmark, then the chemical would not be selected as a COPEC.
- If the maximum concentration of a chemical exceeds the ecotoxicological screening benchmark, then the chemical would be considered a COPEC.

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[1]This initial screening tier corresponds to Steps 1 and 2 of the ERAGS process (USEPA 1997a) and a screening level ecological risk assessment as defined by USACE (1996).

[2] Subsurface media are not considered here as there is no complete exposure pathway for the subsurface to ecological receptors.

[3] The selection of these ecotoxicological benchmarks corresponds with the second component within Step 1 as outlined in ERAGS (1997a) – "evaluation of ecological effects."

- If a chemical was detected and has the potential to biomagnify within the ecological foodweb, then the chemical would be selected as a COPEC, regardless of its ecotoxicological screening benchmark.
- If an inorganic chemical was detected below site-specific background concentrations, then the chemical would not be selected as a COPEC.

This process of COPEC selection corresponds to Step 2 within the ERAGS Screening-Level Ecological Risk Assessment (Screening-Level Exposure Estimate and Risk Calculation). For purposes of screening sites for ecological risk issues, complete exposure pathways are assumed to exist given the presence of applicable habitat. If no COPECs are identified, it is concluded that the COIs are not of potential ecological concern and no further investigation for ecological concerns would be deemed warranted.

2.6.2 Tier II Level Ecological Risk Assessment

Given the presence of an ecological component *and* at least one COPEC, the site would require further evaluation, i.e., a Tier II level risk assessment (USACE 1996). This Tier II level assessment corresponds to an abbreviated Baseline Ecological Risk Assessment (BERA) as outlined within ERAGS. The salient difference lies in the ERAGS BERA requirement for the collection of additional information (ERAGS Steps 4 and 5). The Tier II risk assessment relies on existing information. Based on findings during the first tier of assessment, a formal problem formulation (ERAGS Step 3) will be conducted where:

- The ecological component is further characterized in the context of ecological relevance and value that reflect federal, state, or local ecosystem management goals (i.e., identify assessment endpoints - what needs protection).
- Key relationships are described between COPEC(s) and ecological component(s) in the context of appropriate spatial boundaries (administrative and ecological) and temporal scale (i.e., an exposure assessment).
- Identify measures that reflect the appropriate attributes that may be affected by the COPEC(s) (i.e., an effects assessment).

Based on the components identified above, risk(s) and uncertainties can be more clearly defined than is possible within the Tier I assessment. All of the assumptions made during the Tier I level assessment result in an over-estimation of the potential exposure and effects associated with an ecological resource. Such over-estimation is purposely performed to ensure that a false-negative conclusion (i.e., suggesting no-risk when in reality a risk exists) does not occur during the screening process. This bias is identified and, to the extent possible, quantified during formal problem formulation to allow for a more realistic evaluation of the potential for ecological harm (uncertainty analysis).

2.6.2.1 Ecological Resource(s) at Risk

Characterization of the habitats, communities and ecosystem at risk is used to identify assessment endpoints and measures for focusing the ecological risk assessment. However, this evaluation must be performed within the context of the site risk management goals for

interpreting the relevance of COPEC exposures. The spatial boundaries (ecological and administrative) need to be delineated as well as the temporal scale and ecological component characteristics to focus the assessment on relevant issues. The term *ecological component* can represent any part of an ecosystem, including populations, communities, and the ecosystem itself. In a sense, at the screening level (Tier I) the "ecological component" is a *community* (assemblage of populations of organisms associated with a particular physical medium). In order to identify potential relevant issues, the functional roles of the components identified for the site (i.e., habitats, communities and ecosystems) will be evaluated in terms of their trophic relationships and ecological relevance (value). *Assessment endpoints* represent ecologically relevant values based on fundamental ecological principles, that consider the structure, function and dynamics of the ecological systems at risk. These assessment endpoints represent the ultimate focus of the ecological risk assessment and link the "measured" attributes, i.e., *measurement endpoints*, to the risk management process.

2.6.2.2 Exposure Assessment

Exposure assessment (first component within ERAGS Step 6) evaluates the potential exposure pathways, identified in a site conceptual exposure model, for the selected COPEC(s) and ecological component(s). The chemical fate and transport properties associated with the COPEC, the physical-chemical setting of the site, the distribution of the COPEC(s) within the site, and the attributes associated with the ecological component, are used to ascertain whether any release and/or transport of a COPEC can be linked to the ecological component. Simply stated, this process assures that a complete exposure pathway can be demonstrated. All incomplete exposure pathways are eliminated from further investigation, since without exposure there can be no effect.

During the Tier I screening assessment the maximum detected concentration of a COI is compared to the ecotoxicological screening benchmark. The maximum detection is useful for screening but is inadequate for characterizing a potential for risk. As such, COPEC concentrations are evaluated in the context of spatial distribution in Tier II. However, analytical data are often from sampling locations that were biased towards the indentification of chemical "hot spots" in applicable media. This represents a positive bias, which is consistent with the conservative nature of a screening-level assessment (Tier I). As part of the exposure assessment during formal problem formulation in Tier II, attempts are made in characterizing (statistically) the impact of this bias on the potential for exposure to ecological resources.

2.6.2.3 Effects Assessment

Two tasks are associated with an effects assessment (second component within ERAGS Step 6) for selected COPECs:

- *Relative sensitivities to potential receptors.* Major phylogenetic categories of organisms, e.g., amphibians, reptiles, birds and mammals are compared based on information from toxicological references to assess which receptors are at greatest risk to individual COPECs.
- *Mechanism or mode of toxicity.* This represents how a toxic effect is produced within different groups of organisms. This includes the target organ or process within a receptor that is

pathologically affected by the presence of a poison. This is useful for: (1) differentiating between target organisms; (2) determining whether growth or reproduction are the more important endpoint, and in some cases; (3) determining whether an acute or chronic endpoint is more applicable.

2.6.2.4 Receptors of Concern

To develop a measurement by which risk can be characterized, i.e., evaluate the measurement endpoint, receptors of concern (ROCs) are selected. Populations, communities or species will be selected as ROCs taking the following into consideration:

- general trophic position;
- probable intensity/duration of exposure;
- availability of relevant behavioral and physiological data;
- availability of relevant toxicological data;
- whether there are any federally-listed threatened or endangered species; and
- behavioral and physiological attributes such as body weight, area use, diet composition and rates of ingestion of food, soil and water that may influence an animals' susceptibility (and sensitivity) to contaminants.

ROCs are selected based on the characterization of the ecological resources at risk, the results of the exposure assessment, as well as the results of the effects assessment.

2.6.2.5 Risk Characterization

Toxicity reference values (TRVs) are selected for both no-observed-adverse-effect levels (NOAELs) and lowest-observed-adverse-effect levels (LOAELs). Risk is then evaluated by calculation of *ecological effects quotients* (EEQs) or *hazard quotients* (HQs) (ERAGS Step 7). HQs are the ratio between the exposure point concentration and toxicity reference value. These will be developed for both NOAEL and LOAEL-based TRVs. If the dose to a ROC does not exceed a level known or predicted to be associated with a significant adverse ecological response (HQ > 1) then the process would result in a recommendation of no further action. If the environmental dose equals or exceeds the dose associated with a potentially adverse ecological response by the ROC, an interpretation of the ecological significance of the result will be made which would result in one of the following: (a) a recommendation for no further action; (b) a recommendation for further investigation; or (c) an engineering evaluation/cost analysis or feasibility study (Risk Management – ERAGS Step 8). Considerations of ecological significance in a no-further-action recommendation would include:

1) the magnitude and uncertainty of the *ecological effects quotients*;
2) the risk management goals that acknowledge this is an active industrial site (e.g., if only those ecological communities potentially affected are those that are resident and confined to the habitat *within* the Cannon AFB grounds and if no *transport* of COPEC

effects occurs into the landscape-scale ecosystem surrounding the facility, then a no further action recommendation may be appropriate);

3) the potential for a remedial action to result in a detrimental ecological effect.

In the case of (b) above, another iteration of the problem identification, problem formulation or analysis could result. A recommendation for further investigation would entail the focused acquisition of new information. Information sought may include redefining assessment endpoints, and/or site-specific measurements and/or observations designed to corroborate or refute assumptions made during the assessment. These assumptions could be related to exposures, effects (responses) or both.

2.7 FATE AND TRANSPORT MODELING APPROACH

At SWMUs where chemicals were detected in soil above MSSLs (i.e., Tier 1 RBSLs), contaminant fate and transport in the vadose, or unsaturated, zone was modeled to evaluate the potential for contaminants to be transported to underlying groundwater. Prior to application of a mathematical model, a conceptual vadose zone model was developed. Based on vertical extent and maximum depth of soil borings, an upper soil zone was identified that represents the zone of contamination associated with potential chemical releases. A lower soil zone was also identified, extending to the estimated depth of the water table and representing the vadose zone through which chemicals would be expected to migrate.

The Hydrologic Evaluation of Landfill Performance (HELP) Model, Version 3.01 (Schroeder et al. 1994), was then used to calculate a net infiltration rate at the bottom of the designated upper soil zone. HELP uses weather, soil, and design data to account for various processes including runoff, infiltration, evapotranspiration, soil moisture storage, vertical drainage, and leakage through soil, geomembrane, or composite liners. Results are expressed as daily, monthly, annual, and average long-term water budgets. Soil layers identified in the conceptual model were each simulated as vertical percolation layers by HELP. The amount of net infiltration or percolation through the bottom layer was then input as a constant infiltration rate into the vadose contaminant fate and transport model.

The Multimedia Exposure Assessment Model (MULTIMED), Version 2.00 (Salhotra et al. 1995), as distributed by the USEPA Center for Exposure Assessment Modeling (CEAM), was used to model contaminant fate and transport through the vadose zone to the water table. MULTIMED uses primarily semianalytical solution methods to simulate the movement of contaminants leaching from a waste disposal facility or contaminated soils. The use of analytical rather than more complex numerical models is considered to be appropriate for the current level of risk assessment needs at the site. Additionally, the use of an analytical model is consistent with the typical usage of fate and transport models for Tier 2 RBCA evaluations (ASTM 1999).

To compensate for simplifying assumptions of the models, conservative estimates of input parameters were used based on collected field data, recent literature values, and chemical analytical results. MULTIMED was run for each chemical detected above MSSLs under varying source conditions and consideration of transport processes (e.g., sorption, biodegradation).

Initial leachate concentrations, based on maximum detected concentrations in soil and equilibrium partitioning, were calculated for each chemical detected at each SWMU. Attenuation factors calculated from the results of each model run were then applied to these initial leachate concentrations to predict concentrations of chemicals at the bottom of the unsaturated zone and after initial mixing with groundwater at the water table.

The modeling approach, documentation, input parameters, and output, including assumptions and limitations, are described in Appendix D. Model-predicted concentrations for each SWMU are provided within their respective sections.

FIGURE 2-1

CANNON AFB
DECISION DIAGRAM FOR CORRECTIVE MEASURES STUDY AT SWMUs 31, 48A, 77, AND 127

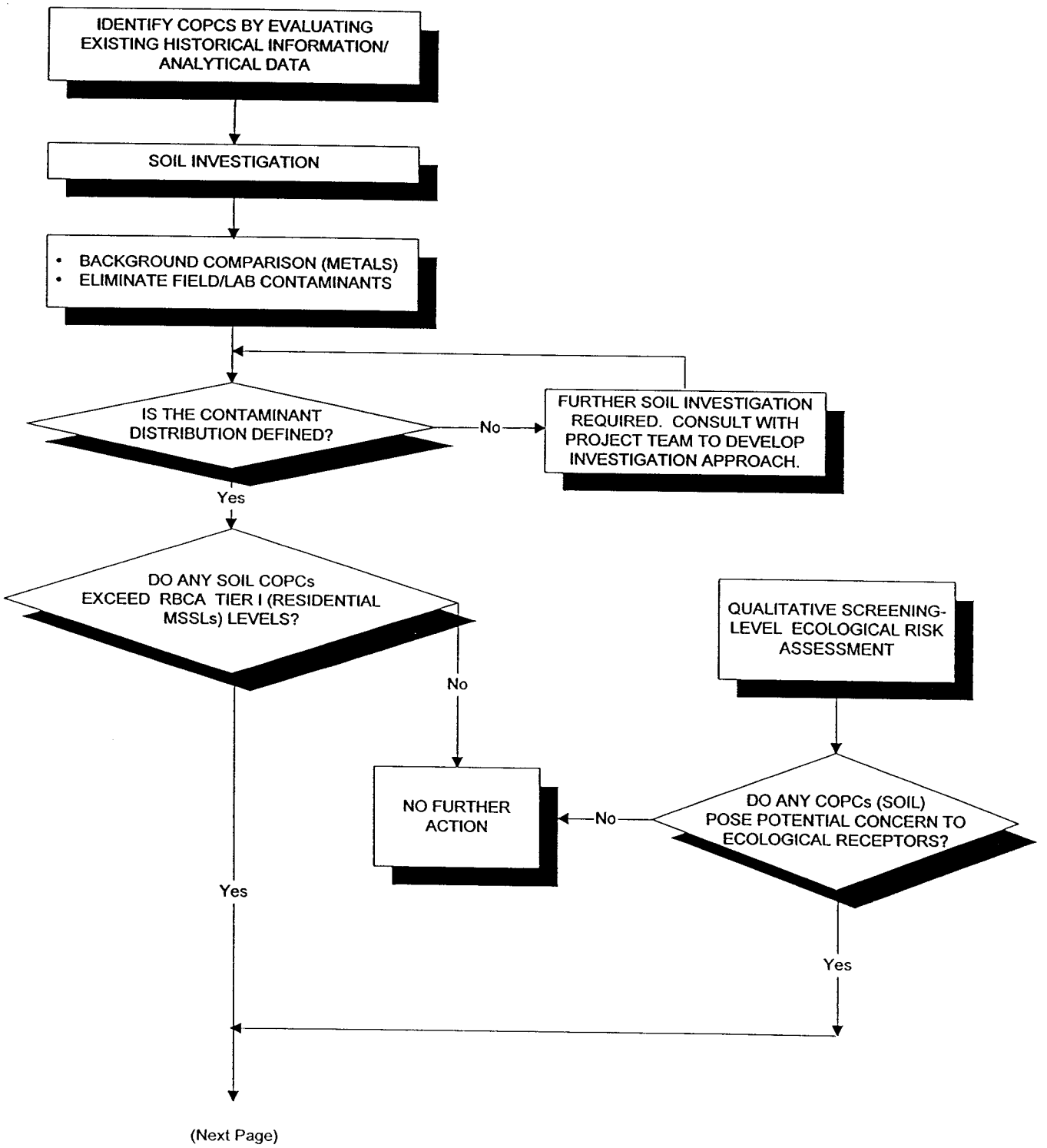


FIGURE 2-1

CANNON AFB
DECISION DIAGRAM FOR CORRECTIVE MEASURES STUDY AT SWMUs 31, 48A, 77, AND 127

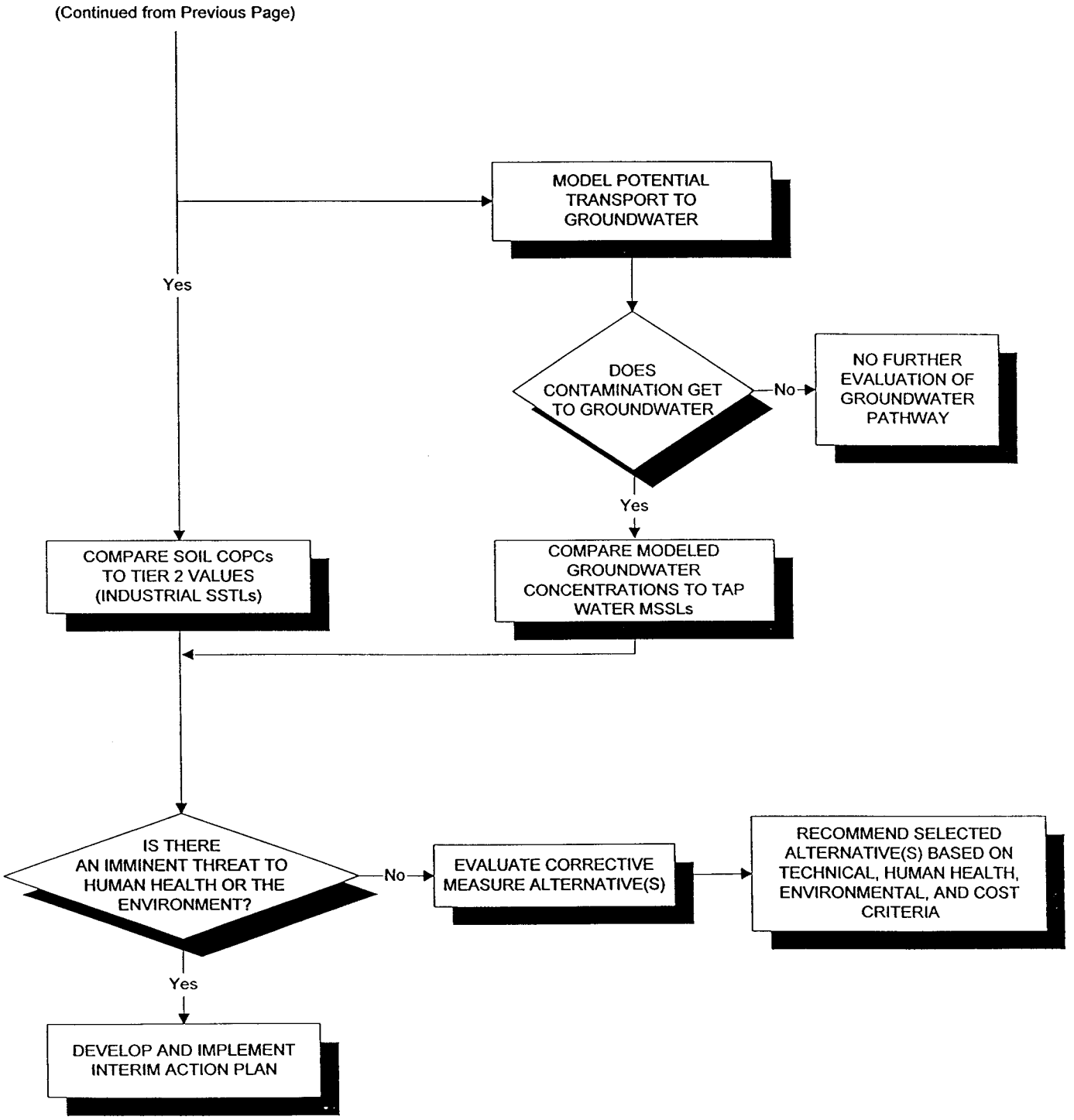
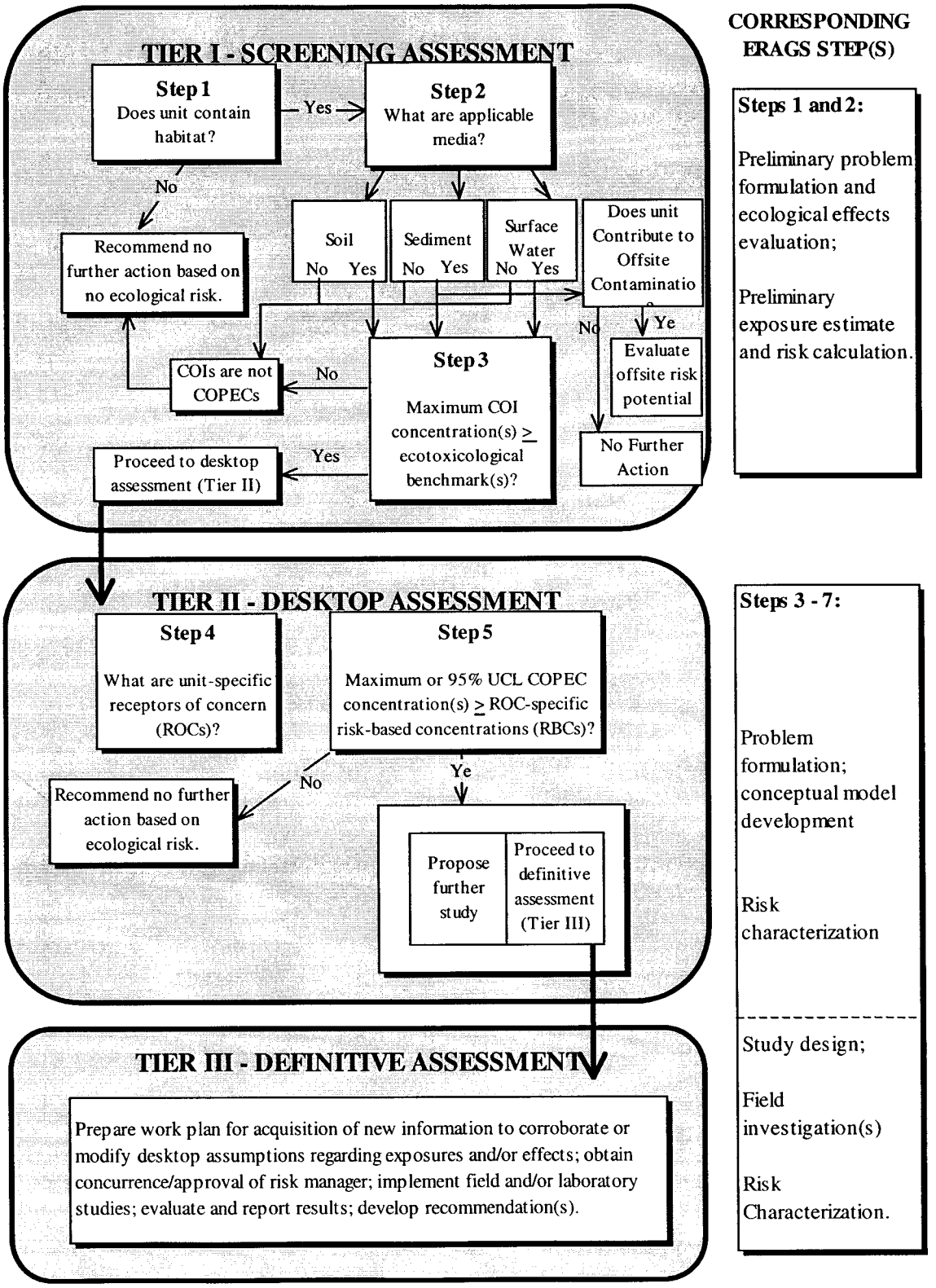


FIGURE 2-2
ECOLOGICAL RISK EVALUATION PROCESS



CORRESPONDING ERAGS STEP(S)

Steps 1 and 2:

Preliminary problem formulation and ecological effects evaluation;

Preliminary exposure estimate and risk calculation.

Steps 3 - 7:

Problem formulation; conceptual model development

Risk characterization

Study design;

Field investigation(s)

Risk Characterization.

3.1 SETTING - PHYSICAL GEOGRAPHY

Cannon AFB is situated in the Southern High Plains Physiographic Province in the Llano Estacado subprovince. The Llano Estacado is a nearly flat plain sloping gently (10 to 15 feet per mile) to the east and southeast. Elevations in the eastern New Mexico portion of the Llano Estacado exceed 4,000 feet above mean sea level (msl). In the vicinity of Cannon AFB, elevations range from 4,250 feet to 4,350 feet above msl.

The most prominent geomorphic features in the vicinity of Cannon AFB are blowouts and broad, widely spaced valleys. Less common landforms are relict sand dunes located along the northern side of the Portales Valley south of the Base. Relict dunes are not found on or near Cannon AFB.

Blowouts are broad shallow depressions which form as the result of soil erosion by wind. Blowouts commonly collect surface runoff from small to moderate sized drainage areas. During periods of rainfall, runoff collects in blowouts to form ephemeral playa lakes. Playas have no external surface drainage. Water is lost by infiltration to the soil and evaporation; without recharge, playa lakes persist for only a few days or weeks. Three playas are located within the Base, and several more are found to the north and east of the Base.

Stream valleys tend to be fairly broad and widely spaced. Streams are ephemeral and drainages are poorly developed. No streams exist on or near Cannon AFB. Running Water Draw and Frio Draw, located about 10 and 20 miles, respectively, north of Cannon AFB, are the nearest streams. These are second-order streams. Both streams are very straight, flow southeast, and have rectilinear drainage patterns with short laterals (W-C 1991).

3.2 DEMOGRAPHICS AND LAND USE NEAR CANNON AFB

Cannon AFB is located just south of U.S. Highway 60-84 in a farming and ranching area (Figure 1-1). The majority of the land surrounding Cannon AFB is productive, irrigated farmland or grassland. The major crops are wheat, sorghum, sugar beets, corn, cotton, alfalfa, barley, and peanuts. The land is also used for cattle grazing, both beef and dairy, and Clovis is considered the "Cattle Capital of the Southwest." There were 32,767 people living in Clovis in 1990, while the Cannon AFB population was estimated to be 4,650 in 1990 (W-C 1991).

3.3 CLIMATOLOGY

The climate of east-central New Mexico is classified as tropical semi-arid, with summer temperature and precipitation maxima. Average monthly temperatures range from a January low of 12°C (39°F) to a July high of 26°C (78°F). Extreme daily temperatures range from -24°C (-11°F) to 41°C (106°F) (Lee Wan and Associates 1990). Average monthly precipitation ranges from 1 cm (0.4 inches) in winter to 6.9 cm (2.7 inches) in July. The maximum recorded 24-hour rainfall is 12.2 cm (4.8 inches), which occurred in August. Rainfall occurs on eight or more days per month during the summer precipitation maximum. Mean annual precipitation is approximately 41 cm (16 inches). The mean annual evapotranspiration rate is 181.4 cm/yr

(71.4 inches/yr) (Lee Wan and Associates 1990). Prevailing winds are from the west at an average of 5 km/hr (3.1 mph) during fall, winter, and spring. During the summer, winds are from the south at an average of 3.7 km/hr (2.3 mph).

The atmosphere around the area of Cannon AFB is generally well mixed. The seasonal and annual average mixing heights can vary from 400 meters in the morning to 4,000 meters in the afternoon. The afternoon mixing heights are typically greater during the spring and fall seasons. The morning mixing heights are usually low, due to nighttime heat loss from the ground producing surface-based temperature inversions. After sunrise, these inversions break up, and solar heating of the earth's surface causes vertical mixing in the atmosphere.

Dust is frequently entrained into the atmosphere in this region of the country because of gusty winds and the semiarid climate. The Texas Panhandle-eastern New Mexico area is considered the worst area in the United States for windblown dust. Occasionally, this windblown dust is of sufficient quantity to restrict visibility. Most of the seasonal dust storms occur in March and April, when the wind speeds are typically high (average 5 km/hr) (W-C 1991).

3.4 GEOLOGY

The near-surface stratigraphic units of interest at Cannon AFB are the Late Miocene-Late Pliocene-age Ogallala Formation and the Early Triassic Dockum Group as shown in Figure 3-1.

The Dockum Group consists of three formations. The stratigraphically lowest unit is the Santa Rosa Sandstone. Overlying the Santa Rosa Sandstone are the Chinle and Redonda Formations. The Chinle and Redonda Formations are composed mainly of red shales with lesser interbedded sands, and are known locally as "redbeds." The top of the Dockum Group is marked by an erosional unconformity having relief of up to several hundred feet (Lee Wan and Associates 1990).

Overlying the Dockum Group redbeds is the Ogallala Formation. The Ogallala Formation extends from eastern New Mexico and Colorado into Texas, Oklahoma, Kansas, Nebraska, and South Dakota. Drillers' logs from Cannon AFB indicate that the Ogallala Formation varies from 360 feet to 415 feet in thickness. The incised upper surface of Triassic redbeds strongly influences Ogallala thickness. Paleovalleys in the post-Triassic unconformity are deep and trend dominantly east-west. Ogallala thickness may thus vary significantly over short north-south distances.

The Ogallala is erosionally truncated to the south along the abandoned Portales Valley, to the west along the Pecos River Valley, and to the north in a series of ephemeral stream valleys. The Ogallala Formation extends more than 125 miles to the east before terminating as an escarpment in Briscoe County, Texas. Springs and seeps are common along the erosional margins of the Ogallala.

The Ogallala dips gently and monoclinally to the southeast in the vicinity of Cannon AFB. As reported in Lee Wan and Associates (1990), data suggest that some Quaternary warping may have occurred; however, most of the structures are well to the northwest and southwest of

Cannon AFB. No faults or buried structural lineaments are known in the vicinity of Cannon AFB.

The Ogallala Formation is composed of unconsolidated poorly sorted gravel, sand, silts, and clays. The base of the Ogallala is generally marked by a gravel, cobble, and boulder deposit. This basal member contains sediments derived from igneous and sedimentary rocks transported from the mountains to the west. The Ogallala Formation was laid down as stream and overbank deposits formed within coalescing alluvial fans. These fans form a broad pediment along the eastern flank of the Rocky Mountains. As is typical of alluvial deposits, Ogallala internal stratigraphy varies vertically and horizontally over short distances.

Except where strongly cemented by calcium carbonate (caliche), the sediments of the Ogallala are loose and friable. Authigenic and allogenic clays are found as a trace to abundant matrix mineral (Lee Wan and Associates 1990). As reported by Lee Wan and Associates (1990), five zones have been distinguished within the Ogallala of east central New Mexico on the basis of clay minerals. Smectites (montmorillonites) and attapulgite (with sepeotite) are the dominant clays throughout the Ogallala. Illite is a lesser, but persistent clay, as is kaolinite. Smectite is a swelling clay, causing deep cracks to form in dry surface soils. Smectite, in particular, and to a lesser extent, attapulgite and illite, are clays with moderate to high cation exchange capacities (CEC). The formation as a whole should therefore have a relatively high CEC, which should inhibit the migration of charged contaminants, and especially ionic forms of metals.

Caliche is a major feature of the Ogallala Formation, occurring as nearly continuous to discontinuous layers throughout. A generalized geologic section at Cannon AFB is shown in Figure 3-1. Caliche is hard, white to pale tan on fresh surfaces, weathering to gray, and has a chalky appearance. Caliche forms as calcium carbonate, leached from overlying sediments, and precipitates in the pore space of the host sediments. Precipitation is caused by the evaporation of downward percolating water. The caliche may thus mark the position of ancient vadose zones. As reported in Lee Wan and Associates (1990) radiocarbon dates for the upper "climax" caliche range from -27,000 yr. Before Present (B.P.) to -42,000 yr. B.P.

Caliche is relatively soluble in acidic water ($pH < 7$) or in waters containing dissolved CO_2. The top surface of the upper "climax" caliche in fresh outcrop shows solution etching.

The Ogallala has numerous continuous to discontinuous caliche layers throughout its thickness. The uppermost caliche, termed the "climax" caliche, is pisolitic (consisting of spherical concentrically laminated aggregates 1 to 10 mm in diameter (Lee Wan and Associates 1990). The pisolites are thought to have formed as the caliche was repeatedly chemically weathered and brecciated during Pleistocene pluvials (wet climate episodes) and later recemented during drier intervals. This upper caliche crops out around playas and the bounding escarpments of the Ogallala, and is locally termed "caprock." The "climax" caliche is typically 3 to 5 feet thick. Caliches which occur lower in the Ogallala are platy and harder. Caliche may be thin or absent below playas (W-C 1991).

3.5 HYDROGEOLOGY

The lower portion of the Ogallala Formation is the primary regional aquifer for both potable and irrigation water. No deeper aquifers are utilized in the vicinity of Cannon AFB. The Ogallala aquifer is part of the High Plains Aquifer which extends continuously from Wyoming and South Dakota into New Mexico and Texas. In east central New Mexico, the Ogallala aquifer rests on Dockum Group redbeds, which serve as the basal confining layer. The Ogallala is a water table, or unconfined aquifer (Lee Wan and Associates 1990). The Ogallala aquifer has a southeasterly regional gradient of about 13 feet/mile. Well yields vary from less than one gallon per minute (gpm) in thin silts and sands, and up to 1,600 gpm in thick sands and gravels (Lee Wan and Associates 1990). Water quality is generally good, with hardness and fluorides being somewhat high (Lee Wan and Associates 1990).

At Cannon AFB, the depth to groundwater is greater than 200 feet, and the Ogallala aquifer has an average saturated thickness of 120 feet based on mid-1960s data. Saturated thickness ranges from 93 to 143 feet, and is influenced by the configuration of the erosional nonconformity surface marking the top of the Dockum Group. The local groundwater gradient is southeasterly at 7.5 feet/mile (Lee Wan and Associates 1990). Figure 3-2 shows water table elevation contours for 1984. Flow within the saturated zone may be influenced by the configuration of the top of the Dockum Group. Yields in tests of Cannon AFB water wells have ranged from 776 L/min (205 gpm) to 4,353 L/min (1150 gpm). Specific capacities range from 0.14 m^3/m (11.4 gal/ft) to 0.35 m^3/m (27.9 gal/ft) (Lee Wan and Associates 1990).

Very rough estimates of hydraulic conductivity were made from well pump tests in water wells 5 and 9 (Figure 3-3) located on base using the Theis equation. An estimate of hydraulic conductivity for base water well 8 was based on water level recovery data using the Bouwer and Rice approach (Lee Wan and Associates 1990). The data used in these calculations were obtained to evaluate pump rates, efficiency, and well yield, and were not intended for use in calculating aquifer properties. The results of these calculations should therefore be considered as first approximations.

Hydraulic conductivity values for water wells 5 and 9 were found to be approximately 2.0×10^{-3} cm/sec. Calculations for water well 8 resulted in a hydraulic conductivity of 2.0×10^{-2} cm/sec. In addition, slug testing of two monitoring wells (MW-O and MW-N) located on the base by landfill 3 and 4 was done by Woodward-Clyde in February 1995 (W-C 1995a). The estimated hydraulic conductivities from these slug tests were both 3×10^{-3} cm/sec. These estimates appear to be low when compared to published hydraulic conductivity data for sands and gravels. As reported in Lee Wan and Associates (1990) a groundwater flow velocity of about 45 m/yr (150 ft/yr) has been estimated. This calculates out to a hydraulic conductivity of approximately 1.0×10^{-1} cm/sec. Again, this appears to be low when compared with published data (Freeze and Cherry 1979).

The presence of interstitial clays may account for both the variability and low values of hydraulic conductivities. Boring logs from Cannon AFB IRP projects and published reports (Lee Wan and Associates 1990) indicated that interstitial and interstratified clays are abundant in the Ogallala Formation.

Recharge to the Ogallala is primarily through precipitation. As reported in Lee Wan and Associates (1990), a recharge rate of 0.5 inches/year was calculated using the Theis equation. Lee Wan and Associates (1990) reported that the recharge rate may be as much as 1.0 inches/yr. Due to the high evapotranspiration rate and low precipitation, recharge probably occurs only during heavy rainfall events in which the infiltration capacity of the soil is exceeded and runoff occurs, or during cool months when precipitation exceeds evapotranspiration. Excess runoff flows to playas, and the presence of water in playas may allow deep percolation to the aquifer. The occurrence of this process is evidenced by the presence of clay deposits in, and thin or nonexistent caliche layers directly below, playas. Caliche is soluble in acidic rain waters, and is leached over time to form percolation pathways.

Discharge from the Ogallala occurs through well pumping and springs along the eroded margins of the formation. Spring discharge does not occur on or near Cannon AFB. Domestic and irrigation water wells are common on and around the Base, however. The rate of discharge exceeds the rate of recharge. Water levels in the Ogallala have declined steadily from the 1930s to the present. A decline of 50 to 100 feet has been observed in the area around Clovis, New Mexico, for the period from the 1930s to 1980. Lee Wan and Associates (1990) states, "the largest area of water level decline exceeding 100 feet occurs south of the Canadian River extending from Curry Co., New Mexico to Crosby Co., Texas."

The dominant uses of groundwater in the Cannon AFB area are for potable and irrigation water. Numerous wells are found in the Cannon AFB area, most of which provide only irrigation water (Figure 3-3).

The Ogallala will continue to be used as the primary source of potable and irrigation water for eastern New Mexico. The New Mexico State Engineer designated Curry County as a Water Basin in 1989. This designation allows for regulation of water rights, usage, and well drilling (W-C 1991).

3.6 SOILS

Soils in the vicinity of Cannon AFB are classified as SM to SC under the Unified Soil Classification System, and as aridisols (calciorthids) under the Soil Conservation Service Comprehensive Soil Classification System. The following summary is based on the Soil Conservation Service Curry County Soil Survey as reported in Lee Wan and Associates (1990).

The most common soil type on the Base is the Amarillo fine sandy loam, 0- to 2-percent slope phase (map symbol Ab Figure 3-4). This soil consists of a thin sandy A horizon, well-defined clayey B_{1-3} horizons, with a calcic B_3 horizon at depths below 40 inches. The calcic B_3 horizon lies on a calcic C horizon, or on caliche. The Amarillo fine sandy loam is present on all relatively flat surfaces at the Base, but is also found on slopes associated with playas (map symbol Ac).

Clovis fine sandy loams, 0- to 2-percent slope phase (map symbol Cb) and 2- to 5-percent slope phase (map symbol Cc), are very similar to Amarillo fine sandy loams. In the Clovis soils, the

depth to the calcic C horizon ranges from 28 to 56 inches. The depth to caliche exceeds 56 inches. Clovis and Amarillo fine sandy loams occur in close association.

In a few limited areas, particularly along the steeper slopes around playas, Mausker fine sandy loam, 0- to 2-percent slope phase (map symbol Ma), and 2- to 5-percent phase (map symbol Mb) are found. Mausker fine sandy loams have no B horizons and are very calcareous. The calcic C horizon is within 2 feet of the surface.

The A and B horizons of Amarillo and Clovis fine sandy loams are rapidly to moderately permeable. Mausker fine sandy loam A and Ac horizons are rapidly permeable. Permeabilities in calcic B and C horizons are moderate (Lee Wan and Associates 1990).

3.7 BACKGROUND METALS CONCENTRATIONS IN SOIL AND WATER QUALITY

The natural soils in the vicinity of Cannon AFB are alkaline and rich in metals in general. Typically high concentrations of aluminum, iron, magnesium, manganese, and potassium combine with elevated levels of many other metals in the natural soils. Calcium is naturally present in the soils at levels up to nearly 200,000 mg/kg (W-C, 1997). Tightly cemented layers of "caliche" are present in several horizons in the natural soils and the Ogallala aquifer below.

The background levels of inorganic compounds in surface and subsurface soil at Cannon AFB are presented in Table 3-1 in the form of a mean value and statistical information on the ranges encountered for each element. Table 3-1 has been adapted from a final report by Woodward-Clyde dated September 1997 entitled "Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico." This report summarizes background data for soil from numerous past investigations in the vicinity.

The mean values and upper tolerance limits (UTLs) presented in Table 3-1 are the background levels used in the screening of soil chemical results for this RFI. In addition to comparison to the UTL of the Base-wide background data (which is necessarily from a limited data set), other sources of naturally occurring metals concentrations, such as USGS (1984), were considered when determining whether metals concentrations are within background levels.

3.8 BIOLOGICAL RESOURCES

Land adjacent to Cannon AFB is primarily used for agriculture, and there is little natural vegetation remaining in the area. The wildlife species that are common to agricultural areas throughout the region include bobwhite quail and pheasant. There are a few playa lakes in the area; these are used by upland game for cover, by waterfowl for resting and feeding, and by wildlife in general for drinking. Nearby riverbeds also provide water sources during rainy seasons. During periods of low rainfall, the riverbeds are dry (W-C 1991).

3.8.1 Plant Resources

The climate of the Base area is considered to be semiarid. The thin layer of topsoil in the vicinity of Cannon AFB is sandy loam, which is highly susceptible to wind erosion. The undisturbed natural vegetation is mostly shortgrass prairie, including blue grama grassland and mixed grama grassland vegetation types, which have moderately fast recovery rates (W-C 1991).

Much of the study area has been previously cleared for agricultural crops. The predominant land use of the region is rangeland, primarily for cattle grazing. In general, moderately grazed rangeland areas of the types occurring in the project area are highly productive in terms of both forage quality and quantity. The rangeland in the vicinity may support up to 15 to 20 head of cattle per section, depending on the rainfall. Large trees do not uniformly exist in the vicinity of the range except where planted around buildings and other structures on the Base. Woodlands composed of large shrubs and small trees are confined to riparian areas and playa lakes in the vicinity (W-C 1991).

The following plants are candidate species for the Federal List of Endangered and Threatened Wildlife and Plants (CFR 1990) and are found within a 50-mile radius of Cannon AFB: chatterbox orchid (*Epipactus gigantea*), spiny aster (*Aster harridus*), Whittmans milkvetch (*Astragalus witmanii*), dune unicorn plant (*Proboscidea sabulosa*), and the tall plains spruce (*Eupjorbia strictior*). The dune unicorn plant is also on the state endangered plant species list. No federally protected endangered plants are known to be present on the Base (Lee Wan and Associates 1990).

3.8.2 Wildlife Resources

The eastern New Mexico area contains many nongame wildlife species that are typical of the High Plains. Most of these species are distributed widely throughout the western United States. Species diversity is low in most habitats because of the low vegetation diversity. Most amphibian species are associated with riparian habitats and playa lakes. Reptiles are found in all terrestrial habitat types, but are most abundant in scrub/grasslands. Nocturnal rodents are the most abundant members of the small mammal community.

Grasslands on the High Plains support a variety of seed-eating sparrows and other ground-dwelling birds, both as residents and migrants. Raptors (hawks and owls) are relatively abundant in all habitats in the region. Insectivorous and tree-nesting species are most abundant in riparian areas. Shorebirds and waterbirds, and migratory waterfowl in general, utilize the rivers, playa lakes, and reservoirs of the region.

Two National Wildlife Refuges (NWRs) are in the region surrounding Cannon AFB. The Grulla and Muleshoe NWRs are within 30 miles of Cannon AFB. These areas provide high-quality habitat for migratory and breeding waterfowl.

Big-game species in the area include mule deer, white-tailed deer, pronghorn, and barbary sheep. Pronghorn are the most abundant game animal in the area. Several species of upland game, such as quail, ring-necked pheasant, and turkey, are common in the area. Reservoirs (Ute Lake,

Conchas Lake, and Clayton Lake) and playa lakes are important waterfowl habitats in the region. Numerous species of native and introduced fish inhabit the rivers and perennial streams, and the reservoirs support recreational fishing of warm-water species, such as walleye, crappie, channel catfish, largemouth bass, and bluegill.

As determined by the regional office of the U.S. Fish and Wildlife Service, two federally listed endangered animal species, the bald eagle and peregrine falcon, are known to inhabit the area within a 50-mile radius of Cannon AFB. The New Mexico Department of Game and Fish also indicated that the state endangered Mississippi kite, Baird's sparrow, and the black-footed ferret may also occur in the vicinity of the Base. The federal- and state-protected species are listed in Table 3-2.

Within Curry County, the only state-protected bird that is expected to occur is the Mississippi kite. In New Mexico, since the early 1960s, this kite summers regularly and breeds in the Clovis region. The birds frequent the golf course at Cannon AFB. Two other state-protected birds that may occur within Curry County are the McCown's longspur and Baird's sparrow. These two species have not been sighted regularly in recent years. No information is available on the McCown's longspur in New Mexico; however, Baird's sparrow occurs mainly in autumn during migration in the eastern plains and southern lowlands. Migrants appear as early as the first week of August and move further south by November. The species seems to have declined in abundance throughout its range in the Southwest due to the loss of shrubby shortgrass habitats.

State-protected birds known to occur infrequently are the bald eagle and the peregrine falcon. The bald eagle migrates and winters from the northern border of New Mexico to the Gila, lower Rio Grande, middle Pecos, and Canadian valleys. It is seen occasionally in summer and as a breeding bird, with nests reported in the extreme northern and western parts of the state. Winter and migrant populations appear to have increased with reservoir construction. The peregrine falcon is widely distributed, but population numbers are low. The American subspecies breeds statewide in New Mexico, but mainly west of the eastern plains (Source: Draft Environmental Impact Statement - Cannon AFB 1990).

TABLE 3-1

SUMMARY OF BACKGROUND ELEMENTAL CONCENTRATIONS[1] IN SOIL SAMPLES[2] AT CANNON AFB, NEW MEXICO

	Mean (x)		Standard Deviation (s)		95% Upper Tolerance Limit of Background Concentrations (UTLs)	
Element	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil
Aluminum	5,508	5,932	1,964	2,183	8,950	12,214
Antimony	ND (3)	ND (3)	ND (3)	ND (3)	3.15 (3)	16 (3)
Arsenic	2.1	2.1 (4)	0.48	0.96 (4)	3.6	4.3 (4)
Barium	100	210	165	199	670	890
Beryllium	0.35 (4)	0.35 (4)	0.13 (4)	0.17 (4)	0.78 (4)	0.73 (4)
Cadmium	ND (3)	ND (3)	ND (3)	ND (3)	0.435 (3)	1.3 (3)
Calcium	5,645	89,410	11,366	64,611	44,800	237,498
Chromium (total)	7.1	5.6	1.3	2.33	10.5	13.3
Cobalt	2.9	2.6 (4)	1.0	1.4 (4)	6.6	4.7 (4)
Copper	6.8	3.8 (4)	4.6	1.97 (4)	18.3	8.3 (4)
Iron	6,458	5,148	1,349	2,262	10,100	13,148
Lead	6.8	4.7	1.6	1.7	12	8.7
Magnesium	1,066	4,260	390	3,856	1,930	19,300
Manganese	139	83	51	50	307	333
Mercury	0.025 (4)	ND (3)	0.016 (4)	ND (3)	0.056 (4)	0.019 (3)
Nickel	5.5	5.9 (4)	1.6	2.41 (4)	11	14.9 (4)
Potassium	1,345	1,222	413	417	2,691	2,512
Selenium	ND (3)	0.47 (4)	ND (3)	0.31 (4)	0.26 (3)	1.1 (4)
Silver	--- (5)	ND (3)	--- (5)	ND (3)	0.4 (5)	2.65 (3)
Sodium	91	351 (4)	10	253 (4)	102	1,227 (4)
Thallium	ND (3)	ND (3)	ND (3)	ND (3)	0.6 (3)	2.65 (3)
Vanadium	14.9	16	2.8	5.2	23.3	32.8
Zinc	15.4	12.1	5.2	4.8	32.2	30.6

(1) All concentrations are in milligrams per kilogram (mg/kg).

(2) From report entitled "Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico" (W-C 1997).

(3) Analytical data were reported as nondetect; therefore, a mean and standard deviation was not calculated. One-half the highest reporting limit is used as the 95% UTL. The actual mean, standard deviation, and UTL may be less than these values.

(4) Values determined from a data set including one-half of the reporting limits for nondetects.

(5) Silver was detected in only one sample; therefore, a mean and standard deviation was not calculated. The single detected concentration is used as the 95% UTL.

TABLE 3-2

FEDERAL- AND STATE-PROTECTED ANIMALS POTENTIALLY OCCURRING IN THE VICINITY OF CANNON AFB (CURRY COUNTY)

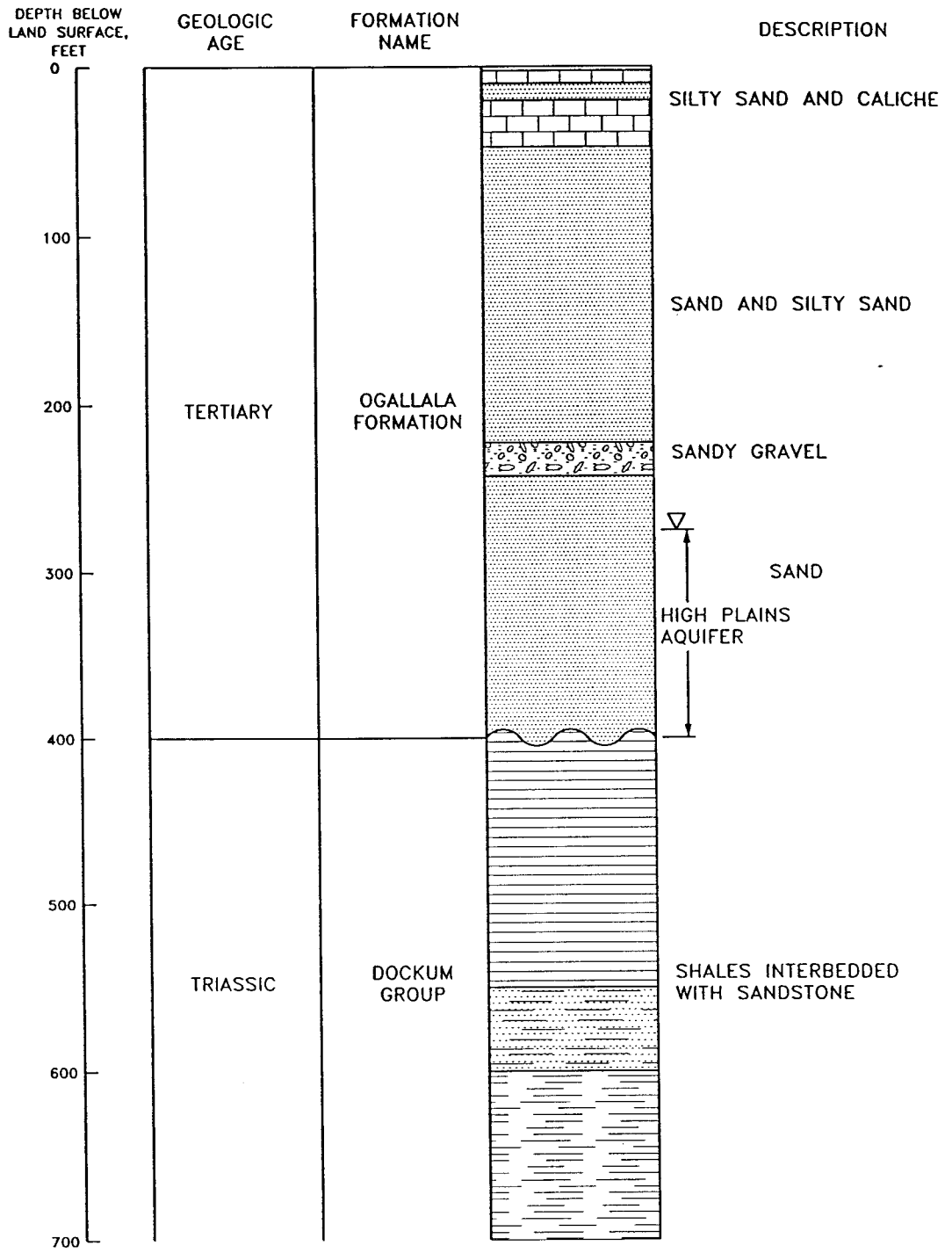
Common Name	Scientific Name	Federal Status	State Status
Birds			
Mississippi kite	*Ictinia mississippiensis*		Endangered (Group 2)
Baird's sparrow	*Ammodramus baridii*		Endangered (Group 2)
Bald eagle	*Haliaeetus leucocephalus*	Endangered	Endangered (Group 2)
Peregrine falcon	*Falco perigrinus*	Endangered	Endangered (Group 1)
Mammals			
Black-footed ferret	*Mustela nigripes*	Endangered	Possibly Extinct

Endangered (Group 1): Species whose prospects of survival or recruitment within the state are in jeopardy

Endangered (Group 2): Species whose prospects of survival or recruitment within the state are likely to become jeopardized in the foreseeable future.

Possibly Extinct: Potentially no longer in existence in the state.

Source: Lee Wan and Associates 1990



LEGEND

LITHOLOGIC CONTACT

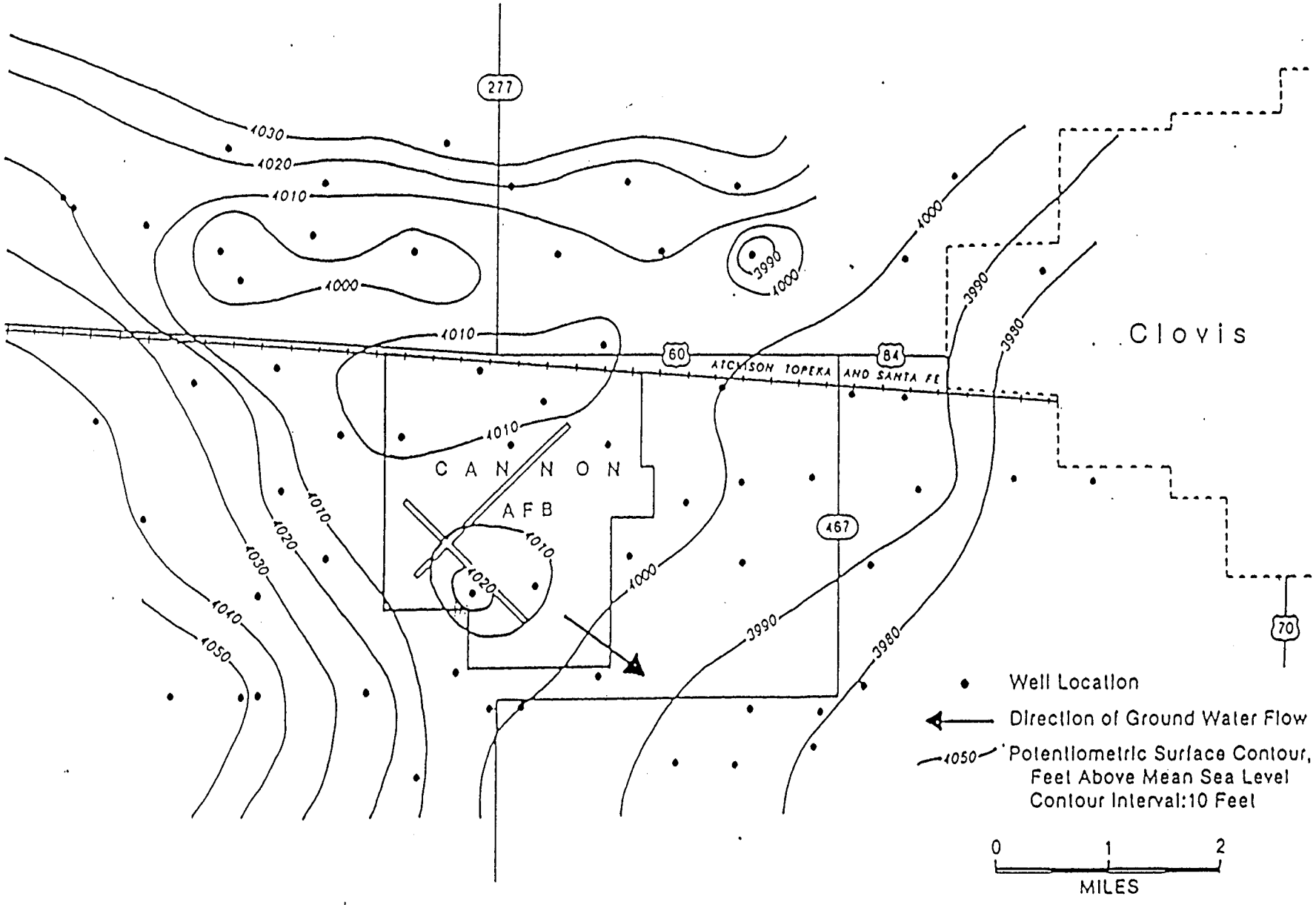
EROSINOAL UNCONFORMITY

WATER LEVEL

SOURCE: MODIFIED FROM GUTENTAG ET.AL., 1984

T:\cannon\m9602cc\T5500\Fig3-1.dgn

DRN BY TSSM	DATE: 04/07/99	GENERALIZED GEOLOGIC STRATA AT CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. No. 3-1
CHK'D BY	REVISION 0			



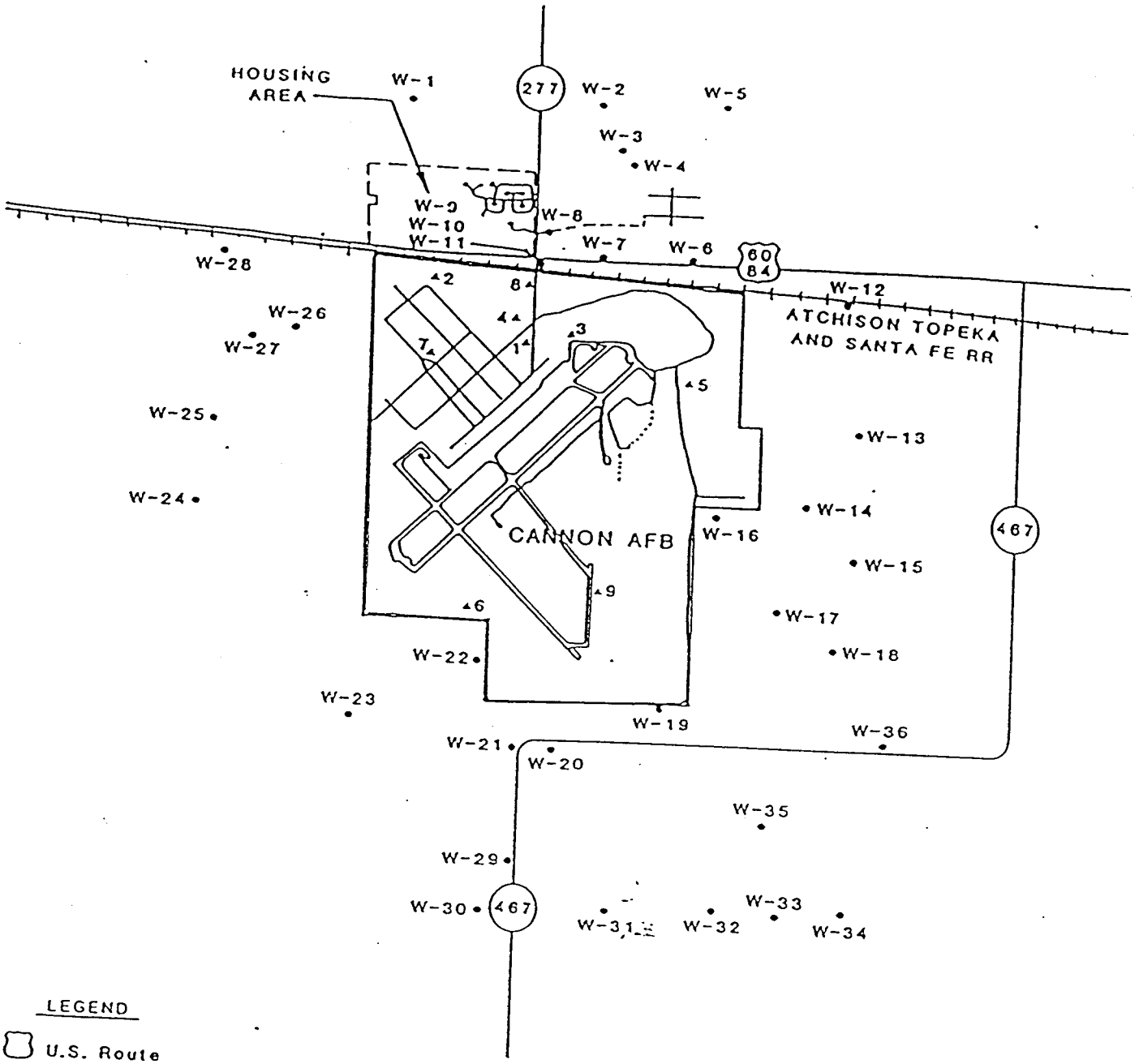
SOURCE: FINAL REPORT, IRP PHASE II

ril 07, 1999 11:46:57 a.m.
awing: T:\CANNON\M9602CC\T5500\FIG3-2.DWG (TSM)

DRN BY TSSM	DATE 04/07/99	POTENTIOMETRIC SURFACE CONTOUR MAP, VICINTY OF CANNON AIR FORCE BASE NEW MEXICO	PROJECT No.	FIG. No.
CHK'D BY	REVISIONS: 0		45FM9602CC.00	3-2

RFI SITE SD-11

REPORT PHASE: PHA



LEGEND

- U.S. Route
- State Route
- Base Water Well
- Vicinity Water Well

1 1/2 0 1 Mile

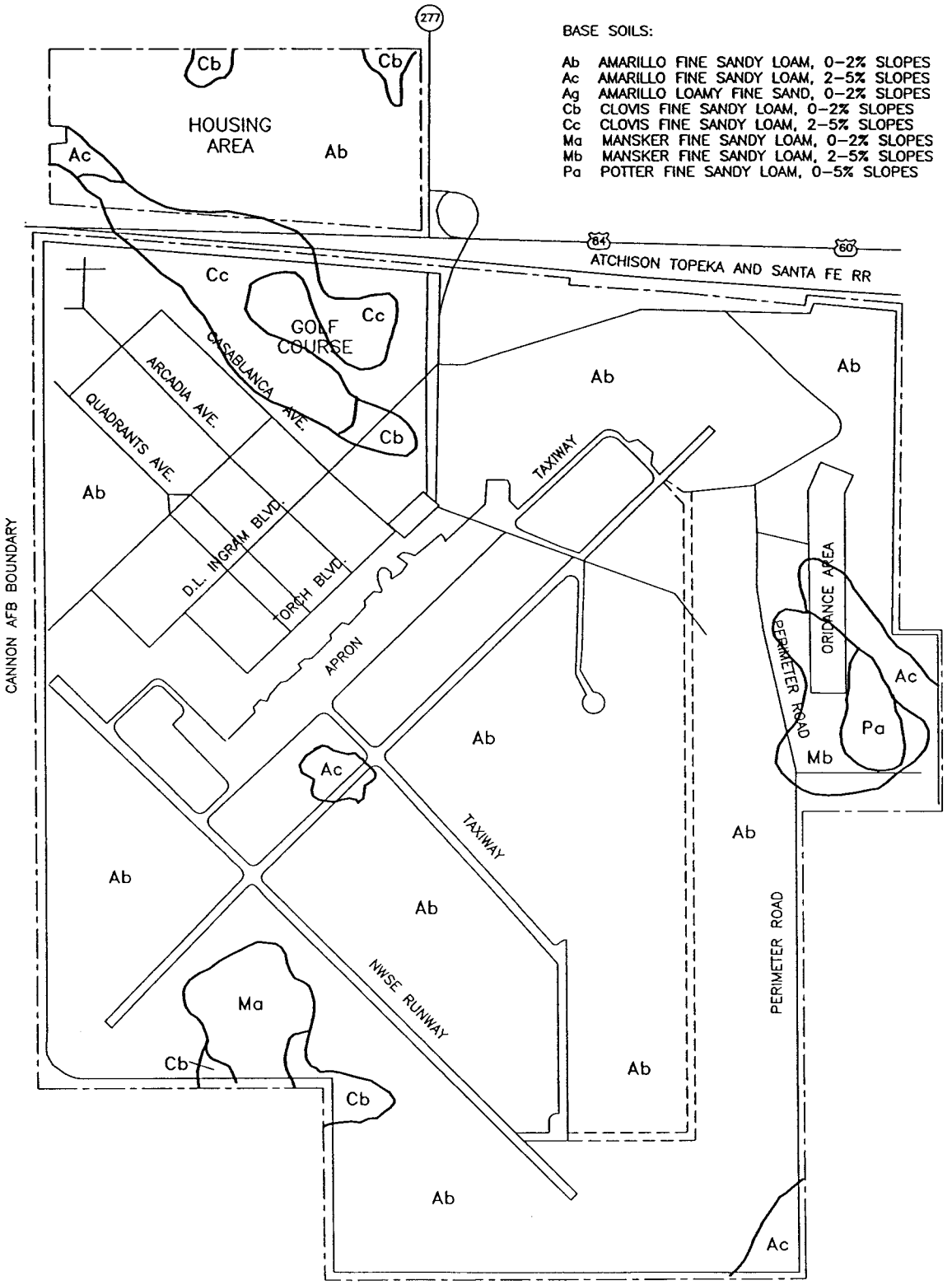
SCALE

SOURCE: MODIFIED FROM BUTENTAG ET. AL., 1984

April 07, 1999 11:47:29 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG3-3.DWG (TSM)

DRN. BY: TSSM	DATE: 04/07/99	WATER WELL LOCATIONS ON AND NEAR CANNON AIR FORCE BASE NEW MEXICO	PROJECT No.	FIG. No.
CHK'D. BY:	REVISIONS: 0		45FM9602CC.00	3-3

REPORT PHASE: PHAS SITE SD-11



SOURCE: USDA-S.C.S., SOIL SURVEY OF CURRY COUNTY N.M., 1958

April 07, 1999 11:47:58 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG3-4.DWG (TSM)

N

2000 1000 0 2000
SCALE IN FEET

DRN. BY: TSSM	DATE: 04/07/99	DISTRIBUTION OF SOILS, BY TYPE CANNON AIR FORCE BASE NEW MEXICO	PROJECT No.	FIG. No.
CHK'D. BY:	REVISIONS: 0		45FM9602CC.00	3-4

Rack near the expansion joint to ascertain the presence and extent of possible contamination at this point. Small piles of stained soil observed at this location suggested that oily soils were deposited there. Boring 03104 was located about 10 feet southwest of Boring 03103, just off the edge of the AGE pad. No surface staining was evident at this site.

Soil samples were collected from 0- to 0.5-foot, 1.5- to 3.5-foot, 4- to 6-foot, and 8- to 10-foot depth intervals in Borings 03101 and 03102 and from the 0.5- to 2-foot, 2- to 4-foot, and 8- to 10-foot depth intervals in Borings 03103 and 03104. Target analytes included volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), target analyte list (TAL) metals, and total recoverable petroleum hydrocarbons (TRPH). SVOCs were analyzed only at the surface samples and at selected depth intervals to allow for risk assessment. Surficial samples from the 0- to .5-foot interval were collected in areas of soil cover from the 0.2- to 0.5-foot depth interval to provide a worst-case situation for risk assessment purposes if SVOC contamination was found in these samples. In areas of pavement or concrete surfaces, soil sampling began immediately below the pavement/soil contact. Chemical results are summarized in Tables 4-1 and 4-2.

Tetrachloroethene (PCE) was detected at low concentrations in Boring 03103 at the surface. Anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, carbazole, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, phenanthrene, and pyrene were detected in samples from the surface of Boring 03101, 03102, and 03103 at the surface and in Boring 03102 at 3.5 feet. Antimony, barium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, and zinc were detected above background in surface and subsurface samples to 10 feet in one or more of the borings for the Phase I RFI (W-C 1994a). Asphalt present may be the source of polycyclic aromatic hydrocarbons (PAHs) and metals. Barium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, cadmium, chromium, chrysene, indeno(1,2,3-cd)pyrene, lead, and petroleum hydrocarbons exceeded the risk screening criteria. These results are summarized on Figure 4-3.

Phase II RFI

Three soil borings were drilled and soil samples collected at the AGE Maintenance Shop Pad (W-C 1995c). One boring was drilled near the location of the wash rack (Boring 3107), one boring was drilled in a grassy area northeast of the wash rack (Boring 3105), and one boring was drilled at the bottom of a shallow drainage swale northeast of the wash rack (Boring 3106) (Figure 4-2). The borings were drilled to a total depth of 10 feet. The boring locations were chosen to further assess the lateral and vertical presence and extent of site-related soil contaminants at the 10-foot depth interval. Samples were analyzed for VOCs, SVOCs, TAL metals, and TRPH.

A summary of the detected chemicals for the Phase II RFI soil samples is provided on Figure 4-3 and in Table 4-3. Other than acetone, which was qualified nondetect after it was determined to be laboratory contamination, the only VOC reported in near-surface soil samples was total xylenes at a concentration of 130 µg/kg. Several SVOC compounds, mostly PAHs, were reported for all three near-surface samples. Total PAHs were detected at concentrations of 7,903 µg/kg (Boring 3105), 18,265 µg/kg (Boring 3106) and 25,450 µg/kg (Boring 3107). Other

4.1 SITE DESCRIPTION

The AGE Maintenance Shop Pad is an open concrete area adjacent to the southeast side of the AGE Maintenance Shop, located in Building No. 186 (Figure 4-1). The pad is approximately 60 to 70 feet wide and 240 to 280 feet long. A wash rack occupies an area about 45 feet square beyond the southeast edge of the pad. The AGE Drainage Ditch (SWMU No. 34), investigated in the Appendix I RI (W-C 1993b), lies to the southeast of the maintenance pad and carries runoff to the northeast.

4.2 SITE HISTORY

Use of the maintenance pad began in 1971. Water from washing and surface or storm water, potentially contaminated with JP-4, oils, and diesel fuel, flowed off the pad to the southeast. The Appendix I RI investigation of soils lining the AGE Drainage Ditch, southeast of the AGE pad, found negligible to nondetectable levels of target contaminants in the soils sampled. Subsequent to the Appendix I RI, Phase I and Phase II RFIs were completed as discussed below.

4.3 CURRENT USE

Maintenance on aeronautical ground equipment is performed in Building No. 186 and on the south and east sections of the pad. The wash rack (not a target of this investigation) is frequently used to wash and clean support vehicles and equipment. The wash rack is drained separately to an adjacent oil/water separator (OWS) which was a part of the Appendix II investigation. This OWS was removed and replaced with a new one in February 1997. A portion of the drainage from the pad reportedly flows into a sand trap at the northwest corner of the wash rack. This sand trap reportedly empties into the OWS.

4.4 PREVIOUS INVESTIGATIONS

Phase I RFI

Four 10-foot soil borings were drilled and soil samples collected during the Phase I RFI (W-C 1994a) in areas where wash-down water from the maintenance pad enters the AGE ditch and along expansion joints or cracks in the maintenance pad to determine if a release of SWMU-related chemicals posing a hazard to human health or the environment had occurred at these points. The Phase I boring locations and numbers are shown on Figure 4-2. Boring 03101 was drilled in a slight drainage channel entering the AGE ditch to sample the effect maintenance pad runoff may have on the soil at this location. Surface soils at this location were discolored and vegetation within the channel appeared distressed. Since this drainage ditch receives runoff from areas other than the AGE Maintenance Shop, other sources may be contributing contaminants to this sample location. Boring 03102 was drilled in an area of soil cover near the AGE ditch to determine the presence and the lateral extent of potential contaminants in soils at this point. Soils at this location did not appear contaminated and vegetation appeared normal. The high density of buried utilities under the maintenance pad forced the relocation of two borings from the pad itself to nearby sites. Boring 03103 was located just off the slab to the west of the Wash

SVOCs detected in near-surface soil samples were bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, carbazole, dibenzofuran, and 4-methylphenol. Petroleum hydrocarbons were detected at concentrations of 696 mg/kg, 914 mg/kg, and 2,500 mg/kg in near-surface soil samples from Borings 3105, 3106, and 3107, respectively. Asphalt present may be the source of PAHs and metals.

Other than acetone, which was qualified nondetect after it was determined to be laboratory contamination, the only VOC reported in subsurface soil samples was toluene at concentrations of 5.5 µg/kg (estimated) and 4.9 µg/kg (estimated) in Boring 3107. Only one SVOC compound (fluoranthene) was reported for any of the subsurface samples (Boring 3107 at a concentration of 120 µg/kg, estimated). Petroleum hydrocarbons were not reported in any of the subsurface samples.

The maximum concentrations of cadmium, chromium, cobalt, copper, lead, manganese, nickel, and zinc exceeded background levels for the Phase II RFI (W-C 1995b).

TRPH was also addressed in the previous investigations. The maximum detected Phase I and Phase II concentrations (4,070 mg/kg and 2,500 mg/kg, respectively) exceeded the New Mexico Environment Department (NMED) action levels of 520 mg/kg. These locations are shown on Figure 4-3. The NMED action levels of 500 mg/kg for benzene, toluene, ethylbenzene, and xylenes (BTEX) and 10 mg/kg for benzene individually were not exceeded.

4.5 HUMAN HEALTH RISK EVALUATION

4.5.1 Site Conceptual Exposure Model

The site conceptual exposure model (SCEM) is a schematic representation of the contaminant source areas, chemical release mechanisms, environmental transport media, potential human intake routes, and potential human receptors. A SCEM should identify complete exposure pathways that may result in human health risks and indicate the data needed to evaluate those pathways. An exposure pathway consists of four necessary elements:

- A source and mechanism of chemical release to the environment
- An environmental transport medium for the released chemical (e.g., air, groundwater, or surface water)
- A point of potential human exposure to transported chemicals (e.g., a domestic drinking water well)
- A human intake mechanism (e.g., inhalation or ingestion) at the point of exposure

All four elements must be present for an exposure pathway to be complete and for chemical exposure to occur. In the SCEM, potentially complete exposure pathways are indicated with solid lines; minor (insignificant) pathways are indicated with dashed lines. Figure 4-4 presents the SCEM for SWMU 31.

The primary source at SWMU 31 (the AGE Maintenance Shop Pad) is waste fluids (e.g., fuels, oils, and solvents) that have leaked or been spilled on the pad and the surrounding surface soil. Chemicals from the primary source may be transported away from the primary source areas, affecting other media that may in turn act as secondary sources. Mixing and infiltration of the wastes with the soil are shown as the primary chemical release mechanisms. Subsurface soils are an important secondary source of potential chemical release. Site-related chemicals in soils may infiltrate/percolate through the soil and be released to groundwater.

Other release mechanisms, such as direct contact (soil and dermal contact), surface runoff, wind erosion, or volatilization to the atmosphere, are also depicted in the SCEM. Transport by storm runoff is not considered a significant pathway for human exposure at SWMU 31 because runoff settles in the low spots located on the southeast side of the SWMU, but is not transported off-site.

Potential receptors at SWMU 31 include occupational receptors, hypothetical future construction workers, and hypothetical trespassers. SWMU 31 is located in the industrial area of the Base (Figure 1-2); therefore, residential development is not a likely future land use. Surface soil (upper 2 feet of soil column) and air emissions (particulate) from surface soil may provide exposures to occupational receptors and hypothetical trespassers. Surface soil, subsurface soil, and air emissions (volatile and particulate) may provide exposures to hypothetical future construction workers during excavation activities.

Groundwater is used for domestic purposes on and off Base. However, potential groundwater exposures were not evaluated because fate and transport modeling indicates that groundwater will not be impacted (see Section 4.7).

In summary, the potentially complete human exposure pathways at SWMU 31 are:

Occupational Receptors

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

Hypothetical Construction Workers

- Ingestion of subsurface and surface soil
- Dermal Contact with subsurface and surface soil
- Inhalation of volatile emissions and airborne particulate matter from subsurface and surface soil

Hypothetical Trespassers

- Ingestion of surface soil
- Dermal Contact with surface soil

- Inhalation of airborne particulate matter from surface soil

4.5.2 Site Classification

Site classification is a prioritization step that is used to judge the urgency of the need for initial response actions and maximizes the effectiveness of limited resources. There are four classes of sites (ASTM 1996):

Class 1: Immediate threat to human health and safety or sensitive environmental receptors

Class 2: Short-term threat to human health and safety or sensitive environmental receptors

Class 3: Long-term threat to human health and safety or sensitive environmental receptors

Class 4: No demonstrable threat to human health and safety or sensitive environmental receptors

This site presents no explosive threat and contains no free product, no surface water, and no groundwater discharges. There are no public facilities (i.e., daycares, parks, schools, dwellings) located on or near the site. The nearest potable groundwater aquifer is more than 250 feet bgs. Additionally, access to soils is limited primarily to Base personnel. Therefore, SWMU 31 was considered to be a Class 4 site.

4.5.3 Background Comparison

Metals are natural constituents of soils and water. Metals that occur in concentrations within background levels are not considered site-related chemicals of concern and are not evaluated further. To determine if the concentrations of metals detected in surface and subsurface soil at SWMU 31 exceeded background concentrations, the maximum detected concentrations at the site were compared to the calculated background UTLs. The UTLs used in this comparison were calculated as part of the background study for Cannon AFB (W-C 1997). Maximum detected concentrations from surface soils were compared to surface soil UTLs. Maximum detected concentrations from subsurface soils were compared to subsurface UTLs. If the maximum detected concentration exceeded the background UTL, the metal was considered to exceed background and was evaluated in the Tier 1 screen.

Four samples from the Phase I investigation (CAN031-0311-0002, CAN031-0312-0002, CAN031-0313-0002, CAN031-0314-0002) are shown in Table 4-1 as near surface samples. However, these four samples were collected at 1.5 to 3.5 feet below ground surface. Therefore, they were considered to be subsurface samples for purposes of this risk evaluation.

Surface Soil

The maximum detected surface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, nickel, sodium, and zinc were considered to exceed background levels. All other metals were considered to be within background levels. Table 4-4 summarizes the comparison and a discussion is given below.

Three of seven surface soil samples contained aluminum at concentrations (ranging from 9,230 mg/kg to 10,200 mg/kg) which exceeded the background UTL of 8,950 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

Three of seven surface soil samples contained arsenic at concentrations (ranging from 3.7 mg/kg to 4.6 mg/kg) which exceeded the background UTL of 3.6 mg/kg. Therefore, arsenic was considered to exceed background levels and was evaluated further.

Two of seven surface soil samples contained barium at concentrations (ranging from 716 mg/kg to 1,460 mg/kg) which exceeded the background UTL of 670 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

Six of seven surface soil samples contained cadmium at concentrations (ranging from 0.85 mg/kg to 8.7 mg/kg) which exceeded the background UTL of 0.435 mg/kg. Therefore, cadmium was considered to exceed background levels and was evaluated further.

Two of seven surface soil samples contained calcium at concentrations (ranging from 48,600 mg/kg to 173,000 mg/kg) which exceeded the background UTL of 44,800 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

Five of seven surface soil samples contained chromium at concentrations (ranging from 11.3 mg/kg to 130 mg/kg) which exceeded the background UTL of 10.5 mg/kg. Therefore, chromium was considered to exceed background levels and was evaluated further.

Two of seven surface soil samples contained cobalt at concentrations (ranging from 7.6 mg/kg to 22.2 mg/kg) which exceeded the background UTL of 6.6 mg/kg. Therefore, cobalt was considered to exceed background levels and was evaluated further.

Four of seven surface soil samples contained copper at concentrations (ranging from 18.8 mg/kg to 10,700 mg/kg) which exceeded the background UTL of 18.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

One of seven surface soil samples contained iron at a concentration (10,600 mg/kg) which exceeded the background UTL of 10,100 mg/kg. Therefore, iron was considered to exceed background levels and was evaluated further.

Seven of seven surface soil samples contained lead at a concentration (ranging from 20.7 mg/kg to 2,130 mg/kg) which exceeded the background UTL of 12 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

Four of seven surface soil samples contained magnesium at concentrations (ranging from 2,310 mg/kg to 5,230 mg/kg) which exceeded the background UTL of 1,930 mg/kg. Therefore, magnesium was considered to exceed background levels and was evaluated further.

Two of seven surface soil samples contained nickel at concentrations (ranging from 15.8 mg/kg to 1,610 mg/kg) which exceeded the background UTL of 11 mg/kg. Therefore, nickel was considered to exceed background levels and was evaluated further.

One of seven surface soil samples contained sodium at a concentration (193 mg/kg) which exceeded the background UTL of 102 mg/kg. Therefore, sodium was considered to exceed background levels and was evaluated further.

Six of seven surface soil samples contained zinc at concentrations (ranging from 44.7 mg/kg to 479 mg/kg) which exceeded the background UTL of 32.2 mg/kg. Therefore, zinc was considered to exceed background levels and was evaluated further.

Subsurface Soil

The maximum detected subsurface soil concentrations of metals were compared to background concentrations (W-C 1997). Barium, calcium, copper, lead, and zinc were considered to exceed background levels. All other metals were considered to be within background levels. Table 4-5 summarizes the comparison and a discussion is given below.

One of eighteen subsurface soil samples contained barium at a concentration (1,130 mg/kg) which exceeded the background UTL of 890 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

Two of eighteen subsurface soil samples contained calcium at concentrations (ranging from 288,000 to 289,000 mg/kg) which exceeded the background UTL of 237,498 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

One of eighteen subsurface soil samples contained copper at a concentration (10.9 mg/kg) which exceeded the background UTL of 8.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

One of eighteen subsurface soil samples contained lead at a concentration (22.3 mg/kg) which exceeded the background UTL of 8.7 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

One of eighteen subsurface soil samples contained zinc at a concentration (33.5 mg/kg) which exceeded the background UTL of 30.6 mg/kg. Therefore, zinc was considered to exceed background levels and was evaluated further.

Comparison of Site Essential Nutrient Concentrations to RDAs

The maximum detected concentrations of essential nutrients which exceeded background and which do not have EPA Region VI MSSLs established for them were compared to the recommended daily allowances (RDAs) set by the National Research Council.

At SWMU 31, calcium, magnesium, and sodium were compared to the RDAs. Table 4-6 shows that the maximum detected concentrations of calcium, magnesium, and sodium did not cause estimated potential site daily intake to exceed the RDAs. Therefore, these inorganics would not pose a human health risk and were not evaluated further.

4.5.4 Tier 1 Evaluation

The Tier 1 evaluation involves the comparison of the maximum detected site concentrations to conservative, nonsite-specific, risk-based screening levels to determine whether site conditions satisfy the criteria for a quick regulatory closure or warrant a more site-specific evaluation.

Chemicals of Potential Concern

COPCs were identified based on the chemical analytical data (both historic and current) presented in Tables 4-1, 4-2, and 4-3. Metals which exceeded background levels and RDAs and all detected organic compounds (except those considered to be laboratory contaminants) were evaluated as COPCs. TRPH was not considered to be a COPC because it is a complex chemical mixture with varying constituents. Therefore, individual constituents (e.g., BTEX, PAHs, etc.) were used to evaluate potential impacts from TPH at SWMU 31.

Tier 1 Comparison

Maximum detected concentrations of COPCs were compared to the EPA Region VI Residential MSSLs. The comparison is shown in Table 4-7. The table shows that benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, chromium, and lead exceeded the Tier 1 values. Therefore, these compounds were considered to be chemicals of concern (COCs) at SWMU 31.

4.5.5 Tier 2 Evaluation

The Tier 2 evaluation provides an option to determine the target levels for the COCs identified in the Tier 1 comparison. This step uses site-specific information related to exposure parameters and soil properties to develop site-specific target levels (SSTLs).

At SWMU 31, the SSTL(s) were calculated using the RBCA Tool Kit for Chemical Releases developed by Groundwater Services, Inc. (GSI 1999). The site-specific information used to develop the SSTL included the assumption of a commercial and construction worker exposure scenarios. Tier 1 values assumed residential exposure which is highly conservative for SWMU 31. SWMU 31 is located in an industrial area of the Base and is part of the active AGE Maintenance Shop. Therefore, industrial exposures are more appropriate for this site. The following exposure assumptions were used to calculate the SSTL for COCs at SWMU 31.

An exposure frequency of 60 days per year was assumed for the commercial worker scenario. Although SWMU 31 is an active facility, the type of work performed on site does not require regular contact with soil and the area is predominantly covered by concrete. Therefore, worker exposures to contaminated soils are very limited. Additionally, the site does not require significant ground maintenance/landscaping because of the concrete ground cover. Therefore, the assumption of 60 days per year (5 days per month) is conservative and provides protection for Base workers. Standard default values were used for all other exposure parameters. Appendix C shows all the input parameters and assumptions used to calculate the SSTLs at SWMU 31.

The SSTLs for COCs at SWMU 31 and their maximum detected concentrations are shown below.

COCs	SSTLs	Maximum Concentrations
Benzo(a)anthracene	4.3 mg/kg	2.4 mg/kg
Benzo(a)pyrene	0.43 mg/kg	2.7 mg/kg
Benzo(b)fluoranthene	1.3 mg/kg	5.6 mg/kg
Dibenzo(a,h)anthracene	3.7 mg/kg	0.63 mg/kg
Indeno(1,2,3-cd)pyrene	4.3 mg/kg	2.3 mg/kg
Arsenic	16 mg/kg	4.6 mg/kg
Chromium	3100 mg/kg	130 mg/kg

The maximum detected concentrations for benzo(a)pyrene and benzo(b)fluoranthene exceed their SSTLs. All other COCs were below their SSTLs.

Lead does not have an EPA-established toxicity factor; therefore, an SSTL could not be calculated for it. However, EPA Region VI recommends a value of 2,000 mg/kg of lead for industrial soils. The maximum detected concentration of lead at SWMU 31 (930 mg/kg) does not exceed the industrial MSSL value.

Detections that exceeded SSTLs included benzo(a)pyrene in three surface soil samples and benzo(b)fluoranthene in one surface soil sample. Concentrations of these two COCs decreased with depth to nondetect in all soil borings (see Figure 4-3). The maximum concentrations of these COCs used for comparisons to SSTLs were those detected in samples collected during the Phase I RFI (W-C 1994a) and used in the Baseline Risk Assessment (W-C 1994b). The Baseline Risk Assessment (BRA) included both human health and ecological risk evaluations and concluded that the risk was within USEPA acceptable levels. The BRA is included with Appendix C.

4.5.6 Tier 3 Evaluation

Noncarcinogenic hazards and carcinogenic risks to occupational workers, hypothetical future construction workers, and hypothetical future trespassers were estimated in the Tier 3 evaluation. The concentrations of antimony, barium, cadmium, chromium, copper, lead, and zinc exceeded background and were considered chemicals of concern in soil. All detected organic chemicals were also retained as chemicals of concern in soil.

The total hazard index calculated for noncarcinogenic health effects for the average and RME for construction worker exposure was 0.0001 and 0.001, respectively. Neither hazard index exceeds 1.0, which indicates that no adverse health effects are anticipated. The estimated lifetime excess cancer risk under the assumed occupational exposure scenario was 2E-08 and 5E-06, respectively. The risks are within or below the USEPA target risk range of 1E-06 to 1E-04.

"The total hazard index calculated for noncarcinogenic health effects for the average and RME for construction worker exposure was 0.0001 and 0.001, respectively. Neither hazard index

exceeds 1.0, which indicates that no adverse health effects are anticipated. The estimated lifetime excess cancer risk under the assumed occupational exposure scenario was 3E-09 and 6E-08, respectively. The risks are below the USEPA target risk range of 1E-06 to 1E-04.

The total hazard index calculated for noncarcinogenic health effects for the average and RME for the hypothetical future trespasser scenario was 0.00003 and 0.005, respectively. Neither hazard index exceeds 1.0, which indicates that no adverse health effects are anticipated. The estimated lifetime excess cancer risk under the assumed occupational exposure scenario was 4E-09 and 3E-07, respectively. The risks are below the USEPA target risk range of 1E-06 to 1E-04.

4.6 ECOLOGICAL RISK EVALUATION

Certain nondomesticated plants and animals will occur, at least at times, in almost any area that is outdoors, regardless of the absence of "natural" habitat and/or the omnipresence of human activity and artificial structures (buildings, pavement). Thus, strictly speaking, virtually any area outside of a building might include "habitat for ecological receptors." Such essentially artificial habitats are not, however, considered *directly* ecologically relevant because they exist and are configured to support human (industrial) functions. Understanding the concept of "direct ecological relevance" is very important in assessing ecological risk at an active military site.

The initial step in ecological evaluation of a site is determining whether the unit has an *ecological component*. This determination is based on the availability, within the subject unit, of *habitat*. Simply defined, the term habitat means the "place where a plant or animal lives" (USACE 1996; USEPA 1997a), but a more functional definition can be paraphrased as the *type of environment* where an organism (or community of similarly adapted organisms) *normally* lives. If no ecological components are identified, it is concluded that the unit is not of potential ecological concern and no further ecological evaluation is warranted. It is not believed that individual organisms that are occasionally present constitute an ecological component because individuals (unless accorded official protection as endangered or threatened) are not appropriate as assessment endpoints for an ecological risk assessment. As stated by USEPA (1997a), "Ecological effects of most concern are those that can impact populations (or higher levels of biological organization)." By definition, an occasional individual does not constitute a population, nor would any effects on an occasional individual be expected to translate into an effect on a population.

SWMU 31 is a very small area associated with the AGE Maintenance Shop (Building No. 186). The area under investigation does contain a very limited area of manicured grass (lawn). The limited size of the area, coupled with the limited ecological value of lawn areas, suggests that no ecological community is present and, at best, only a few individuals of even the smallest organisms are present. Based on this, SWMU 31 does not contain any significant ecological component such that a formal ecological risk assessment is warranted.

4.7 VADOSE ZONE FATE AND TRANSPORT MODELING

Because chemicals were detected in soil above residential MSSLs at SWMU 31, the fate and transport of contaminants in the vadose, or unsaturated, zone was modeled to evaluate the potential for contaminants in soil to be transported to underlying groundwater. The following provides a brief description of the modeling effort and presents model-predicted concentrations for SWMU 31.

4.7.1 Description of Modeling Effort

The mathematical models HELP and MULTIMED were applied to a conceptual vadose zone model developed for SWMUs 31, 77, and 127, all of which had chemicals detected above MSSLs and which have similar geology and site conditions. The HELP model was used to estimate a net infiltration rate for input into MULTIMED. MULTIMED was then used to model contaminant migration through the vadose zone to the water table.

MULTIMED was run for each chemical detected above MSSLs under steady-state, pulse source, and source decay conditions while considering both sorption and sorption/biodegradation as attenuation mechanisms. Results were used to calculate attenuation factors (AFs) and dilution-attenuation factors (DAFs) which can then be used to predict concentrations, respectively, at the bottom of the unsaturated zone and at the water table after initial mixing in groundwater.

Appendix D provides a detailed description of the modeling approach, model documentation, input parameters, and model output for SWMUs 31, 77, and 127.

4.7.2 Model-Predicted Concentrations

Initial leachate concentrations were calculated for each chemical detected in soil above MSSLs at SWMU 31 using the following equilibrium partitioning equation from the Soil Screening Technical Background Document (USEPA 1996):

$$Cs = Cw \cdot \left[Kd + \frac{\theta w + \theta a \cdot H'}{\rho b} \right]$$

In the above equation, Cw is the initial leachate concentration (mg/L) and Cs is the maximum detected soil concentration (mg/kg) at the SWMU. Kd is the distribution coefficient (L/kg or mL/g), θw is the water-filled soil porosity, θa is the air-filled soil porosity, H' is the dimensionless Henry's law constant, and ρb is the dry bulk density (kg/L, g/mL, or g/cm^3). For organic compounds, Kd is the product of the normalized organic carbon distribution coefficient, Koc, and fraction organic carbon content, foc. Porosity and bulk density are taken from the HELP layer 1 (sandy clay loam) at field capacity. Values for Koc, Kd, and H' are taken from USEPA 1996. Other values are the same as used in the MULTIMED model. Calculations for each chemical are shown in Table 4-8.

AFs and DAFs for each chemical and type of model run were then applied to these initial leachate concentrations. The results of this analysis are shown in Table 4-9. Predicted concentrations that exceed USEPA Region VI tap water MSSLs or MCLs are shaded.

For all modeled chemicals (SVOCs and metals), predicted concentrations for steady-state, nontransport decay analyses, are above tap water MSSLs and/or MCLs. However, in general, both organic and inorganic contaminant source mass is expected to decrease over time due to such processes as sorption (organic/inorganic), volatilization (organic), biodegradation (organic), precipitation (inorganic), and ion exchange (inorganic). Therefore, the assumption of a constant, infinite source (i.e., steady-state) is believed to be unrealistic and overly conservative. The results for other analyses are discussed further.

As shown in Table 4-9 for SVOCs (PAHs), predicted concentrations for sorption-only analyses (plus dispersion) are usually at least one order of magnitude, or ten times, below the tap water MSSL. When biodegradation is also considered, predicted concentrations are zero.

Analyses for metals do not consider biodegradation. In addition, converse to results for organic compounds, the use of a 100-year pulse source results in a greater source mass (and lower AFs/DAFs) than the use of a decaying source due to the increase in half-life from 10 years for SVOCs to 100 years for metals. For chromium and lead, predicted concentrations are below the tap water MSSL or MCL. However, for arsenic, the pulse source analysis results in predicted concentrations at the bottom of the vadose zone of one order of magnitude above (4.3×10^{-4} mg/L) and at the water table after initial mixing of groundwater of slightly above (6.0×10^{-5} mg/L) the tap water MSSL (4.5×10^{-5} mg/L). Although the program would not compute a saturated zone concentration, results are similar for the decaying source analysis.

The distribution coefficient values used for both arsenic and chromium are based on the most mobile species of those metals, 3+ and 6+, respectively. For arsenic, if a distribution coefficient of 50 ml/g rather than 29 ml/g is used to account for the presence of the less mobile 5+ species, the initial leachate concentration is 0.092 mg/L, the concentration at the bottom of the vadose zone is 1.5×10^{-4} mg/L, and the concentration at water table after initial mixing is 2.0×10^{-5} mg/L, which is slightly less than the tap water MSSL of 4.5×10^{-5} mg/L.

4.7.3 Assumptions and Limitations

The results of the vadose zone contaminant fate and transport modeling at SWMUs 31, 77, and 127 and predicted concentrations at each SWMU are based on a conservative, analytical approach with many simplifying assumptions. These assumptions and limitations are described in Appendix D. However, to summarize, the implementation of a more complex, numerical model (e.g., typical for RBCA Tier 3) would most likely produce results that are more representative of actual flow and transport processes that presumably occur at SWMUs 31, 77, and 127, due to its semiarid climate. These processes include the effects of capillary forces and soil hysteresis. The use of a numerical model might even result in lower predicted concentrations at the water table for similar assumed source conditions.

4.7.4 Summary of Results

The results of the vadose zone fate and transport modeling for SWMU 31, assuming sorption, dispersion, and biodegradation occurs, indicate that chemicals of concern will not reach groundwater above tap water screening levels.

4.8 VOLUNTARY CORRECTIVE MEASURE IMPLEMENTATION

Concentrations of benzo(a)pyrene and benzo(b)fluoranthene exceeded the SSTLs in surface samples collected from soil boring SB 3101. In addition, there were elevated levels of TRPH, lead, and chromium. In February 1999, a backhoe was used to remove contaminated soil from a 10-foot by 5-foot by 2-foot deep excavation around this soil boring (Foster Wheeler 1999, Appendix E). Confirmation samples collected from the excavation area indicated that contaminated soils had been removed. The excavation was then backfilled with clean fill.

4.9 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVE

Results of the human health and ecological risk evaluations indicate that there is no unacceptable risk to human health and the environment based on the maximum detected concentrations of chemicals of concern in soil at SWMU 31. Furthermore, results of vadose zone fate and transport modeling, assuming sorption, dispersion, and biodegradation occurs, show that chemicals of concern will not reach groundwater above allowable concentrations for tap water. In addition, through a voluntary corrective measure implementation, soil containing those maximum concentrations, were removed. Therefore, the "No Further Action" alternative was evaluated based on the criteria listed in Section 2.3 and as outlined in the CMS Work Plan (W-C 1998).

1. Technical
   - Performance – the No Further Action alternative is effective at being protective of human health and the environment over extended periods of time. This has been demonstrated through Tier I and Tier II human health and ecological risk evaluations, a baseline risk assessment, and fate and transport modeling.
   - Reliability – the No Further Action alternative does not require any operation or maintenance activities and has been proven to be effective before for similar sites and conditions.
   - Implementability – the No Further Action alternative is easy to implement and will meet or exceed applicable standards.
   - Safety – the No Action Alternative poses no threat to the safety of nearby workers.
2. Human Health
   - The No Further Action alternative was determined following the Risk-Based Corrective Action (RBCA) process as outlined in ASTM E1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release sites.

- Maximum concentrations of most chemicals of concern left in place are less than conservative Tier I EPA Region VI Media-Specific Screening Levels (MSSLs) and calculated Tier II Site-Specific Target Levels (SSTLs).
- Those chemicals of concern that exceeded SSTLs were only in surface soil samples. The maximum concentrations of these chemicals were used in a baseline risk assessment that concluded there was no unacceptable risk; however, soils containing these maximum concentrations were removed anyhow.

3. Environmental
   - No valued ecological resources are present.
4. Cost
   - The No Further Action alternative is protective of human health and the environment and at the lower cost.

TABLE 4-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE I FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0311-0000			CAN031-0311-0002			CAN031-0312-0000			CAN031-0312-0002		
LAB SAMPLE NUMBER	0311830016SA			0311830017SA			0311830010SA			0311830011SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Tetrachloroethene										<	5.6	U
Semivolatile Organics (µg/kg)												
Anthracene	600	4100	J							<	370	U
Benzo(a)anthracene	2400	4100	J							<	370	U
Benzo(a)pyrene	2700	4100	J							<	370	U
Benzo(b)fluoranthene	5600	4100								65	370	J
Benzo(g,h,i)perylene	2600	4100	J							<	370	U
Carbazole	500	4100	J							<	370	U
Chrysene	3100	4100	J							<	370	U
Fluoranthene	5600	4100								55	370	J
Indeno(1,2,3-cd)pyrene	2300	4100	J							<	370	U
2-Methylnaphthalene	<	4100	U							45	370	J
Phenanthrene	3200	4100	J							44	370	J
Pyrene	4600	4100								44	370	J
Metals (mg/kg)												
Aluminum	5660	12.5		4160	24.1		4260	10.5		5430	11.2	
Antimony 7	1.9	7.5	J	<	14.4	U	<	6.3	U	<	6.7	U
Arsenic	3.2	0.62		2.3	0.6		2.4	0.52		2.9	0.56	
Barium	1460	1.2	J	120	2.4	J	166	1	J	201	1.1	J
Beryllium 150	0.36	0.25		0.26	0.48	J	0.22	0.21		0.27	0.22	
Cadmium	8.7	0.62		<	1.2	U	0.85	0.52		0.63	0.56	
Calcium	6270	25		205000	48.1		48600	20.9		94400	22.3	
Chromium	130	1.2		4.2	2.4		9.9	1	J	8	1.1	J
Cobalt	3.4	1.2		2.3	2.4	J	2.6	1		3.2	1.1	

NOTE: Results presented here are chemicals which were detected at least once in near-surface soils at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A of the RFI report.
J = Estimated value below reporting limit or estimated based on data quality criteria.
U = Not detected
Qual = Qualification
RL = Reporting Limit

Metals (mg/kg), cont.												
Copper	61.4	2.5		2.7	4.8	J	9.3	2.1		10.9	2.2	

TABLE 4-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE I FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0311-0000			CAN031-0311-0002			CAN031-0312-0000			CAN031-0312-0002		
LAB SAMPLE NUMBER	0311830016SA			0311830017SA			0311830010SA			0311830011SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	7150	12.5		3290	24.1		5570	10.5		6420	11.2	
Lead	930	125		3.5	1.2		46.9	5.2		22.3	5.6	
Magnesium	1150	25		2450	48.1		1810	20.9		2210	22.3	
Nickel	7.2	5		4.9	9.6	J	5.8	4.2		6.9	4.5	
Potassium	867	625	UJ	666	1200	J	1100	523		954	558	
Selenium	<	1.2	U	<	1.2	UJ	<	1	UJ	<	1.1	UJ
Sodium	<	625		<	1200	U	<	523	U	<	558	U
Vanadium	13.8	1.2		10.4	2.4		13.8	1		17.1	1.1	
Zinc	479	2.5		9.2	4.8		57	2.1		33.5	2.2	
TPH (mg/kg)												
Total Petroleum Hydrocarbons	3180	500		<	48.1	U	973	209		81	44.6	

NOTE: Results presented here are chemicals which were detected at least once in near-surface soils at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A of the RFI report.

J = Estimated value below reporting limit or estimated based on data quality criteria.
U = Not detected
Qual = Qualification
RL = Reporting Limit

TABLE 4-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE I FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0313-0000			CAN031-0313-0002			CAN031-0314-0000			CAN031-0314-0002		
LAB SAMPLE NUMBER	0311830002SA			0311830003SA			0311830006SA			0311830008SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Tetrachloroethene	3.6	6.1								<	5.8	U
Semivolatile Organics (µg/kg)												
Anthracene	<	8000	U	<	390	U				<	380	U
Benzo(a)anthracene	<	8000	U	<	390	U				<	380	U
Benzo(a)pyrene	<	8000	U	<	390	U				<	380	U
Benzo(b)fluoranthene	<	8000	U	<	390	U				<	380	U
Benzo(g,h,i)perylene	<	8000	U	<	390	U				<	380	U
Carbazole	<	8000	U	<	390	U				<	380	U
Chrysene	<	8000	U	<	390	U				<	380	U
Fluoranthene	<	8000	U	<	390	U				<	380	U
Indeno(1,2,3-cd)pyrene	<	8000	U	<	390	U				<	380	U
2-Methylnaphthalene	<	8000	U	<	390	U				<	380	U
Phenanthrene	<	8000	U	<	390	U				<	380	U
Pyrene	<	8000	U	<	390	U				<	380	U
Metals (mg/kg)												
Aluminum	6650	12.2		5740	11.7		9430	11.7		6090	11.7	J
Antimony	<	7.3	U	<	7	U	<	7	U	<	7	U
Arsenic	4.4	0.61		2.2	0.59		4.6	0.59		2.6	0.58	
Barium	229	1.2	J	119	1.2	J	104	1.2	J	107	1.2	J
Beryllium	0.25	0.24		0.25	0.23		0.69	0.23		0.34	0.23	
Cadmium	4.4	0.61		<	0.59	U	<	0.59	U	<	0.58	U
Calcium	42400	24.4		108000	23.4		4200	23.5		71300	23.3	J
Chromium	24.3	1.2		6	1.2		11.8	1.2		6.4	1.2	
Cobalt	3.5	1.2		3.2	1.2		5.1	1.2		3.2	1.2	

NOTE: Results presented here are chemicals which were detected at least once in near-surface soils at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A of the RFI report.

J = Estimated value below reporting limit or estimated based on data quality criteria.
U = Not detected

Qual = Qualification
RL = Reporting Limit

Metals (mg/kg), cont.												
Copper	18.8	2.4		4.7	2.3		7.6	2.3		5.2	2.3	J

TABLE 4-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE I FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0313-0000			CAN031-0313-0002			CAN031-0314-0000			CAN031-0314-0002		
LAB SAMPLE NUMBER	0311830002SA			0311830003SA			0311830006SA			0311830008SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	7950	12.2		5470	11.7		10700	11.7		6030	11.7	J
Lead	77.7	6.1		4.7	0.59		9.4	0.59		6.9	1.2	J
Magnesium	2310	24.4		1940	23.4		2130	23.5		1760	23.3	
Nickel	6.8	4.9		5.7	4.7		9.7	4.7		7	4.7	
Potassium	1550	610		998	586		1610	587		1110	583	J
Selenium	0.24	1.2	J	<	1.2	UJ	0.15	1.2	J	0.16	1.2	J
Sodium	193	610	J	<	586	U	<	587	U	<	583	U
Vanadium	16.6	1.2		13.1	1.2		21.2	1.2		13.3	1.2	
Zinc	85.8	2.4		12.6	2.3		29.8	2.3		13.2	2.3	
TPH (mg/kg)												
Total Petroleum Hydrocarbons	4070	488		<	46.9	U	<	46.9	U	<	46.6	U

NOTE: Results presented here are chemicals which were detected at least once in near-surface soils at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A of the RFI report.

J = Estimated value below reporting limit or estimated based on data quality criteria.
U = Not detected

Qual = Qualification
RL = Reporting Limit

TABLE 4-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0311-0004			CAN031-0311-0008			CAN031-0312-0004			CAN031-0312-0008		
LAB SAMPLE NUMBER	0311830018SA			0311830001SA			0311830014SA			0311830015SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)												
Aluminum	7690	11.8		3210	11.2		4210	23.5		5820	11.4	
Arsenic	2.4	0.59		1.1	0.56		2.2	0.59		2.6	0.57	
Barium	81.2	1.2	J	327	1.1	J	273	2.4	J	237	1.1	J
Beryllium	0.29	0.24		<	0.22	U	<	0.47	U	0.35	0.23	
Calcium	22900	23.6		60300	22.4		217000	47		68100	22.9	
Chromium	8.2	1.2		3.8	1.1		6.5	2.4		6.1	1.1	
Cobalt	4.4	1.2		1.7	1.1		2.4	2.4		3.1	1.1	
Copper	5.9	2.4		2.2	2.2		3.6	4.7	J	3.8	2.3	
Iron	8140	11.8		3320	11.2		3930	23.5		5900	11.4	
Lead	6.7	1.2		4.5	1.1		5.4	0.59		6.6	0.57	
Magnesium	2000	23.6		2200	22.4		3250	47		3970	22.9	
Nickel	7.4	4.7		3.6	4.5	J	5.7	9.4	J	6.3	4.6	
Potassium	1450	590		892	560		688	1180		1090	572	
Selenium	<	1.2	UJ	0.12	1.1	J	<	1.2	UJ	<	1.1	UJ
Vanadium	16.4	1.2		11.2	1.1		14	2.4		23.4	1.1	
Zinc	18.8	2.4		8	2.2	J	9.6	4.7		12.9	2.3	

NOTE: Results presented here are chemicals which were detected at least once in subsurface soils at this SWMU and have passed data review. A complete summary of chemical results are presented in Appendix A of the RFI report.

J = Estimated value below reporting limit or estimated based on data quality criteria.

U = Not detected

RL = Reporting Limit.

Qual= Qualifier

TABLE 4-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0313-0004			CAN031-0313-0008			CAN031-0314-0004			CAN031-0314-0008		
LAB SAMPLE NUMBER	0311830004SA			0311830005SA			0311830009SA			0311830019SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)												
Aluminum	4090	23.3		5460	11.4		4830	23.5		2160	23.3	
Arsenic	2.7	0.58		3	0.57		3.1	0.59		1.5	0.58	
Barium	130	2.3	J	411	1.1	J	1130	2.4	J	143	2.3	J
Beryllium	0.24	0.47	J	0.53	0.23		<	0.47	U	<	0.47	U
Calcium	142000	46.6		50700	22.8		156000	47		222000	46.5	
Chromium	4.9	2.3		6.1	1.1		4.5	2.4		2.3	2.3	
Cobalt	2.5	2.3		3	1.1		2.4	2.4		<	2.3	U
Copper	2.7	4.7	J	3.6	2.3		2.5	4.7	J	1.5	4.7	J
Iron	4050	23.3		5580	11.4		4570	23.5		1680	23.3	
Lead	4	0.58		5.8	1.1		4.1	0.59		1.9	0.58	
Magnesium	2500	46.6		2960	22.8		3390	47		2920	46.5	
Nickel	5.9	9.3	J	6.5	4.6		6.2	9.4	J	3.6	9.3	J
Potassium	762	1170		1140	570		844	1180	J	<	1160	U
Selenium	<	1.2	UJ	<	1.1	UJ	<	1.2	UJ	<	1.2	UJ
Vanadium	15.4	2.3		22.6	1.1		18.7	2.4		6	2.3	
Zinc	9.8	4.7		12.1	2.3		11.9	4.7		5.6	4.7	

NOTE: Results presented here are chemicals which were detected at least once in subsurface soils at this SWMU and have passed data review. A complete summary of chemical results are presented in Appendix A of the RFI report.

J = Estimated value below reporting limit or estimated based on data quality criteria.

U = Not detected

RL = Reporting Limit.

Qual= Qualifier

TABLE 4-3

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 31 CANNON AFB

LOCATOR	CAN031-3105-0000			CAN031-3105-0005			CAN031-3105-0010			CAN031-3106-0000			CAN031-3106-0005			CAN031-3106-0010		
LAB SAMPLE NUMBER	0397140012SA			0397140013SA			0397140014SA			0397140015SA			0397140016SA			0397140017SA		
COLLECT DATE	12/08/94			12/08/94			12/08/94			12/08/94			12/08/94			12/08/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	12	U	<	12	U	<	12	U	<	11	U	2.6	12	J	<	11	U
Toluene	<	6	U	<	5.8	U	<	5.8	U	<	5.5	UJ	<	6	U	<	5.7	U
Xylenes (total)	<	6	U	<	5.8	U	<	5.8	U	<	5.5	UJ	<	6	U	<	5.7	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	400	U	<	380	U	<	380	U	89	360	J	<	400	U	<	380	U
Anthracene	80	400	J	<	380	U	<	380	U	370	360		<	400	U	<	380	U
Benzo(a)anthracene	490	400		<	380	U	<	380	U	1600	360		<	400	U	<	380	U
Benzo(a)pyrene	600	400		<	380	U	<	380	U	1900	360		<	400	U	<	380	U
Benzo(b)fluoranthene	1100	400		<	380	U	<	380	U	<	360	U	<	400	U	<	380	U
Benzo(g,h,i)perylene	310	400	J	<	380	U	<	380	U	870	360		<	400	U	<	380	U
Benzo(k)fluoranthene	1300	400		<	380	U	<	380	U	3800	360		<	400	U	<	380	U
bis(2-Ethylhexyl)phthalate	340	400	J	<	380	U	<	380	U	1200	360		<	400	U	<	380	U
Butyl benzyl phthalate	65	400	J	<	380	U	<	380	U	73	360	J	<	400	U	<	380	U
Carbazole	170	400	J	<	380	U	<	380	U	370	360		<	400	U	<	380	U
Chrysene	790	400		<	380	U	<	380	U	270	360	J	<	400	U	<	380	U
Dibenz(a,h)anthracene	140	400	J	<	380	U	<	380	U	400	360		<	400	U	<	380	U
Dibenzofuran	<	400	U	<	380	U	<	380	U	49	360	J	<	400	U	<	380	U
Fluoranthene	1300	400		<	380	U	<	380	U	3800	360		<	400	U	<	380	U
Fluorene	47	400	J	<	380	U	<	380	U	96	360	J	<	400	U	<	380	U
Indeno(1,2,3-cd)pyrene	330	400	J	<	380	U	<	380	U	920	360		<	400	U	<	380	U
4-Methylphenol	<	400	U	<	380	U	<	380	U	<	360	U	<	400	U	<	380	U
Naphthalene	66	400	J	<	380	U	<	380	U	39	360	J	<	400	U	<	380	U
Phenanthrene	540	400		<	380	U	<	380	U	1500	360		<	400	U	<	380	U
Pyrene	810	400		<	380	U	<	380	U	2700	360		<	400	U	<	380	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented on Table A.
J = Estimated value.
R = Rejected value. D = Sample was diluted for analysis.
U = Nondetected value. RL = Reporting Limit.
(1) = MS/MSD for preceding sample number.

TABLE 4-3

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 31
CANNON AFB

LOCATOR	CAN031-3105-0000			CAN031-3105-0005			CAN031-3105-0010			CAN031-3106-0000			CAN031-3106-0005			CAN031-3106-0010		
LAB SAMPLE NUMBER	0397140012SA			0397140013SA			0397140014SA			0397140015SA			0397140016SA			0397140017SA		
COLLECT DATE	12/08/94			12/08/94			12/08/94			12/08/94			12/08/94			12/08/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Aluminum	9230	12		10500	11.5		8700	23.2		10200	11		3970	60.3		10200	11.4	
Arsenic	2.4	1.2		2.3	0.58		2	0.58		3.1	0.55		2.4	0.6		2.5	0.57	
Barium	237	1.2		657	1.2		275	2.3		305	1.1		270	6		101	1.1	
Beryllium	0.38	0.24		0.45	0.23		0.4	0.46	J	0.42	0.22		<	1.2	U	0.47	0.23	
Cadmium	1.2	0.6		<	0.58	U	<	1.2	U	3.3	0.55		<	3	U	<	0.57	U
Calcium	44600	24		105000	23		124000	46.3		46600	21.9		288000	121		96600	22.8	
Chromium	11.3	1.2		8.2	1.2		5.8	2.3		26.5	1.1		<	6	U	7.7	1.1	
Cobalt	2.9	1.2		2.1	1.2		2.2	2.3	J	3.1	1.1		<	6	U	2.5	1.1	
Copper	14.9	2.4		5.6	2.3		4	4.6	J	15.5	2.2		3.9	12.1	J	4.5	2.3	
Iron	8700	12		7590	11.5		6370	23.2		10600	11		3620	60.3		8050	11.4	
Lead	42.7	6	J	7	0.58	J	5.1	1.2	J	138	11		3.1	1.2	J	5.8	1.1	
Magnesium	2310	24		2620	23		2910	46.3		2460	21.9		3270	121		4330	22.8	
Manganese	234	1.2	J	99.4	1.2	J	73.2	2.3	J	187	1.1	J	40.7	6	J	112	1.1	J
Nickel	8.7	4.8		9.3	4.6		8.6	9.3	J	10.1	4.4		8.8	24.1	J	9	4.6	
Potassium	1460	600		1740	576		1430	1160		2200	548		639	3010	J	1830	571	
Thallium	<	1.2	UJ	0.13	1.2	J	0.12	1.2	J	<	1.1	UJ	<	1.2	UJ	<	1.1	UJ
Vanadium	17.3	1.2		15.1	1.2		15.4	2.3		19.9	1.1		12.2	6		23.7	1.1	
Zinc	114	2.4		21.1	2.3		16.4	4.6		139	2.2		8.5	12.1	J	20.6	2.3	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocar	696	48		<	46.1	U	<	46.3	U	914	132		<	48.2	U	<	45.7	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented on Table A-1.

J = Estimated value.
R = Rejected value. D = Sample was diluted for analysis.
U = Nondetected value. RL = Reporting Limit.
(1) = MS/MSD for preceding sample number.

TABLE 4-3

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 31 CANNON AFB

LOCATOR	CAN031-3107-0000			CAN031-3107-0005			CAN031-3107-6005[1]			CAN031-3107-0010		
LAB SAMPLE NUMBER	0398710006SA			0398710002SA			0398710010SA			0398710004SA		
COLLECT DATE	12/13/94			12/13/94			12/13/94			12/13/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Acetone	210	110		6.3	11	J	14	11		12	12	
Toluene	<	56	U	5.5	5.7	J	<	5.7	U	4.9	5.9	J
Xylenes (total)	130	56		<	5.7	U	<	5.7	U	<	5.9	U
Semivolatile Organics (µg/kg)												
Acenaphthene	<	3700	U	<	380	U	<	380	U	<	390	U
Anthracene	820	3700	J	<	380	U	<	380	U	<	390	U
Benzo(a)anthracene	1800	3700	J	<	380	U	<	380	U	<	390	U
Benzo(a)pyrene	1700	3700	J	<	380	U	<	380	U	<	390	U
Benzo(b)fluoranthene	1200	3700	J	<	380	U	<	380	U	<	390	U
Benzo(g,h,i)perylene	1100	3700	J	<	380	U	<	380	U	<	390	U
Benzo(k)fluoranthene	1800	3700	J	<	380	U	<	380	U	<	390	U
bis(2-Ethylhexyl)phthalate	2500	3700	J	<	380	U	<	380	U	<	390	U
Butyl benzyl phthalate	<	3700	U	<	380	U	<	380	U	<	390	U
Carbazole	<	3700	U	<	380	U	<	380	U	<	390	U
Chrysene	2000	3700	J	<	380	U	<	380	U	<	390	U
Dibenz(a,h)anthracene	630	3700	J	<	380	U	<	380	U	<	390	U
Dibenzofuran	<	3700	U	<	380	U	<	380	U	<	390	U
Fluoranthene	4800	3700		120	380	J	170	380	J	<	390	U
Fluorene	<	3700	U	<	380	U	<	380	U	<	390	U
Indeno(1,2,3-cd)pyrene	1100	3700	J	<	380	U	<	380	U	<	390	U
4-Methylphenol	1100	3700	J	<	380	U	<	380	U	<	390	U
Naphthalene	3100	3700	J	<	380	U	<	380	U	<	390	U
Phenanthrene	1900	3700	J	<	380	U	<	380	U	<	390	U
Pyrene	3500	3700	J	<	380	U	<	380	U	<	390	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed c
A complete summary of chemical results are presented on Table A-1.

J = Estimated value.

R = Rejected value. D = Sample was diluted for analysis.

U = Nondetected value. RL = Reporting Limit.

[1] = MS/MSD for preceding sample number.

TABLE 4-3

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 31 CANNON AFB

LOCATOR	CAN031-3107-0000			CAN031-3107-0005			CAN031-3107-6005[1]			CAN031-3107-0010		
LAB SAMPLE NUMBER	0398710006SA			0398710002SA			0398710010SA			0398710004SA		
COLLECT DATE	12/13/94			12/13/94			12/13/94			12/13/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)												
Aluminum	7550	22.5		7550	23		7050	23		4160	58.9	
Arsenic	3.7	0.56		3	0.57		2.8	0.57		1	0.59	
Barium	716	2.2		267	2.3	J	208	2.3	J	344	5.9	J
Beryllium	0.46	0.45		0.43	0.46	J	0.45	0.46	J	<	1.2	U
Cadmium	1.9	1.1		1	1.1	J	5.2	1.1		<	2.9	U
Calcium	173000	45		120000	45.9		133000	46		289000	118	
Chromium	25.6	2.2		5.6	2.3		4.9	2.3		<	5.9	U
Cobalt	22.2	2.2		2.8	2.3		2.6	2.3		2.6	5.9	J
Copper	22.5	4.5		4.9	4.6		5.2	4.6		<	11.8	U
Iron	8990	22.5		6410	23		6120	23		2930	58.9	
Lead	20.7	2.8	J	4.7	0.57	J	4.8	0.57	J	3.3	0.59	J
Magnesium	5230	45		3050	45.9		3070	46		4820	118	
Manganese	280	2.2		86.5	2.3		89	2.3		81.6	5.9	
Nickel	15.8	9		7.5	9.2	J	8.8	9.2	J	7.4	23.6	J
Potassium	994	1120	J	1180	1150		1180	1150		706	2940	J
Thallium	<	2.2	UJ	<	1.1	UJ	<	1.1	UJ	<	1.2	UJ
Vanadium	21	2.2		18	2.3		18.8	2.3		10	5.9	
Zinc	44.7	4.5		18.7	4.6		20.8	4.6		8.2	11.8	J
TRPH (mg/kg)												
Total Recoverable Petroleum Hydrocarbons	2500	225		<	45.9	U	<	46	U	<	47.1	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed c
A complete summary of chemical results are presented on Table A.

J = Estimated value.

R = Rejected value. D = Sample was diluted for analysis.

U = Nondetected value. RL = Reporting Limit.

[1] = MS/MSD for preceding sample number.

TABLE 4-4

COMPARISON OF SWMU 31 METALS CONCENTRATIONS IN SURFACE SOIL WITH BACKGROUND UTLs CANNON AFB, NEW MEXICO

Chemical	Frequency Detected	Field Sample ID for Maximum Hit	Maximum Detected Concentration (mg/kg)	Qualifiers for Maximum Hit	Background Surface Soil UTL Concentration[1] (mg/kg)	Exceeds Background UTL	Frequency of Exceedance of UTL	Frequency of Exceedance (%)	Does Metal Exceed Background?
METALS									
Aluminum	7/7	CAN031-3106-0000	10200		8,950	YES	3/7	43%	**YES**
Antimony	1/7	CAN031-0311-0000	1.9	J	3.15	NO			NO
Arsenic	7/7	CAN031-0314-0000	4.6		3.6	YES	3/7	43%	**YES**
Barium	7/7	CAN031-0311-0000	1460	J	670	YES	2/7	29%	**YES**
Beryllium	7/7	CAN031-0314-0000	0.69		0.78	NO			NO
Cadmium	7/7	CAN031-0311-0000	8.7		0.435	YES	6/7	86%	**YES**
Calcium	7/7	CAN031-3107-0000	173000		44800	YES	2/7	29%	**YES**
Chromium, Total	7/7	CAN031-0311-0000	130		10.5	YES	5/7	71%	**YES**
Cobalt	7/7	CAN031-3107-0000	22.2		6.6	YES	2/7	29%	**YES**
Copper	7/7	CAN031-0311-0000	61.4		18.3	YES	3/7	43%	**YES**
Iron	7/7	CAN031-3114-0000	10700		10100	YES	2/7	29%	**YES**
Lead	7/7	CAN031-0311-0000	930		12	YES	6/7	86%	**YES**
Magnesium	7/7	CAN031-3107-0000	5230		1930	YES	4/7	57%	**YES**
Manganese	3/7	CAN031-3107-0000	280		307	NO			NO
Nickel	7/7	CAN031-3107-0000	15.8		11	YES	1/7	14%	**YES**
Potassium	7/7	CAN031-3106-0000	2200		2691	NO			NO
Selenium	1/7	CAN031-0313-0000	0.24	J	0.26	NO			NO
Sodium	2/7	CAN031-0313-0000	193	J	102	YES	1/7	14%	**YES**
Vanadium	7/7	CAN031-0314-0000	21.2		23.3	NO			NO
Zinc	6/7	CAN031-0311-0000	479		32.2	YES	6/7	86%	**YES**

[1] Upper Tolerance Limit of Background (90% limit of 95th percentile). See Table 6-3 of W-C 1997.
mg/kg = milligrams per kilogram
J = Estimated

TABLE 4-5

COMPARISON OF SWMU 31 METALS CONCENTRATIONS IN SUBSURFACE SOIL WITH BACKGROUND UTLs CANNON AFB, NEW MEXICO

Chemical	Frequency Detected	Field Sample ID for Maximum Hit	Maximum Detected Concentration (mg/kg)	Qualifiers for Maximum Hit	Background Subsurface Soil UTL Concentration[1] (mg/kg)	Exceeds Background UTL	Frequency of Exceedance of UTL	Frequency of Exceedance (%)	Does Metal Exceed Background?
METALS									
Aluminum	18/14	CAN031-3105-0005	10500		12,214	NO			NO
Arsenic	18/14	CAN031-0314-0004	3.1		4.3	NO			NO
Barium	18/14	CAN031-0314-0004	1130	J	890	YES	1/18	6%	**YES**
Beryllium	12/14	CAN031-0313-0008	0.53		0.73	NO			NO
Cadmium	2/14	CAN031-3107-0005	1	J	1.3	NO			NO
Calcium	18/14	CAN031-3107-0010	289000		237498	YES	2/18	11%	**YES**
Chromium	12/14	CAN031-3105-0005	8.2		13.3	NO			NO
Cobalt	12/14	CAN031-0311-0004	4.4		4.7	NO			NO
Copper	17/18	CAN031-0312-0002	10.9		8.3	YES	1/18	6%	**YES**
Iron	18/18	CAN031-0311-0004	8140		13148	NO			NO
Lead	18/18	CAN031-0312-0002	22.3		8.7	YES	1/18	6%	**YES**
Magnesium	18/18	CAN031-3107-0010	4820		19300	NO			NO
Manganese	6/18	CAN031-3106-0010	112	J	333	NO			NO
Nickel	18/18	CAN031-3105-0005	9.3		14.9	NO			NO
Potassium	17/18	CAN031-3106-0010	1830		2512	NO			NO
Selenium	2/18	CAN031-0314-0002	0.16	J	1.1	NO			NO
Thallium	2/18	CAN031-3105-0005	0.13	J	2.65	NO			NO
Vanadium	18/18	CAN031-3106-0010	23.7		32.8	NO			NO
Zinc	18/18	CAN031-0312-0002	33.5		30.6	YES	1/18	6%	**YES**

[1] Upper Tolerance Limit of Background (90% limit of 95th percentile). See Table 6-3 of W-C 1997.

mg/kg = milligrams per kilogram

J = Estimated

TABLE 4-6

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCs IN THE SOIL AT SWMU 31 CANNON AFB, NEW MEXICO

Chemical	Detected Concentration[1] (mg/kg)	Ingestion Rate[2] (mg/d)	Conversion Factor (kg/mg)	Daily Intake from the site[3] (mg/d)	Recommended Daily Allowance (RDA)[4] (mg/d)
Calcium	289,000	100	1.00E-06	28.9	1,200
Magnesium	5,230	100	1.00E-06	0.523	400
Sodium	193	100	1.00E-06	0.0193	2400 [5]

[1] Maximum detected concentration at SWMU 31. See Tables 4-5 and 4-6.
[2] Estimation of potential chemical ingestion rate for receptors at SWMU 31.
[3] Daily Intake = Detected Concentration * Ingestion Rate * Conversion Factor
[4] National Research Council 1989
[5] An RDA has not been established for sodium. This number is based on a recommendation for a 2,000 calorie diet (National Research Council, 1989).

TABLE 4-7

COMPARISON OF SWMU 31 MAXIMUM SOIL CONCENTRATIONS TO MSSLs
CANNON AFB, NEW MEXICO

Chemical	Maximum Detected Concentration (mg/kg)	Qual	Residential Soil MSSL Concentration[1] (mg/kg)	Exceeds MSSL?
VOLATILE ORGANICS		SSL		
Acetone	0.21		1400	NO
Methylene Chloride	0.0065 → .001		8.5	NO
Tetrachloroethene	0.0036 → .003		4.7 .5	NO
Toluene	0.0055		520	NO
Xylenes	0.13		210 370	NO
SEMIVOLATILE ORGANICS				
Acenaphthene	0.089		2600 3,700	NO
Anthracene	0.82		14000 22,000	NO
Benzo(a)anthracene	2.4 → .08		0.56 .62	YES
Benzo(a)pyrene	2.7 → .4		0.056 .062	YES
Benzo(b)fluoranthene	5.6 → .2		0.56 .62	YES
Benzo(k)fluoranthene	3.8 → 2.0		5.6 6.2	NO
Benzo(g,h,i)perylene*	2.6		55 120	NO
Bis(2-ethylhexyl)phthalate	2.5		32 35	NO
Butylbenzylphthalate	0.073		240 240	NO
Carbazole	0.5 → 0.03		22 24	NO
Chrysene	3.1		56 62	NO
Dibenzo(a,h)anthracene	0.63 → .08		0.056 .062	YES
Dibenzofuran	0.049		210 150	NO
Fluoranthene	5.6		2000 2300	NO
Fluorene	0.096		1800 1300	NO
Indeno(1,2,3)pyrene	2.3 → 0.4		0.56 .62	YES
2-Methylnaphthalene*	0.045		55 120	NO
4-Methylphenol	1.1		270 310	NO
Naphthalene	3.1		55 120	NO
Phenanthrene*	3.2		55 120	NO
Pyrene	4.6		1500 2300	NO
Siloxane	0.019		NA	NA
TRPH	4070		NA	NA
METALS				
Aluminum	10,500		75,000 7,664	NO
Arsenic	4.6 → 1.0		0.38 0.39	YES
Barium	1460 → 82		5200 1,600 D	NO
Cadmium	8.7 → .4		37 39	NO
Chromium	130 → 2.0		30 30	YES
Cobalt	22.2		3300 900	NO
Copper	61.4		2800 2900	NO
Iron	10,700		22,000 23000	NO
Lead	930		400	YES
Nickel	15.8		1500 1600	NO
Zinc	479		22000 24,000	NO

(1) EPA Region VI Media-Specific Screening Levels for Residential Soil (EPA 1998)

* The MSSL for naphthalene was used as a surrogate for these PAHs. See text.

mg/kg = milligrams per kilogram

used Cr VI

TABLE 4-8

CALCULATION OF INITIAL LEACHATE CONCENTRATIONS
CANNON AFB SWMU 31

Chemical	C_s (mg/kg)	f_{oc}	K_{oc} (mL/g)	K_d (mL/g)	θ_w	θ_a	H'	ρ_b (g/cm^3)	C_w (mg/L)
Benzo(a)anthracene	2.4	0.0004	3.98E+05	1.59E+02	0.24	0.16	1.37E-04	1.6	0.0151
Benzo(a)pyrene	2.7	0.0004	1.02E+06	4.08E+02	0.24	0.16	4.63E-05	1.6	0.0066
Benzo(b)fluoranthene	5.6	0.0004	1.23E+06	4.92E+02	0.24	0.16	4.55E-03	1.6	0.0114
Dibenzo(a,h)anthracene	0.63	0.0004	3.80E+06	1.52E+03	0.24	0.16	6.03E-07	1.6	0.00041
Indeno(1,2,3)pyrene	2.3	0.0004	3.47E+06	1.39E+03	0.24	0.16	6.56E-05	1.6	0.00166
Arsenic	4.6	-	-	29	0.24	0.16	0.0	1.6	0.158
Chromium	130	-	-	19	0.24	0.16	0.0	1.6	6.8
Lead	930	-	-	8,000	0.24	0.16	0.0	1.6	0.116

$$Cs = Cw \cdot \left[Kd + \frac{\theta w + \theta a \cdot H'}{\rho b} \right]$$

C_s = soil concentration, mg/kg

C_w = initial leachate concentration, mg/L

f_{oc} = fraction organic carbon content

K_{oc} = organic carbon distribution coefficient, mL/g (USEPA 1996)

K_d = distribution coefficient, mL/g (=K_{oc}*f_{oc} for organics, K_d at pH=6.8 for metals) (USEPA 1996)

θ_w = water-filled soil porosity

θ_a = air-filled soil porosity

H' = dimensionless Henry's Law constant (USEPA 1996)

ρ_b = dry bulk density, g/cm^3

TABLE 4-9

MODEL-PREDICTED CONCENTRATIONS
CANNON AFB SWMU 31

	Source Conditions			Active Transport Processes					Unsaturated Zone		Saturated Zone		Screening Levels	
Chemical	Steady-State	Pulse*	Decay**	Dispersion	Adsorption	Biodegradation	C_s (mg/kg)	C_w (mg/L)	AF	$(C_w)_u$ (mg/L)	DAF	$(C_w)_s$ (mg/L)	Region VI Tap Water MSSL (mg/L)	MCL (mg/L)
Benzo(a)anthracene	✓			✓			2.4	0.0151	1.0	0.0151	6.0	0.0025	9.2E-05	-
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				2,003	7.5E-06	14607.1	1.03E-06		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				14,543	1.04E-06	-	-		
			✓	✓	✓	✓			-	0	-	0		
Benzo(a)pyrene	✓			✓			2.7	0.0066	1.0	0.0066	6.0	0.0011	9.2E-06	0.0002
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				5,131	1.3E-06	37,439	1.8E-07		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				37,258	1.8E-07	-	-		
			✓	✓	✓	✓			-	0	-	0		
Benzo(b)fluoranthene	✓			✓			5.6	0.0114	1.0	0.0114	6.0	0.0019	9.2E-05	-
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				6,188	1.8E-06	45,147	2.5E-07		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				44,944	2.5E-07	-	-		
			✓	✓	✓	✓			-	0	-	0		
Dibenzo(a,h)anthracene	✓			✓			0.63	0.00041	1.0	4.1E-04	6.0	6.9E-05	9.2E-06	-
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				19,113	2.2E-08	139,470	3.0E-09		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				138,812	3.0E-09	-	-		
			✓	✓	✓	✓			-	0	-	0		

TABLE 4-9

MODEL-PREDICTED CONCENTRATIONS
CANNON AFB SWMU 31

	Source Conditions			Active Transport Processes					Unsaturated Zone		Saturated Zone		Screening Levels	
Chemical	Steady-State	Pulse*	Decay**	Dispersion	Adsorption	Biodegradation	C_s (mg/kg)	C_w (mg/L)	AF	$(C_w)_u$ (mg/L)	DAF	$(C_w)_s$ (mg/L)	Region VI Tap Water MSSL (mg/L)	MCL (mg/L)
Indeno(1,2,3)pyrene	✓			✓			2.3	0.00166	1.0	0.00166	6.0	0.00028	9.2E-05	-
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				17,446	9.5E-08	127,307	1.30E-08		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				126,759	1.31E-08	-	-		
			✓	✓	✓	✓			-	0	-	0		
Arsenic	✓			✓			4.6	0.158	1.0	0.158	6.0	0.026	4.5E-05	0.05
		✓		✓	✓				365	4.3E-04	2,658	5.9E-05		
			✓	✓	✓				265	6.0E-04	-	-		
Chromium	✓			✓			130	6.8	1.0	0.1	6.0	0.0	0.18	0.1
		✓		✓	✓				240	0.000	1,741	0.0001		
			✓	✓	✓				174	0.001	-	-		
Lead	✓			✓			930	0.116	1.0	0.1	6.0	0.0	0.015	0.015
		✓		✓	✓				100,402	1.16E-06	732,064	1.58E-07		
			✓	✓	✓				73,046	1.59E-06	-	-		

* Pulse duration = 100 years.

** Decay half-life = 10 years for SVOCs and 100 years for metals.

Cs = maximum detected soil concentration

Cw = initial leachate concentration based on equilibrium partitioning

AF = attenuation factor for unsaturated zone calculated from MULTIMED results

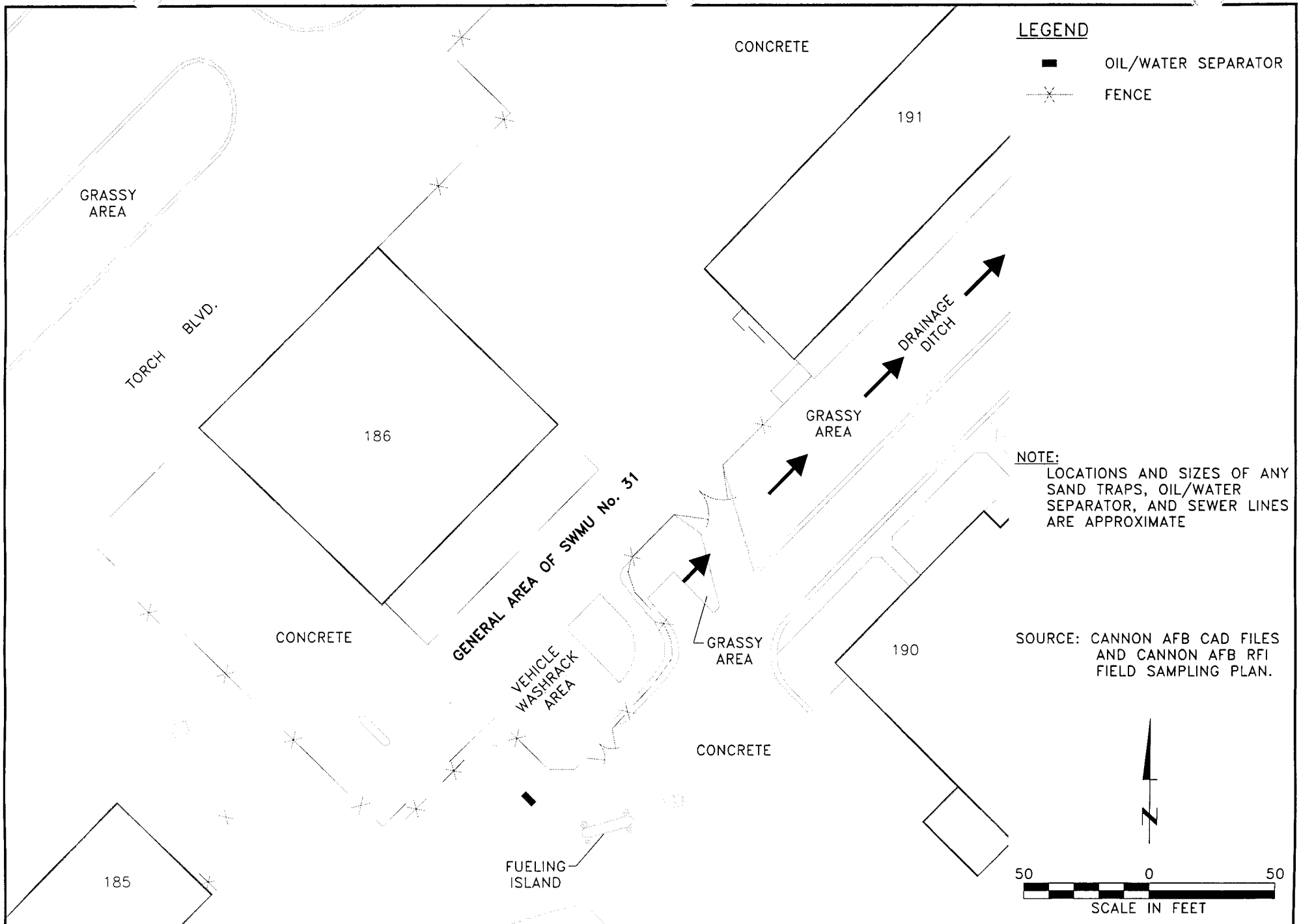
(Cw)u = soil water concentration at bottom of unsaturated zone (= Cw / AF)

DAF = dilution-attenuation factor for initial groundwater mixing zone calculated from MULTIMED results

(Cw)s = groundwater concentration at water table after initial mixing (= Cw / DAF)

"-" indicates factor is not applicable or factor/concentration could not be calculated based on model results

indicates predicted concentration exceeds highlighted screening level



June 09, 2000 3:46:03 p.m.
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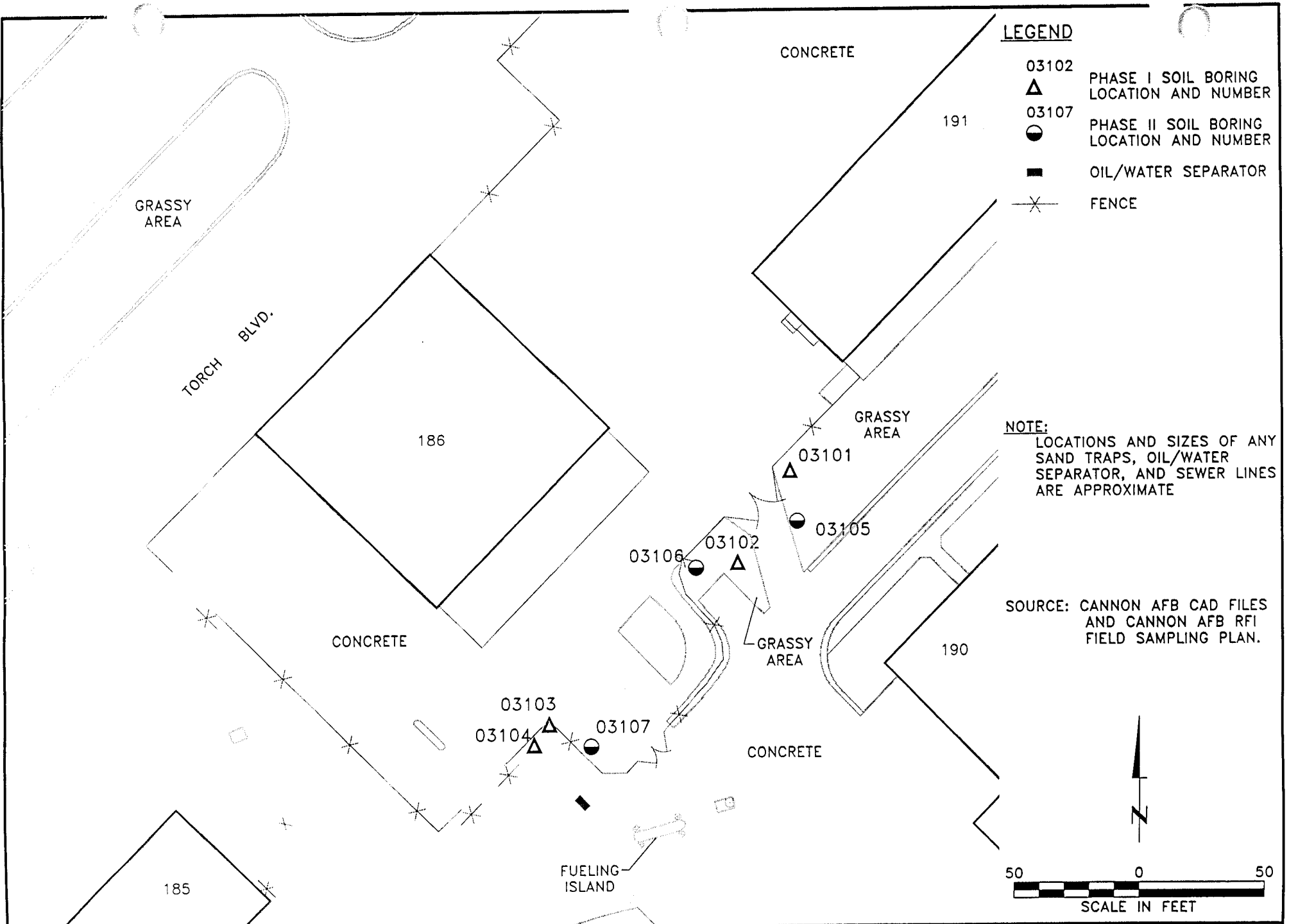
Xrefs: CAN-BASE.DWG

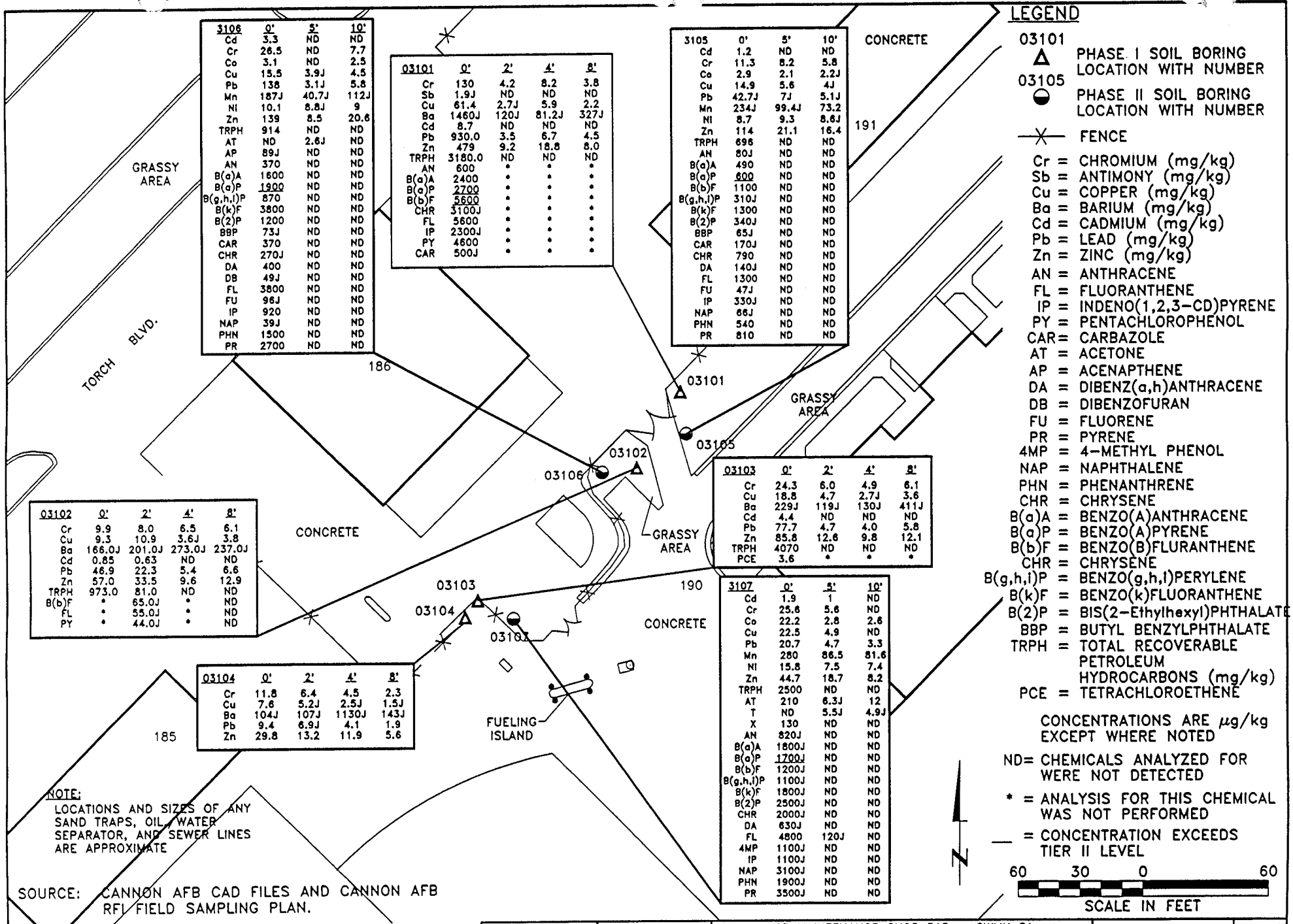
DRN BY: TSSM	DATE: 04/07/99	AGE MAINTENANCE SHOP PAD - SWMU 31 SITE PLAN CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00
CHK'D BY: .	REVISION: 0		FIG. NO. 4-1

REPORT PHASE: PHASE II



April 07, 1999 11:54:00 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG4-2.DWG (TSM)
Xrefs: CAN-BASE.DWG

DRN BY: TSSM	DATE: 04/07/99	AGE MAINTENANCE SHOP PAD - SWMU 31 SITE PLAN WITH BORING LOCATIONS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00
CHK'D BY: .	REVISION: 0		FIG. NO. 4-2



3106	0'	5'	10'
Cd	3.3	ND	ND
Cr	26.5	ND	7.7
Co	3.1	ND	2.5
Cu	15.5	3.9J	4.5
Pb	138	3.1J	5.8
Mn	187J	40.7J	112J
Ni	10.1	8.8J	9
Zn	139	8.5	20.6
TRPH	914	ND	ND
AT	ND	2.6J	ND
AP	89J	ND	ND
AN	370	ND	ND
B(a)A	1600	ND	ND
B(a)P	1900	ND	ND
B(g,h,i)P	870	ND	ND
B(k)F	3800	ND	ND
B(2)P	1200	ND	ND
BBP	73J	ND	ND
CAR	370	ND	ND
CHR	270J	ND	ND
DA	400	ND	ND
DB	49J	ND	ND
FL	3800	ND	ND
FU	96J	ND	ND
IP	920	ND	ND
NAP	39J	ND	ND
PHN	1500	ND	ND
PR	2700	ND	ND

03101	0'	2'	4'	8'
Cr	130	4.2	8.2	3.8
Sb	1.9J	ND	ND	ND
Cu	61.4	2.7J	5.9	2.2
Ba	1460J	120J	81.2J	327J
Cd	8.7	ND	ND	ND
Pb	930.0	3.5	6.7	4.5
Zn	479	9.2	18.8	8.0
TRPH	3180.0	ND	ND	ND
AN	600	*	*	*
B(a)A	2400	*	*	*
B(a)P	2700	*	*	*
B(b)F	5600	*	*	*
CHR	3100J	*	*	*
FL	5600	*	*	*
IP	2300J	*	*	*
PY	4600	*	*	*
CAR	500J	*	*	*

3105	0'	5'	10'
Cd	1.2	ND	ND
Cr	11.3	8.2	5.8
Co	2.9	2.1	2.2J
Cu	14.9	5.6	4J
Pb	42.7J	7J	5.1J
Mn	234J	99.4J	73.2
Ni	8.7	9.3	8.6J
Zn	114	21.1	16.4
TRPH	696	ND	ND
AN	80J	ND	ND
B(a)A	490	ND	ND
B(a)P	600	ND	ND
B(b)F	1100	ND	ND
B(g,h,i)P	310J	ND	ND
B(k)F	1300	ND	ND
B(2)P	340J	ND	ND
BBP	65J	ND	ND
CAR	170J	ND	ND
CHR	790	ND	ND
DA	140J	ND	ND
FL	1300	ND	ND
FU	47J	ND	ND
IP	330J	ND	ND
NAP	66J	ND	ND
PHN	540	ND	ND
PR	810	ND	ND

03102	0'	2'	4'	8'
Cr	9.9	8.0	6.5	6.1
Cu	9.3	10.9	3.6J	3.8
Ba	166.0J	201.0J	273.0J	237.0J
Cd	0.85	0.63	ND	ND
Pb	46.9	22.3	5.4	6.6
Zn	57.0	33.5	9.6	12.9
TRPH	973.0	81.0	ND	ND
B(b)F	*	65.0J	*	ND
FL	*	55.0J	*	ND
PY	*	44.0J	*	ND

03103	0'	2'	4'	8'
Cr	24.3	6.0	4.9	6.1
Cu	18.8	4.7	2.7J	3.6
Ba	229J	119J	130J	411J
Cd	4.4	ND	ND	ND
Pb	77.7	4.7	4.0	5.8
Zn	85.8	12.6	9.8	12.1
TRPH	4070	ND	ND	ND
PCE	3.6	*	*	*

03104	0'	2'	4'	8'
Cr	11.8	6.4	4.5	2.3
Cu	7.6	5.2J	2.5J	1.5J
Ba	104J	107J	1130J	143J
Pb	9.4	6.9J	4.1	1.9
Zn	29.8	13.2	11.9	5.6

3107	0'	5'	10'
Cd	1.9	1	ND
Cr	25.6	5.6	ND
Co	22.2	2.8	2.6
Cu	22.5	4.9	ND
Pb	20.7	4.7	3.3
Mn	280	86.5	81.6
Ni	15.8	7.5	7.4
Zn	44.7	18.7	8.2
TRPH	2500	ND	ND
AT	210	6.3J	12
T	ND	5.5J	4.9J
X	130	ND	ND
AN	820J	ND	ND
B(a)A	1800J	ND	ND
B(a)P	1700J	ND	ND
B(b)F	1200J	ND	ND
B(g,h,i)P	1100J	ND	ND
B(k)F	1800J	ND	ND
B(2)P	2500J	ND	ND
CHR	2000J	ND	ND
DA	630J	ND	ND
FL	4800	120J	ND
4MP	1100J	ND	ND
IP	1100J	ND	ND
NAP	3100J	ND	ND
PHN	1900J	ND	ND
PR	3500J	ND	ND

LEGEND

03101 △ PHASE I SOIL BORING LOCATION WITH NUMBER

03105 ◒ PHASE II SOIL BORING LOCATION WITH NUMBER

FENCE

Cr = CHROMIUM (mg/kg)
Sb = ANTIMONY (mg/kg)
Cu = COPPER (mg/kg)
Ba = BARIUM (mg/kg)
Cd = CADMIUM (mg/kg)
Pb = LEAD (mg/kg)
Zn = ZINC (mg/kg)
AN = ANTHRACENE
FL = FLUORANTHENE
IP = INDENO(1,2,3-CD)PYRENE
PY = PENTACHLOROPHENOL
CAR = CARBAZOLE
AT = ACETONE
AP = ACENAPTHENE
DA = DIBENZ(a,h)ANTHRACENE
DB = DIBENZOFURAN
FU = FLUORENE
PR = PYRENE
4MP = 4-METHYL PHENOL
NAP = NAPHTHALENE
PHN = PHENANTHRENE
CHR = CHRYSENE
B(a)A = BENZO(A)ANTHRACENE
B(a)P = BENZO(A)PYRENE
B(b)F = BENZO(B)FLURANTHENE
CHR = CHRYSENE
B(g,h,i)P = BENZO(g,h,I)PERYLENE
B(k)F = BENZO(k)FLUORANTHENE
B(2)P = BIS(2-Ethylhexyl)PHTHALATE
BBP = BUTYL BENZYLPHTHALATE
TRPH = TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/kg)
PCE = TETRACHLOROETHENE

CONCENTRATIONS ARE μg/kg EXCEPT WHERE NOTED

ND= CHEMICALS ANALYZED FOR WERE NOT DETECTED

* = ANALYSIS FOR THIS CHEMICAL WAS NOT PERFORMED

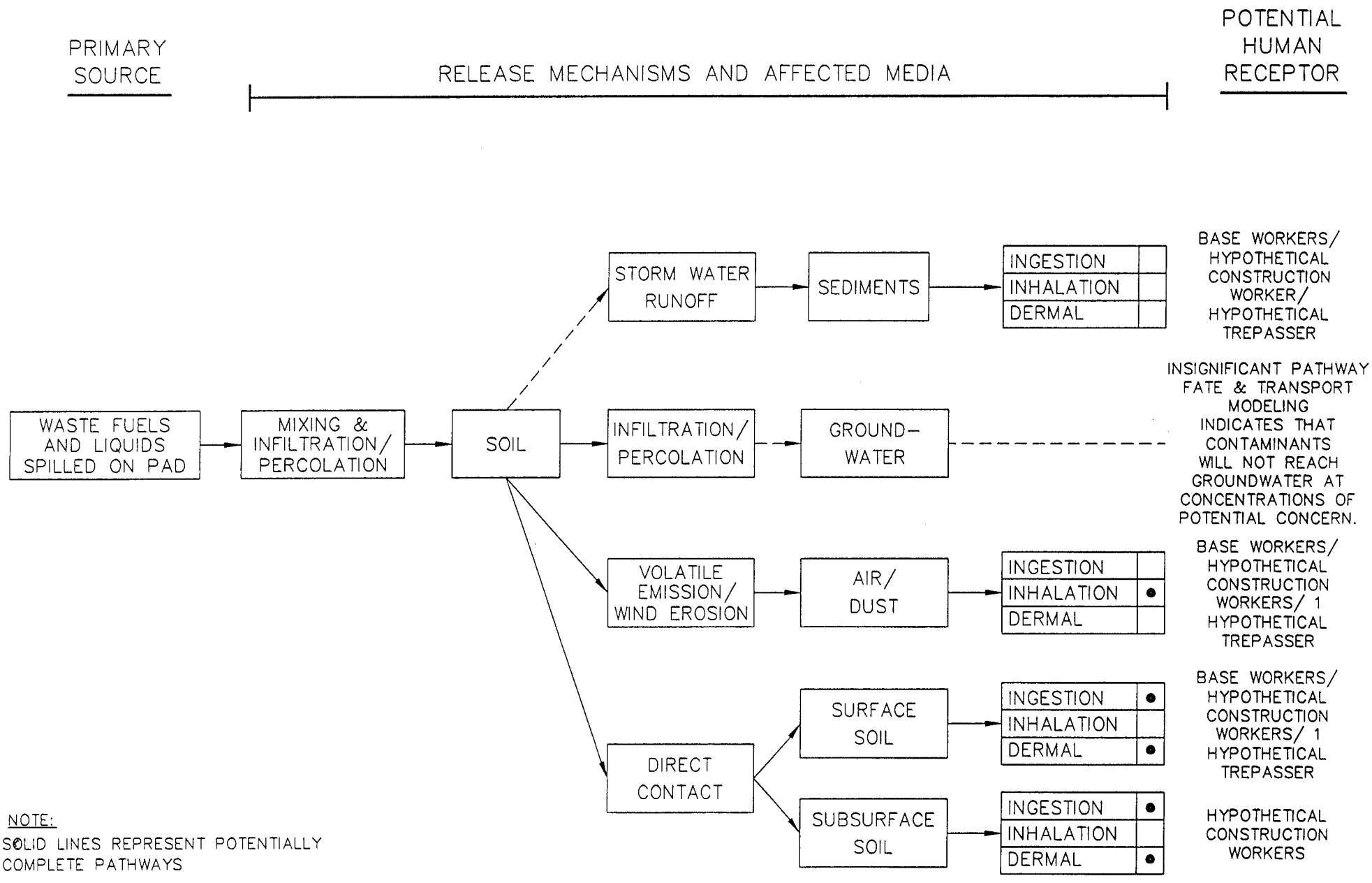
— = CONCENTRATION EXCEEDS TIER II LEVEL

NOTE:
LOCATIONS AND SIZES OF ANY SAND TRAPS, OIL/WATER SEPARATOR, AND SEWER LINES ARE APPROXIMATE

SOURCE: CANNON AFB CAD FILES AND CANNON AFB RFI FIELD SAMPLING PLAN.

August 06, 1999 10:55:01 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG4-3.DWG (TSM)
Xrefs: CAN-BASE.DWG

DRN BY: TSSM	DATE: 08/06/99	AGE MAINTENANCE SHOP PAD - SWMU 31 CHEMICAL CONCENTRATIONS DETECTED IN SOIL CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO.	FIG. NO.
CHK'D BY: .	REVISION: 0		45FM9602CC.00	4-3



NOTE:

SOLID LINES REPRESENT POTENTIALLY COMPLETE PATHWAYS

DASHED LINES REPRESENT INCOMPLETE OR INSIGNIFICANT PATHWAYS

ONLY FUTURE USE EXPOSURES WILL BE CONSIDERED FOR SOILS PRESENTLY COVERED BY PAVEMENT

July 26, 1999 10:54:27 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG4-4.DWG (TSM)

DRN BY TSSM	DATE 07/26/99	SITE CONCEPTUAL EXPOSURE MODEL AGE MAINTENANCE SHOP PAD SWMU – 31 CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO.	FIG. NO.
CHK'D BY .	REVISIONS: 0		45-FM9602CC.00	4-4

5.1 SITE DESCRIPTION

SWMU No. 48A was a 20,000-gallon underground storage tank located about 125 feet east of the intersection of Argentia Avenue and Torch Boulevard (Figure 5-1). The tank and associated piping were removed in 1988. The area is presently paved and used as a parking lot. The depth of the former tank is unknown.

5.2 SITE HISTORY

As discussed in the site description, the tank and associated piping were removed in 1988. SWMU No. 48A was active from 1941 to 1985. Historically, the site was a gas station from 1941 to 1965. From 1965 to 1985, the tank was used to store waste products. The tank received waste oils, spent solvents, paint thinners, and recovered fuels. The products were removed periodically from the tank. The quantities of each of the waste products stored in the tank are unknown.

5.3 CURRENT USE

The underground storage tank has been removed. The area is currently covered with asphalt pavement and is being used as a parking lot.

5.4 PREVIOUS INVESTIGATIONS

Phase I RFI

During the Phase I RFI, three soil borings were drilled and sampled to a depth of 30 feet bgs (LRL 1993) at the site of the former underground storage tank to determine whether a release of SWMU-related chemicals had occurred from the tank. The previous boring locations are shown on Figure 5-2. Target analytes for the samples collected included Target Compound List (TCL) VOCs, cyanide, TAL metals, and BTEX. Ethylbenzene, toluene, and xylene were detected in Boring No. 48A-2 at 10 and 20 feet. The concentration of xylene was 100 ppm at 20 feet. Metals were detected above background in surface samples and subsurface samples at 20 feet in all of the borings.

Phase II RFI

The Phase I investigation sampled soils to 30 feet bgs. The Phase II investigation included three new soil borings to a depth of 40 feet bgs. Nine soil samples were collected for chemical analysis from the surface to the bottom of each boring. Chemical analysis included VOCs, SVOCs, TAL metals, and TRPH.

Three soil borings were drilled and soil samples collected in the area surrounding the presumed location of the former aboveground storage tank. Two of the borings (4804 and 4805) were drilled to a total depth of 39.5 feet, while the third boring (4806) was drilled to a total depth of 40 feet (Figure 5-2). Two of the borings, one at each end of the UST, were placed at the

presumed location of the unit, while the third boring was placed about 20 feet to the northeast of the presumed north end of the former UST location.

Surface soil samples were collected from 0 to 0.5 feet in Boring 4804, from 0.5 to 2.5 feet in Boring 4805, and from 0 to 2.0 feet in Boring 4806. All borings were also sampled at intervals of 3 to 5 feet, 8 to 10 feet, 13 to 15 feet, 18 to 20 feet, 23 to 25 feet, 28 to 30 feet, 33 to 35 feet, and 38 to 40 feet (39.5 feet in Borings 4804 and 4805).

A summary of the detected chemicals for these soil samples are provided in Figure 5-3 and Table 5-1. Other than acetone and methylene chloride, which were qualified nondetect after they were determined to be laboratory contaminants, the only VOC reported in any of the surface samples was toluene at an estimated concentration of 1.3 µg/kg in Boring 4806 and at a concentration of 5.7 µg/kg in Boring 4804. Only one SVOC, bis(2-ethylhexyl) phthalate, was detected in the surface samples at a concentration of 57 µg/kg (Boring 4804). TRPH was reported in all of the near-surface samples at concentrations of 185 mg/kg (Boring 4804), 61.6 mg/kg (Boring 4805), and 56.2 mg/kg (Boring 4806). The maximum concentrations of aluminum, antimony, calcium chromium, iron, lead, magnesium and nickel exceeded background concentrations in surface soils.

In subsurface soils other than acetone and methylene chloride, which were qualified nondetect after they were determined to be laboratory contaminants, the only VOCs reported were toluene, chlorobenzene, ethylbenzene, xylenes, and 2-butanone. Toluene was reported only in two samples at concentrations of 1.3 and 2.3 µg/kg (Boring 4804-05 and 4806-05). Ethylbenzene was reported in four samples from Boring 4806 at concentrations ranging from 1.8 to 890 µg/kg. Ethylbenzene concentrations decreased with depth to non-defect. Total xylenes were reported in five samples from Boring 4806 ranging from at concentrations of 69 to 12,000 µg/kg. Xylene concentrations decreased with depth to non-defect. 2-Butanone was reported in two samples from Boring 4806 at concentrations of 1,200 µg/kg and 140 µg/kg. Several SVOCs were reported in some of the subsurface samples. Most of these SVOCs are PAH compounds in the subsurface samples from Boring 4806. Total PAH concentrations reported in Boring 4806 ranged from 3,338 µg/kg to 18,990 µg/kg. Other non-PAH compounds reported were acenaphthene, 4-chloroaniline, di-n-butyl phthalate, dibenzofuran, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and phenol. TRPH was reported in several of the subsurface samples. Boring 4804 samples had reported TRPH concentrations of 1,050 mg/kg (estimated) and 81 mg/kg (estimated). None of the subsurface samples in Boring 4805 had reported TRPH concentrations. Boring 4806 samples had reported TRPH concentrations of 729 mg/kg, 17,300 mg/kg, 3,890 mg/kg, 2,080 mg/kg, 1,350 mg/kg, and 199 mg/kg.

The maximum concentrations of antimony, barium, cobalt, manganese, nickel, and zinc exceeded background levels in subsurface soils in the Phase II investigation (W-C 1995b).

TRPH from the Phase II investigation (17,300 mg/kg) exceeds the NMED screening guideline for soil of 1,000 mg/kg. The NMED action levels of 500 mg/kg for BTEX and 10 mg/kg for benzene individually were not exceeded.

5.5 HUMAN HEALTH RISK EVALUATION

5.5.1 Site Conceptual Exposure Model

The SCEM is a schematic representation of the contaminant source areas, chemical release mechanisms, environmental transport media, potential human intake routes, and potential human receptors. A SCEM should identify complete exposure pathways that may result in human health risks and indicate the data needed to evaluate those pathways. An exposure pathway consists of four necessary elements:

- A source and mechanism of chemical release to the environment
- An environmental transport medium for the released chemical (e.g., air, groundwater, or surface water)
- A point of potential human exposure to transported chemicals (e.g., a domestic drinking water well)
- A human intake mechanism (e.g., inhalation or ingestion) at the point of exposure

All four elements must be present for an exposure pathway to be complete and for chemical exposure to occur. In the SCEM, potentially complete exposure pathways are indicated with solid lines; minor (insignificant) pathways are indicated with dashed lines.

The SCEM for SWMU 48A is presented in Figure 5-4. The primary source at the SWMU is waste fuels and fluids that have leaked into subsurface soils or have been spilled on surface soils during tank emptying. Chemicals from the primary source may be transported away from the primary source areas, affecting other media that may in turn act as secondary sources. Mixing and infiltration of the wastes with the soil is shown as the primary chemical release mechanisms. Once released to soil, the chemicals may then be released to groundwater by infiltration/ percolation or to the atmosphere by volatilization or wind erosion. Chemicals could also be released directly to receptors via contact with soil.

Other release mechanisms, such as direct contact (soil ingestion and dermal contact), surface runoff, wind erosion, or volatilization to the atmosphere, are also depicted in the SCEM. Transport by storm runoff is not considered a significant pathway for human exposure at SWMU 48A because the contamination is primarily in the subsurface and the SWMU has been covered with pavement.

Potential receptors at SWMU 48A include occupational receptors, hypothetical future construction workers, and hypothetical trespassers. SWMU 48A is located in the industrial area of the Base; therefore, residential development is not a likely future land use. Surface soil (upper 2 feet of soil column) and air emissions (volatile organic chemicals or particulates) from surface soil may provide exposures to occupational receptors and hypothetical trespassers. Surface soil, subsurface soil, and air emissions (volatile and particulate) from soil may provide exposures to hypothetical future construction workers during excavation activities. If volatile organic chemicals are present in subsurface soils, there is the potential for vapor intrusion from the

subsurface to indoor air pathway. The Johnson and Ettinger model (USEPA 2004) will be used to evaluate this pathway when appropriate.

Groundwater is used for domestic purposes on and off Base. However, the contaminant source at SWMU 48A was removed in 1988 and the area is currently paved. The nearest potable aquifer is located more than 250 feet bgs. Therefore, potential groundwater exposures were not evaluated.

In summary, the potentially complete human exposure pathways at SWMU 48A are:

Occupational Receptors

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

Hypothetical Future Construction Workers

- Ingestion of subsurface and surface soil
- Dermal Contact with subsurface and surface soil
- Inhalation of volatile emissions and airborne particulate matter from subsurface and surface soil

Hypothetical Trespassers

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

5.5.2 Site Classification

Site classification is a prioritization step that is used to judge the urgency of the need for initial response actions and maximizes the effectiveness of limited resources. There are four classes of sites (ASTM 1996):

Class 1: Immediate threat to human health and safety or sensitive environmental receptors

Class 2: Short-term threat to human health and safety or sensitive environmental receptors

Class 3: Long-term threat to human health and safety or sensitive environmental receptors

Class 4: No demonstrable threat to human health and safety or sensitive environmental receptors

This site presents no explosive threat and contains no free product, no surface water, and no groundwater discharges. There are no public facilities (i.e., daycares, parks, schools, dwellings) located on or near the site. The nearest potable groundwater aquifer is located more than 250 feet bgs. Additionally, access to soils is limited primarily to Base personnel. Therefore, SWMU 48A was considered to be a Class 4 site.

5.5.3 Background Comparison

Metals are natural constituents of soils and water. Metals that occur in concentrations within background levels are not considered site-related chemicals of concern and are not evaluated further. To determine if the concentrations of metals detected in surface and subsurface soil at SWMU 48A exceeded background concentrations, the maximum detected concentrations at the site were compared to the calculated background UTLs. The UTLs used in this comparison were calculated as part of the background study for Cannon AFB (W-C 1997). Maximum detected concentrations from surface soils were compared to surface soil UTLs. Maximum detected concentrations from subsurface soils were compared to subsurface UTLs. If the maximum detected concentration exceeded the background UTL, the metal was considered to exceed background and was evaluated in the Tier 1 screen.

Surface Soil

The maximum detected surface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, antimony, calcium, chromium, iron, lead, magnesium, and nickel were considered to exceed background levels. All other metals were considered to be within background levels. Table 5-2 summarizes the comparison and a discussion is given below.

Two of three surface soil samples contained aluminum concentrations (ranging from 12,900 mg/kg to 15,300 mg/kg) which exceeded the background UTL of 8,950 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

One of three surface soil samples contained antimony at a concentration (5.5 mg/kg) which exceeded the background UTL of 3 mg/kg. Therefore, antimony was considered to exceed background levels and was evaluated further.

Two of three surface soil samples contained calcium at concentrations (ranging from 54,100 mg/kg to 63,800 mg/kg) which exceeded the background UTL of 44,800 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

Two of three surface soil samples contained chromium at concentrations (ranging from 11.3 mg/kg to 13.8 mg/kg) which exceeded the background UTL of 10.5 mg/kg. Therefore, chromium was considered to exceeded background levels and was evaluated further.

One of three surface soil samples contained iron at a concentration (13,300 mg/kg) which exceeded the background UTL of 10,100 mg/kg. Therefore, iron was considered to exceed background levels and was evaluated further.

One of three surface soil samples contained lead at a concentration (18.8 mg/kg) which exceeded the background UTL of 12 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

All three surface soil samples contained magnesium at concentrations (ranging from 2830 mg/kg to 3100 mg/kg) which exceeded the background UTL of 1,930 mg/kg. Therefore, magnesium was considered to exceed background levels and was evaluated further.

One of three surface soil samples contained nickel at a concentration (13.5 mg/kg) which exceeded the background UTL of 11 mg/kg. Therefore, nickel was considered to exceed background levels and was evaluated further.

Subsurface Soil

The maximum detected subsurface soil concentrations of metals were compared to background concentrations (W-C 1997). Barium, calcium, copper, lead, and potassium were considered to exceed background levels. All other metals were considered to be within background levels. Table 5-3 summarizes the comparison and a discussion is given below.

Two of twenty-three subsurface soil samples contained barium at concentrations (ranging from 1,640 mg/kg to 2,390 mg/kg) which exceeded the background UTL of 890 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

Two of twenty-three subsurface soil samples contained calcium at concentrations (ranging from 246,000 to 250,000 mg/kg) which exceeded the background UTL of 237,498 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

One of twenty-three subsurface soil samples contained copper at a concentration (14.5 mg/kg) which exceeded the background UTL of 8.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

Two of twenty-three subsurface soil samples contained lead at concentrations (15.5 mg/kg and 25.7 mg/kg) which exceeded the background UTL of 8.7 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

One of twenty-three subsurface soil samples contained potassium at a concentration (3,110 mg/kg) which exceeded the background UTL of 2512 mg/kg. Therefore, potassium was considered to exceed background levels and was evaluated further.

Comparison of Site Essential Nutrient Concentrations to RDAs

The maximum detected concentrations of essential nutrients which exceeded background and which do not have EPA Region VI MSSLs established for them were compared to the recommended daily allowances (RDAs) set by the National Research Council.

At SWMU 48A, calcium, magnesium, and potassium were compared to the RDAs. Table 5-4 shows that the maximum detected concentrations of calcium, magnesium, and potassium did not

cause estimated potential SWMU daily intake to exceed the RDAs. Therefore, these inorganics would not pose a human health risk and were not evaluated further.

5.5.4 Tier 1 Evaluation

The Tier 1 evaluation involves the comparison of the maximum detected site concentrations to conservative, nonsite-specific, risk-based screening levels to determine whether site conditions satisfy the criteria for a quick regulatory closure or warrant a more site-specific evaluation.

Chemicals of Potential Concern

COPCs were identified based on the chemical analytical data (both historic and current) presented in Table 5-1. Metals which exceeded background levels and all detected organic compounds (except those considered to be laboratory contaminants) were evaluated as COPCs. TPH was not considered to be a COPC because it is a complex chemical mixture with varying constituents. Therefore, individual constituents (e.g., BTEX, PAHs, etc.) were used to evaluate potential impacts from TPH at SWMU 48A.

Tier 1 Comparison

Maximum detected concentrations of COPCs were compared to the EPA Region VI Residential MSSLs. The comparison is shown in Table 5-5. The table shows that none of the detected compounds exceeded the Tier 1 values. Therefore, there are no chemicals of concern (COCs) at SWMU 48A.

5.6 ECOLOGICAL RISK EVALUATION

Certain nondomesticated plants and animals will occur, at least at times, in almost any area that is outdoors, regardless of the absence of "natural" habitat and/or the omnipresence of human activity and artificial structures (buildings, pavement). Thus, strictly speaking, virtually any area outside of a building might include "habitat for ecological receptors." Such essentially artificial habitats are not, however, considered *directly* ecologically relevant because they exist and are configured to support human (industrial) functions. Understanding the concept of "direct ecological relevance" is very important in assessing ecological risk at an active military site.

The initial step in ecological evaluation of a site is determining whether the unit has an *ecological component*. This determination is based on the availability, within the subject unit, of *habitat*. Simply defined, the term habitat means the "place where a plant or animal lives" (USACE 1996; USEPA 1997a), but a more functional definition can be paraphrased as the *type of environment* where an organism (or community of similarly adapted organisms) *normally* lives. If no ecological components are identified, it is concluded that the unit is not of potential ecological concern and no further ecological evaluation is warranted. It is not believed that individual organisms that are occasionally present constitute an ecological component because individuals (unless accorded official protection as endangered or threatened) are not appropriate as assessment endpoints for an ecological risk assessment. As stated by USEPA (1997a), "Ecological effects of most concern are those that can impact populations (or higher levels of

biological organization)." By definition, an occasional individual does not constitute a population nor would any effects on an occasional individual be expected to translate into an effect on a population.

SWMU 48A is an asphalt-covered parking lot. This area provides no significant shelter or forage and does not represent any significant ecological component. Formal ecological risk assessment for this SWMU is not warranted.

5.7 VADOSE ZONE CONTAMINANT FATE AND TRANSPORT MODELING

Because chemicals were not detected in soil above MSSLs at SWMU 48A, the fate and transport of contaminants in the vadose, or unsaturated, zone was not modeled.

5.8 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVES

- Results of the human health and ecological risk evaluations indicate that there is minimal risk to human health and the environment based on the maximum detected concentrations of chemicals of concern in soil at SWMU 48A. Therefore, the "No Further Action' alternative was evaluated based on the criteria listed in Section 2.3 and as outlined in the CMS Work Plan (W-C 1998).

1. Technical
   - Performance - the No Further Action alternative is effective at being protective of human health and the environment over extended periods of time. This has been demonstrated through Tier I human health and ecological risk evaluations.
   - Reliability - the No Further Action alternative does not require any operation or maintenance activities and has been proven to be effective before for similar sites and conditions.
   - Implementability - the No Further Action alternative is easy to implement and will meet or exceed applicable standards.
   - Safety - the No Action Alternative poses no threat to the safety of nearby workers.
2. Human Health
   - The No Further Action alternative was determined following the Risk-Based Corrective Action (RBCA) process as outlined in ASTM E1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.
   - Maximum concentrations of chemicals of concern left in place are less than conservative Tier I EPA Region VI Media Specific Screening Levels (MSSLs).
3. Environmental
   - No valued ecological resources are present.
4. Cost

- The No Further Action alternative is protective of human health and the environment and at the lowest cost.

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4804-0000			CAN048-4804-0005			CAN048-4804-0010			CAN048-4804-0015			CAN048-4804-0020			CAN048-4804-0025		
LAB SAMPLE NUMBER	0397740007SA			0397740008SA			0397740009SA			0397740010SA			0397740011SA			0397740012SA		
COLLECT DATE	12/11/1994			12/11/1994			12/11/1994			12/11/1994			12/11/1994			12/11/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (μg/kg)																		
Acetone	3.4	11	J	<	11	U	3	12	J	<	11	U	<	11	U	<	11	U
2-Butanone (MEK)	<	11	U	<	11	U	<	12	U	<	11	U	<	11	U	<	11	U
Chlorobenzene	<	5.6	U	<	5.7	U	<	5.8	U	<	5.6	U	<	5.6	U	<	5.5	U
Ethylbenzene	<	5.6	U	<	5.7	U	<	5.8	U	<	5.6	U	<	5.6	U	<	5.5	U
Methylene chloride	<	5.6	U	<	5.7	U	<	5.8	U	<	5.6	U	<	5.6	U	<	5.5	U
Toluene	5.7	5.6		1.3	5.7	J	<	5.8	U	<	5.6	U	<	5.6	U	<	5.5	U
Xylenes (total)	<	5.6	U	<	5.7	U	<	5.8	U	<	5.6	U	<	5.6	U	<	5.5	U
Semivolatile Organics (μg/kg)																		
Acenaphthene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
bis(2-Ethylhexyl)phthalate	57	370	J	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
4-Chloroaniline	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
Di-n-butyl phthalate	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
Dibenzofuran	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
1,2-Dichlorobenzene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
1,3-Dichlorobenzene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
1,4-Dichlorobenzene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
Fluoranthene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
Fluorene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
2-Methylnaphthalene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
Naphthalene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
N-Nitrosodiphenylamine	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
Phenanthrene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U
Phenol	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	360	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J = Estimated value.
R = Rejected value. D = Sample was diluted for analysis.
U = Nondetected value. RL = Reporting Limit.
(1) Duplicate for the preceeding sample number.

Metals (mg/kg)																		
Aluminum	12900	11.3		11900	11.3		8580	11.5		4400	55.6		8150	11.1		6370	22.1	

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4804-0000			CAN048-4804-0005			CAN048-4804-0010			CAN048-4804-0015			CAN048-4804-0020			CAN048-4804-0025		
LAB SAMPLE NUMBER	0397740007SA			0397740008SA			0397740009SA			0397740010SA			0397740011SA			0397740012SA		
COLLECT DATE	12/11/1994			12/11/1994			12/11/1994			12/11/1994			12/11/1994			12/11/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Antimony	5.5	6.8	J	<	6.8	UJ	<	6.9	U	<	33.3	UJ	<	6.7	UJ	<	13.2	UJ
Arsenic	3	0.56		2.6	0.57		2.9	0.58		2	0.56		1.2	0.56		1.8	0.55	
Barium	149	1.1		456	1.1		304	1.2		436	5.6		69.3	1.1		109	2.2	
Beryllium	0.53	0.23		0.5	0.23		0.46	0.23		<	1.1	U	0.26	0.22		<	0.44	U
Calcium	63800	22.5		102000	22.7		112000	23		250000	111		78900	22.3		173000	44.1	
Chromium	11.3	1.1		8.9	1.1		6.8	1.2		<	5.6	U	5.9	1.1		2.6	2.2	
Cobalt	4.1	1.1		3.5	1.1		3.3	1.2		<	5.6	U	1.6	1.1		1.2	2.2	J
Copper	7.3	2.3		7	2.3		5.9	2.3		<	11.1	U	1.8	2.2	J	1.9	4.4	J
Iron	9480	11.3		8550	11.3		6840	11.5		2410	55.6		4810	11.1		3680	22.1	
Lead	18.8	5.6	J	15.5	5.7	J	11.3	2.9	J	2.3	0.56	J	2.7	0.56	J	1.9	0.55	J
Magnesium	2830	22.5	J	3760	22.7	J	4160	23		13400	111		8310	22.3	J	10500	44.1	J
Manganese	133	1.1		168	1.1		118	1.2		21.4	5.6	J	40.5	1.1		34	2.2	
Nickel	8.2	4.5		7.8	4.5		8.3	4.6		9	22.2	J	5.7	4.5		4.2	8.8	J
Potassium	2140	563		1980	567		1540	576		448	2780	J	1400	556		1070	1100	J
Vanadium	18.6	1.1		18.3	1.1		17.2	1.2		17.7	5.6		18	1.1		15	2.2	
Zinc	29.2	2.3		28.2	2.3		18.2	2.3		6.1	11.1	J	10.3	2.2		7.5	4.4	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons	185	45.1	J	1050	90.8	J	81	46.1	J	<	44.5	UJ	<	44.5	UJ	<	44.1	UJ

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.

A complete summary of chemical results are presented in Appendix A.

J = Estimated value.

R = Rejected value. D = Sample was diluted for analysis.

U = Nondetected value. RL = Reporting Limit.

(1) Duplicate for the preceeding sample number.

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4804-0030			CAN048-4804-0035			CAN048-4804-0040			CAN048-4805-0000			CAN048-4805-0005			CAN048-4805-0010			CAN048-4805-4861[1]		
LAB SAMPLE NUMBER	0397940007SA			0397940008SA			0397940009SA			0397940010SA			0397940011SA			0397940012SA			0398000001SA		
COLLECT DATE	12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (μg/kg)																					
Acetone	4.8	11	J	4.9	11	J	6.7	11	J	<	11	U	9.5	12	J	<	11	U	17	11	
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	12	U	<	11	U	<	11	U
Chlorobenzene	<	5.5	U	<	5.3	U	<	5.3	U	<	5.7	U	<	5.8	U	<	5.5	U	<	5.5	U
Ethylbenzene	<	5.5	U	<	5.3	U	<	5.3	U	<	5.7	U	<	5.8	U	<	5.5	U	<	5.5	U
Methylene chloride	<	5.5	U	<	5.3	U	<	5.3	U	<	5.7	U	<	5.8	U	<	5.5	U	5.6	5.5	
Toluene	<	5.5	U	<	5.3	U	<	5.3	U	<	5.7	U	<	5.8	U	<	5.5	U	<	5.5	U
Xylenes (total)	<	5.5	U	<	5.3	U	<	5.3	U	<	5.7	U	<	5.8	U	<	5.5	U	<	5.5	U
Semivolatile Organics (μg/kg)																					
Acenaphthene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
bis(2-Ethylhexyl)phthalate	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
4-Chloroaniline	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
Di-n-butyl phthalate	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
Dibenzofuran	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
1,2-Dichlorobenzene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
1,3-Dichlorobenzene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
1,4-Dichlorobenzene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
Fluoranthene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
Fluorene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
2-Methylnaphthalene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
Naphthalene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
N-Nitrosodiphenylamine	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
Phenanthrene	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U
Phenol	<	360	U	<	350	U	<	350	U	<	370	U	<	380	U	<	360	U	<	360	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J = Estimated value.
R = Rejected value. D = Sample was diluted for analysis.
U = Nondetected value. RL = Reporting Limit.
[1] Duplicate sample for the preceeding sample number.

Metals (mg/kg)																					
Aluminum	4010	21.9		3210	10.7		3940	10.7		15300	11.3		6410	23.3		9080	10.9		4190	11	J

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4804-0030			CAN048-4804-0035			CAN048-4804-0040			CAN048-4805-0000			CAN048-4805-0005			CAN048-4805-0010			CAN048-4805-4861[1]		
LAB SAMPLE NUMBER	0397940007SA			0397940008SA			0397940009SA			0397940010SA			0397940011SA			0397940012SA			0398000001SA		
COLLECT DATE	12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Antimony	<	13.1	UJ	<	6.4	UJ	<	6.4	UJ	<	6.8	UJ	<	14	UJ	<	6.6	UJ	<	6.6	UJ
Arsenic	1.6	0.55		0.85	0.53		0.67	0.53		2.5	0.57		2.1	0.58		2.1	0.55		2	0.55	
Barium	87.5	2.2		37.5	1.1		39.6	1.1		132	1.1		170	2.3		49.5	1.1		43.9	1.1	J
Beryllium	<	0.44	U	<	0.21	U	<	0.21	U	0.71	0.23	J	0.29	0.47	J	0.43	0.22	J	0.38	0.22	
Calcium	193000	43.8		67900	21.3		64000	21.3		21000	22.6		207000	46.6		49600	21.9		52600	22.1	J
Chromium	4.1	2.2		3	1.1		3.5	1.1		13.8	1.1		4.1	2.3		7.8	1.1		4.5	1.1	J
Cobalt	<	2.2	U	0.88	1.1	J	1.6	1.1		5.9	1.1		3	2.3		3.5	1.1		3.1	1.1	
Copper	2.2	4.4	J	1.8	2.1	J	2	2.1	J	10	2.3		3.2	4.7	J	5.4	2.2		4.5	2.2	
Iron	2830	21.9		3120	10.7		3800	10.7		13300	11.3		5230	23.3		8180	10.9		4480	11	J
Lead	1.4	0.55		1.8	0.53		1.7	1.1		11.8	1.1		3.7	0.58		5.9	0.55		5.2	1.1	J
Magnesium	7060	43.8		3260	21.3		5470	21.3		2840	22.6		2990	46.6		3410	21.9		2580	22.1	
Manganese	27.6	2.2		32.3	1.1		58.9	1.1		245	1.1		49.9	2.3		126	1.1		99.8	1.1	
Nickel	8.2	8.8	J	4.1	4.3	J	5	4.3		13.5	4.5		5.6	9.3	J	8.9	4.4		5.2	4.4	
Potassium	836	1100	J	725	533		838	533		2330	565		1040	1160	J	1810	547		1050	552	
Vanadium	9.5	2.2		7.4	1.1		11.6	1.1		22.2	1.1		13.9	2.3		23.4	1.1		20.7	1.1	J
Zinc	7	4.4		6.5	2.1		7.6	2.1		33.1	2.3		12.7	4.7		19.3	2.2		11.3	2.2	J
TRPH (mg/kg)																					
Total Recoverable Petroleum Hydrocarbons	<	43.8	U	<	42.7	U	<	42.6	U	61.6	45.2		<	46.6	U	<	43.8	U	<	44.2	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.

A complete summary of chemical results are presented in Appendix A.

J = Estimated value.

R = Rejected value. D = Sample was diluted for analysis.

U = Nondetected value. RL = Reporting Limit.

[1] Duplicate sample for the preceeding sample number.

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4805-0015			CAN048-4805-0020			CAN048-4805-0025			CAN048-4805-0030			CAN048-4805-0035			CAN048-4805-0040		
LAB SAMPLE NUMBER	0397940013SA			0397940001SA			0397940002SA			0397940003SA			0397940004SA			0397940005SA		
COLLECT DATE	12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	5	11	J	<	11	U	8.9	11	J	4.8	11	J	<	11	U	3.8	11	J
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Chlorobenzene	<	5.6	U	<	5.7	U	<	5.4	U	<	5.4	U	<	5.3	U	<	5.4	U
Ethylbenzene	<	5.6	U	<	5.7	U	<	5.4	U	<	5.4	U	<	5.3	U	<	5.4	U
Methylene chloride	<	5.6	U	<	5.7	U	<	5.4	U	3.9	5.4	J	4.3	5.3	J	<	5.4	U
Toluene	<	5.6	U	<	5.7	U	<	5.4	U	<	5.4	U	<	5.3	U	<	5.4	U
Xylenes (total)	<	5.6	U	<	5.7	U	<	5.4	U	<	5.4	U	<	5.3	U	<	5.4	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	U	<	350	U
bis(2-Ethylhexyl)phthalate	<	370	U	<	370	U	120	360	J	<	360	U	<	350	U	<	350	U
4-Chloroaniline	<	370	U	<	370	U	<	360	U	<	360	U	<	350	UJ	<	350	U
Di-n-butyl phthalate	<	370	U	<	370	U	<	360	U	<	360	U	<	350	U	<	350	U
Dibenzofuran	<	370	U	<	370	U	<	360	U	<	360	U	<	350	U	<	350	U
1,2-Dichlorobenzene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	UJ	<	350	U
1,3-Dichlorobenzene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	UJ	<	350	U
1,4-Dichlorobenzene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	UJ	<	350	U
Fluoranthene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	U	<	350	U
Fluorene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	U	<	350	U
2-Methylnaphthalene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	UJ	<	350	U
Naphthalene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	UJ	<	350	U
N-Nitrosodiphenylamine	<	370	U	<	370	U	<	360	U	<	360	U	<	350	U	<	350	U
Phenanthrene	<	370	U	<	370	U	<	360	U	<	360	U	<	350	U	<	350	U
Phenol	<	370	U	<	370	U	<	360	U	<	360	U	<	350	UJ	<	350	U
Metals (mg/kg)																		
Aluminum	8100	11.1		12100	11.4		7480	21.8		6460	10.8		3790	10.6		3120	10.7	

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J = Estimated value.
R = Rejected value. D = Sample was diluted for analysis.
U = Nondetected value. RL = Reporting Limit.

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4805-0015			CAN048-4805-0020			CAN048-4805-0025			CAN048-4805-0030			CAN048-4805-0035			CAN048-4805-0040		
LAB SAMPLE NUMBER	0397940013SA			0397940001SA			0397940002SA			0397940003SA			0397940004SA			0397940005SA		
COLLECT DATE	12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Antimony	<	6.7	UJ	<	6.8	UJ	<	13.1	UJ	<	6.5	UJ	<	6.4	UJ	<	6.4	UJ
Arsenic	1.7	0.56		1.7	1.1		0.79	0.54		0.65	0.54		0.58	0.53		0.64	0.54	
Barium	96.1	1.1		331	1.1		2390	2.2		40.1	1.1		35.3	1.1		41.7	1.1	
Beryllium	0.46	0.22	J	0.53	0.23	J	<	0.44	U	0.18	0.22	J	0.13	0.21	J	<	0.21	U
Calcium	37400	22.3		75100	22.7		128000	43.5		53900	21.6		41900	21.2		49200	21.5	
Chromium	7	1.1		9	1.1		4.6	2.2		5.6	1.1		2.8	1.1		3	1.1	
Cobalt	3	1.1		2.7	1.1		2.2	2.2		1.5	1.1		1.8	1.1		1.4	1.1	
Copper	5	2.2		4.1	2.3		14.5	4.4		1.8	2.2	J	1.6	2.1	J	2.4	2.1	
Iron	7620	11.1		8180	11.4		6130	21.8		4670	10.8		3630	10.6		3160	10.7	
Lead	6.5	1.1		5.8	0.57		2.5	0.54		1.9	0.54		2	0.53		2.1	0.54	
Magnesium	3340	22.3		7730	22.7		13700	43.5		5080	21.6		2820	21.2		3600	21.5	
Manganese	124	1.1		81.1	1.1		79.8	2.2		36.7	1.1		58.5	1.1		44.3	1.1	
Nickel	7.7	4.5		9.6	4.5		7.9	8.7	J	5.1	4.3		4.3	4.2		3.5	4.3	J
Potassium	1880	556		3110	568		1350	1090		1380	539		817	530		593	537	
Vanadium	17.9	1.1		21.2	1.1		15.3	2.2		11.3	1.1		8.2	1.1		8.6	1.1	
Zinc	18.3	2.2		19.5	2.3		21.1	4.4		9.2	2.2		7	2.1		7.2	2.1	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons	<	44.5	U	<	45.4	U	<	43.5	U	<	43.1	U	<	42.4	U	<	42.9	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.

A complete summary of chemical results are presented in Appendix A.

J = Estimated value.

R = Rejected value. D = Sample was diluted for analysis.

U = Nondetected value. RL = Reporting Limit.

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4806-0000			CAN048-4806-4862[1]			CAN048-4806-0005			CAN048-4806-0010			CAN048-4806-0010			CAN048-4806-0015		
LAB SAMPLE NUMBER	0398000002SA			0398000007SA			0398000003SA			0398000004RA			0398000004SA			0398000005RA		
COLLECT DATE	12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	11	U	<	11	U	29	11					<	5500	U			
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U				<	5500	U			
Chlorobenzene	<	5.3	U	<	5.6	U	3	5.6	J				<	2800	U			
Ethylbenzene	<	5.3	U	<	5.6	U	1.8	5.6	J				890	2800	J			
Methylene chloride	5.2	5.3	J	5.5	5.6	J	6.5	5.6					<	2800	U			
Toluene	1.3	5.3	J	<	5.6	U	2.3	5.6	J				<	2800	U			
Xylenes (total)	<	5.3	U	<	5.6	U	26	5.6					12000	2800				
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	350	U	<	370	U	<	3700	U	<	1500	UJ	<	3600	UJ	<	750	UJ
bis(2-Ethylhexyl)phthalate	<	350	U	<	370	U	<	3700	U	9100	1500		<	7400	UJ	3300	750	
4-Chloroaniline	<	350	U	<	370	U	<	3700	U	<	1500	UJ	7900	3600	J	<	750	UJ
Di-n-butyl phthalate	<	350	U	<	370	U	<	3700	U	<	1500	UJ	410	3600	J	<	750	UJ
Dibenzofuran	<	350	U	<	370	U	<	3700	U	<	1500	UJ	<	3600	UJ	<	750	UJ
1,2-Dichlorobenzene	<	350	U	<	370	U	<	3700	U	7500	1500		4100	3600	J	1100	750	
1,3-Dichlorobenzene	<	350	U	<	370	U	<	3700	U	700	1500	J	450	3600	J	<	750	UJ
1,4-Dichlorobenzene	<	350	U	<	370	U	<	3700	U	1800	1500		950	3600	J	<	750	UJ
Fluoranthene	<	350	U	<	370	U	<	3700	U	1200	1500	J	700	3600	J	500	750	J
Fluorene	<	350	U	<	370	U	<	3700	U	190	1500	J	<	3600	UJ	110	750	J
2-Methylnaphthalene	<	350	U	<	370	U	<	3700	U	12000	1500		<	3600	UJ	5000	750	
Naphthalene	<	350	U	<	370	U	<	3700	U	5200	1500		2900	3600	J	2200	750	
N-Nitrosodiphenylamine	<	350	U	<	370	U	<	3700	U	<	1500	UJ	<	3600	UJ	400	750	J
Phenanthrene	<	350	U	<	370	U	<	3700	U	400	1500	J	<	3600	UJ	110	750	J
Phenol	<	350	U	<	370	U	<	3700	U	<	1500	UJ	<	3600	UJ	<	750	UJ

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.

J = Estimated value.
R = Rejected value.
U = Nondetected value.
D = Sample was diluted for analysis.
RL = Reporting Limit.
[1] Duplicate sample for the preceeding sample number.

Metals (mg/kg)																		
Aluminum	5240	10.7	J	5640	11.1	J	9790	11.3	J				4050	55.1	J			

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4806-0000			CAN048-4806-4862[1]			CAN048-4806-0005			CAN048-4806-0010			CAN048-4806-0010			CAN048-4806-0015		
LAB SAMPLE NUMBER	0398000002SA			0398000007SA			0398000003SA			0398000004RA			0398000004SA			0398000005RA		
COLLECT DATE	12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Antimony	<	6.4	UJ	<	6.7	UJ	<	6.8	UJ				<	33	U			
Arsenic	2.8	0.53		2.6	0.56		2.7	0.56					3.4	0.55				
Barium	242	1.1	J	169	1.1	J	206	1.1	J				1640	5.5	J			
Beryllium	0.37	0.21		0.41	0.22		0.44	0.23					<	1.1	U			
Calcium	54100	21.3	J	32000	22.3	J	47600	22.5	J				246000	110	J			
Chromium	5.2	1.1	J	6.2	1.1	J	8.2	1.1	J				<	5.5	UJ			
Cobalt	3	1.1		3.6	1.1		3.4	1.1					4.4	5.5	J			
Copper	6.5	2.1		7.1	2.2		6.9	2.3					<	11	U			
Iron	4900	10.7	J	5810	11.1	J	7930	11.3	J				2800	55.1	J			
Lead	11.2	1.1	J	16.1	1.1		25.7	2.8	J				8.9	1.1	J			
Magnesium	3100	21.3		2320	22.3		2140	22.5					7050	110				
Manganese	132	1.1		152	1.1		138	1.1					40.2	5.5				
Nickel	7	4.3		7.1	4.5		7.1	4.5					6	22	J			
Potassium	1150	533		1270	557		1830	563					926	2750	J			
Vanadium	13.4	1.1	J	14.7	1.1	J	15.9	1.1	J				12.3	5.5	J			
Zinc	17.5	2.1	J	17.7	2.2	J	23.1	2.3	J				9.4	11	J			
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons	56.2	42.7		81.8	44.5		729	45					17300	1320				

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.

A complete summary of chemical results are presented in Appendix A.

J = Estimated value.

R = Rejected value.

U = Nondetected value.

D = Sample was diluted for analysis.

RL = Reporting Limit.

[1] Duplicate sample for the preceeding sample number.

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4806-0015			CAN048-4806-0020			CAN048-4806-0025			CAN048-4806-0030			CAN048-4806-4863[1]		
LAB SAMPLE NUMBER	0398000005SA			0398000006SA			0398000008SA			0398000009SA			0398000012SA		
COLLECT DATE	12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)															
Acetone	<	5700	U	<	2900	U	410	110		13	12		<	11	U
2-Butanone (MEK)	<	5700	U	1200	2900	J	140	110		<	12	U	<	11	U
Chlorobenzene	<	2800	U	<	1400	U	<	56	U	<	5.8	U	<	5.3	U
Ethylbenzene	570	2800	J	420	1400	J	<	56	U	<	5.8	U	<	5.3	U
Methylene chloride	<	2800	U	<	1400	U	41	56	J	4.8	5.8	J	1.9	5.3	J
Toluene	<	2800	U	<	1400	U	<	56	U	<	5.8	U	<	5.3	U
Xylenes (total)	5500	2800		3300	1400		69	56		<	5.8	U	<	5.3	U
Semivolatile Organics (µg/kg)															
Acenaphthene	88	750	J	<	1900	U	<	370	U	<	380	U	<	350	U
bis(2-Ethylhexyl)phthalate	<	750	UJ	<	1900	U	<	370	U	<	380	U	<	350	U
4-Chloroaniline	<	750	R	<	1900	U	<	370	U	<	380	U	<	350	U
Di-n-butyl phthalate	<	750	R	<	1900	U	<	370	U	<	380	U	<	350	U
Dibenzofuran	220	750	J	<	1900	U	88	370	J	<	380	U	<	350	U
1,2-Dichlorobenzene	1100	750	J	220	1900	J	<	370	U	<	380	U	<	350	U
1,3-Dichlorobenzene	<	750	R	<	1900	U	<	370	U	<	380	U	<	350	U
1,4-Dichlorobenzene	<	750	R	<	1900	U	<	370	U	<	380	U	<	350	U
Fluoranthene	510	750	J	230	1900	J	150	370	J	<	380	U	<	350	U
Fluorene	130	750	J	<	1900	U	47	370	J	<	380	U	<	350	U
2-Methylnaphthalene	5700	750	J	3600	1900		2300	370		<	380	U	87	350	J
Naphthalene	2100	750	J	1200	1900	J	800	370		<	380	U	<	350	U
N-Nitrosodiphenylamine	<	750	R	<	1900	U	<	370	U	<	380	U	<	350	U
Phenanthrene	98	750	J	<	1900	U	41	370	J	<	380	U	<	350	U
Phenol	<	750		<	1900	U	38	370	J	<	380	U	<	350	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.

J = Estimated value.
R = Rejected value.
U = Nondetected value.
D = Sample was diluted for analysis.
RL = Reporting Limit.
[1] Duplicate sample for the preceeding sample number.

Metals (mg/kg)															
Aluminum	3630	22.7	J	3860	22.9	J	4590	22.4	J	5850	11.5	J	2030	10.7	J

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4806-0015			CAN048-4806-0020			CAN048-4806-0025			CAN048-4806-0030			CAN048-4806-4863[1]		
LAB SAMPLE NUMBER	0398000005SA			0398000006SA			0398000008SA			0398000009SA			0398000012SA		
COLLECT DATE	12/12/1994			12/12/1994			12/12/1994			12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Antimony	<	13.6	UJ	14	13.7	J	<	13.4	UJ	<	6.9	UJ	<	6.4	UJ
Arsenic	1.7	0.57		1.4	0.57		1.6	0.56		0.82	0.58		0.94	2.1	J
Barium	402	2.3	J	205	2.3	J	518	2.2	J	244	1.2	J	63.6	1.1	J
Beryllium	<	0.45	U	<	0.46	U	0.23	0.45	J	0.2	0.23	J	0.12	0.21	J
Calcium	210000	45.3	J	170000	45.8	J	173000	44.7	J	33600	23.1	J	23000	21.4	J
Chromium	5.8	2.3	J	2.4	2.3	J	6.5	2.2	J	4	1.2	J	1.3	1.1	J
Cobalt	1.6	2.3	J	1.2	2.3	J	1.8	2.2	J	1.2	1.2		0.79	1.1	J
Copper	1.4	4.5	J	1.4	4.6	J	2.9	4.5	J	1.6	2.3	J	0.9	2.1	J
Iron	1980	22.7		2320	22.9	J	2890	22.4	J	4360	11.5	J	1560	10.7	J
Lead	1.8	0.57	J	1.9	0.57	J	2.1	0.56	J	2.1	0.58	J	2.1	0.53	J
Magnesium	16200	45.3		15500	45.8		17700	44.7		3330	23.1		2100	21.4	
Manganese	20.8	2.3		26.8	2.3		28.9	2.2		34.6	1.2		24.5	1.1	
Nickel	8.5	9.1	J	4.4	9.2	J	6.2	8.9	J	3.6	4.6	J	1.7	4.3	J
Potassium	478	1130	J	483	1140	J	735	1120	J	1310	577		613	534	
Vanadium	18.9	2.3	J	20	2.3	J	19.8	2.2	J	9.8	1.2	J	5.5	1.1	J
Zinc	6.1	4.5	J	5.5	4.6	J	7.1	4.5	J	9	2.3	J	3.7	2.1	J
TRPH (mg/kg)															
Total Recoverable Petroleum Hydrocarbons	3890	907		2080	137		1350	492		199	46.2		172	42.7	

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.

J = Estimated value.
R = Rejected value.
U = Nondetected value.
D = Sample was diluted for analysis.
RL = Reporting Limit.
[1] Duplicate sample for the preceeding sample number.

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4806-0035			CAN048-4806-0040		
LAB SAMPLE NUMBER	0398000010SA			0398000011SA		
COLLECT DATE	12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)						
Acetone	9.2	10	J	3.5	11	J
2-Butanone (MEK)	<	10	U	<	11	U
Chlorobenzene	<	5.2	U	<	5.3	U
Ethylbenzene	<	5.2	U	<	5.3	U
Methylene chloride	3.3	5.2	J	2.1	5.3	J
Toluene	<	5.2	U	<	5.3	U
Xylenes (total)	<	5.2	U	<	5.3	U
Semivolatile Organics (µg/kg)						
Acenaphthene	<	340	U	<	350	U
bis(2-Ethylhexyl)phthalate	<	340	U	<	350	U
4-Chloroaniline	<	340	U	<	350	U
Di-n-butyl phthalate	<	340	U	<	350	U
Dibenzofuran	<	340	U	<	350	U
1,2-Dichlorobenzene	<	340	U	<	350	U
1,3-Dichlorobenzene	<	340	U	<	350	U
1,4-Dichlorobenzene	<	340	U	<	350	U
Fluoranthene	<	340	U	<	350	U
Fluorene	<	340	U	<	350	U
2-Methylnaphthalene	<	340	U	<	350	U
Naphthalene	<	340	U	<	350	U
N-Nitrosodiphenylamine	<	340	U	<	350	U
Phenanthrene	<	340	U	<	350	U
Phenol	<	340	U	<	350	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J = Estimated value.
R = Rejected value. D = Sample was diluted for analysis.
U = Nondetected value. RL = Reporting Limit.
(1) Duplicate sample for the preceeding sample number.

Metals (mg/kg)						
Aluminum	2860	10.4	J	2970	10.5	J

TABLE 5-1

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 48A CANNON AFB

LOCATOR	CAN048-4806-0035			CAN048-4806-0040		
LAB SAMPLE NUMBER	0398000010SA			0398000011SA		
COLLECT DATE	12/12/1994			12/12/1994		
	Result	RL	Qual	Result	RL	Qual
Antimony	<	6.3	UJ	<	6.3	UJ
Arsenic	0.61	2.1	J	0.57	0.53	
Barium	24.3	1	J	23.1	1.1	J
Beryllium	<	0.21	U	<	0.21	U
Calcium	27700	20.9	J	33300	21.1	J
Chromium	2.5	1	J	2.3	1.1	J
Cobalt	0.82	1	J	0.86	1.1	J
Copper	1.3	2.1	J	0.94	2.1	J
Iron	2890	10.4	J	2810	10.5	J
Lead	1.6	0.52	J	1.5	0.53	J
Magnesium	1930	20.9		2640	21.1	
Manganese	32.1	1		29.9	1.1	
Nickel	1.9	4.2	J	2.2	4.2	J
Potassium	662	522		625	527	
Vanadium	6.8	1	J	7	1.1	J
Zinc	5.8	2.1	J	5.6	2.1	J
TRPH (mg/kg)						
Total Recoverable Petroleum Hydrocarbons	<	41.8	U	<	42.2	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.

J = Estimated value.

R = Rejected value. D = Sample was diluted for analysis.

U = Nondetected value. RL = Reporting Limit.

(1) Duplicate sample for the preceeding sample number.

TABLE 5-2

COMPARISON OF SWMU 48A CONCENTRATIONS IN SURFACE SOIL WITH BACKGROUND UTLs
CANNON AFB, NEW MEXICO

Chemical	Frequency Detected	Field Sample ID for Maximum Hit	Maximum Detected Concentration (mg/kg)	Qualifiers for Maximum Hit	Background Surface Soil UTL Concentration[1] (mg/kg)	Exceeds Background UTL	Frequency of Exceedance of UTL	Frequency of Exceedance (%)	Does Metal Exceed Background?
METALS									
Aluminum	3/3	CAN048-4805-0000	15,300		8,950	YES	2/3	67	**YES**
Antimony	1/3	CAN048-4804-0000	5.5	J	3	YES	1/3	33	**YES**
Arsenic	3/3	CAN048-4804-0000	3		3.6	NO			NO
Barium	3/3	CAN048-4806-0000	242	J	670	NO			NO
Beryllium	3/3	CAN048-4805-0000	0.71		0.78	NO			NO
Calcium	3/3	CAN048-4804-0000	63,800		44800	YES	2/3	67	**YES**
Chromium	3/3	CAN048-4805-0000	13.8		10.5	YES	2/3	67	**YES**
Cobalt	3/3	CAN048-4805-0000	5.9		6.6	NO			NO
Copper	3/3	CAN048-4805-0000	10		18.3	NO			NO
Iron	3/3	CAN048-4805-0000	13,300		10100	YES	1/3	33	**YES**
Lead	3/3	CAN048-4804-0000	18.8	J	12	YES	1/3	33	**YES**
Magnesium	3/3	CAN048-4806-0000	3,100		1,930	YES	3/3	100	**YES**
Manganese	3/3	CAN048-4805-0000	245		307	NO			NO
Nickel	3/3	CAN048-4805-0000	13.5		11	YES	1/3	33	**YES**
Potassium	3/3	CAN048-4805-0000	2,330		2691	NO			NO
Vanadium	3/3	CAN048-4805-0000	22.2		23.3	NO			NO
Zinc	3/3	CAN048-4805-0000	33.1		32.2	NO			NO

[1] Upper Tolerance Limit of Background (90% limit of 95th percentile). See Table 6-3 of W-C 1997.
mg/kg = milligrams per kilogram
J = Estimated

TABLE 5-3

COMPARISON OF SWMU 48A METALS CONCENTRATIONS IN SUBSURFACE SOIL WITH BACKGROUND UTLs
CANNON AFB, NEW MEXICO

Chemical	Frequency Detected	Field Sample ID for Maximum Hit	Maximum Detected Concentration (mg/kg)	Qualifiers for Maximum Hit	Background Subsurface Soil UTL Concentration[1] (mg/kg)	Exceeds Background UTL	Frequency of Exceedance of UTL	Frequency of Exceedance (%)	Does Metal Exceed Background?
METALS									
Aluminum	23/23	CAN048-4805-0020	12,100		12,214	NO			NO
Antimony	1/23	CAN048-4806-0020	14	J	16	NO			NO
Arsenic	23/23	CAN048-4806-0010	3.4		4.3	NO			NO
Barium	23/23	CAN048-4805-0025	2,390		890	YES	2/23	9	**YES**
Beryllium	11/23	CAN048-4805-0020	0.53	J	0.73	NO			NO
Calcium	23/23	CAN048-4804-0015	250,000		237,498	YES	2/23	9	**YES**
Chromium	21/23	CAN048-4804-0005	9		13.3	NO			NO
Cobalt	21/23	CAN048-4806-0010	4.4	J	4.7	NO			NO
Copper	21/23	CAN048-4805-0025	14.5		8.3	YES	1/23	4	**YES**
Iron	23/23	CAN048-4804-0005	8,550		13,148	NO			NO
Lead	23/23	CAN048-4806-0005	25.7	J	8.7	YES	2/23	9	**YES**
Magnesium	23/23	CAN048-4806-0025	17,700		19,300	NO			NO
Manganese	23/23	CAN048-4804-0005	168		333	NO			NO
Nickel	23/23	CAN048-4805-0020	9.6		14.9	NO			NO
Potassium	23/23	CAN048-4805-0020	3,110		2,512	YES	1/23	4	**YES**
Vanadium	23/23	CAN048-4805-0010	23.4		32.8	NO			NO
Zinc	23/23	CAN048-4804-0005	28.2		30.6	NO			NO

(1) Upper Tolerance Limit of Background (90% limit of 95th percentile). See Table 6-3 of W-C 1997.
mg/kg = milligram per kilogram
J = Estimated

TABLE 5-4

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCs IN SOIL AT SWMU 48A CANNON AFB, NEW MEXICO

Chemical	Detected Concentration[1] (mg/kg)	Ingestion Rate[2] (mg/d)	Conversion Factor (kg/mg)	Daily Intake from the site[3] (mg/d)	Recommended Daily Allowance (RDA)[4] (mg/d)
Calcium	250,000	100	1.00E-06	25	1,200
Magnesium	17,700	100	1.00E-06	1.77	400
Potassium	3,110	100	1.00E-06	0.311	390-780[5]

[1] Maximum detected concentration at SWMU 48A. See Table 5-2 or 5-3.

[2] Estimation of potential chemical ingestion rate for receptors at SWMU 48A.

[3] Daily Intake = Detected Concentration * Ingestion Rate * Conversion Factor

[4] National Research Council

[5] Recommended potassium intake is based on body weight. For a small child weighing 10kg, the recommended intake is 390-780 mg/day.

TABLE 5-5

COMPARISON OF SWMU 48A MAXIMUM SOIL CONCENTRATIONS TO MSSLs
CANNON AFB, NEW MEXICO

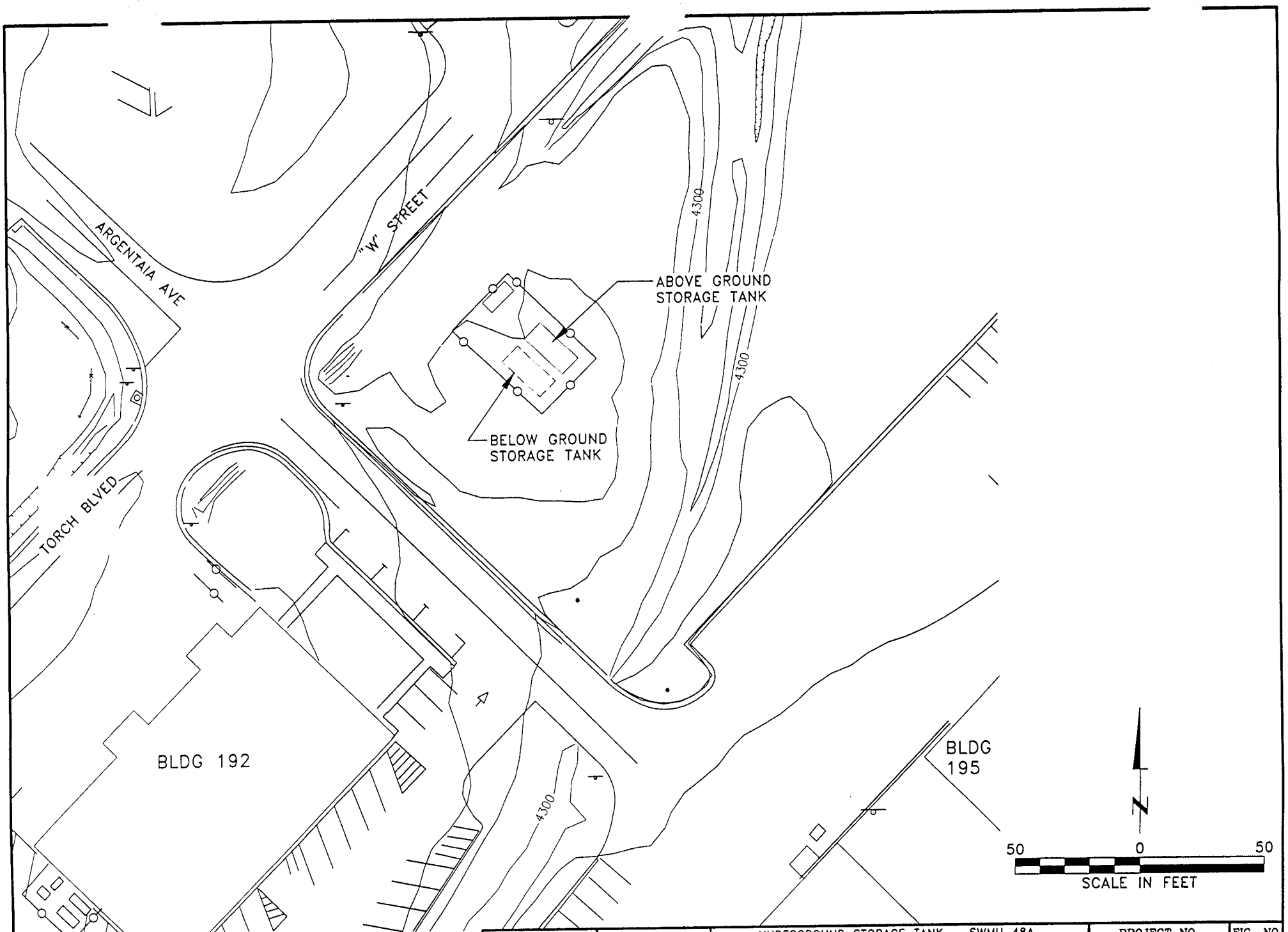
Chemical	Maximum Detected Concentration (mg/kg)	Qual	Residential Soil MSSL Concentration[1] (mg/kg)	Exceeds MSSL?
VOLATILE ORGANICS				
2-Butanone MEK	1.2	– SSL	6900 32,000	NO
Acetone	0.41		1400 14000	NO
Chlorobenzene	0.003	✓	54 320	NO
Ethylbenzene	0.89	0.7	230 230	NO
Methylene Chloride	0.041	.003	8.5 8.9	NO
Toluene	0.0057	✓	520 520	NO
Xylenes	12	✓	210 210	NO
SEMIVOLATILE ORGANICS				
1,2-Dichlorobenzene	7.5	–0.9	370 280	NO
1,3-Dichlorobenzene	0.7	–	41 69	NO
1,4-Dichlorobenzene	1.8	–0.1	3 3.2	NO
2-Methylnaphthalene*	12	–4	55 120	NO
4-Chloroaniline	7.9	–0.03	220 240	NO
Acenaphthene	0.088	✓	2600 3900	NO
Bis(2-ethylhexyl)phthalate	9.1	✓	32 35	NO
Dibenzofuran	0.22	✓	210 150	NO
Di-n-Butyl phthalate	0.41	✓	5,500 6100	NO
Fluoranthene	1.2	✓	2,000 2300	NO
Fluorene	0.19	✓	1,800 2600	NO
N-Nitrosodiphenylamine	0.4	✓	91 99	NO
Naphthalene	5.2	–4	55 120	NO
Phenanthrene*	0.4	✓	55 120	NO
Phenol	0.038	✓	33,000 18400	NO
TRPH	17,300	–	NA	
METALS				
Aluminum	15,300		75,000 74,000	NO
Antimony	14		30 31	NO
Barium	2,390		5,200 16000	NO
Chromium	13.8		30 30	NO
Copper	14.5		2,800 2900	NO
Iron	13,300		22,000 [illegible]	NO
Lead	25.7		400 [illegible]	NO
Nickel	13.5		1,500 1600	NO

CrVI

(1) EPA Region VI Media-Specific Screening Levels for Residential Soil (EPA 1998)

* The MSSL for naphthalene was used as a surrogate for these PAHS. See text.

mg/kg = Milligrams per Kilogram



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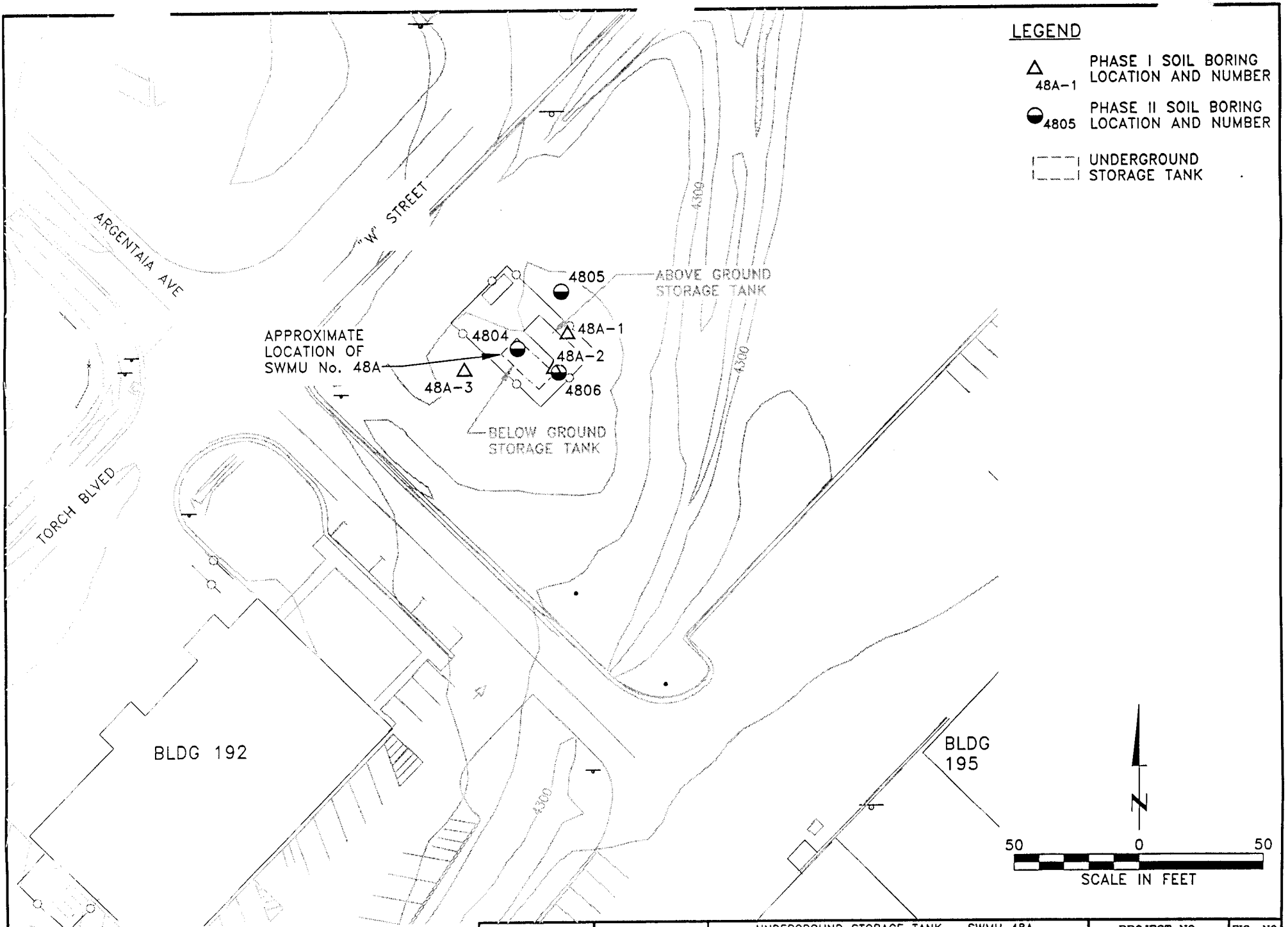
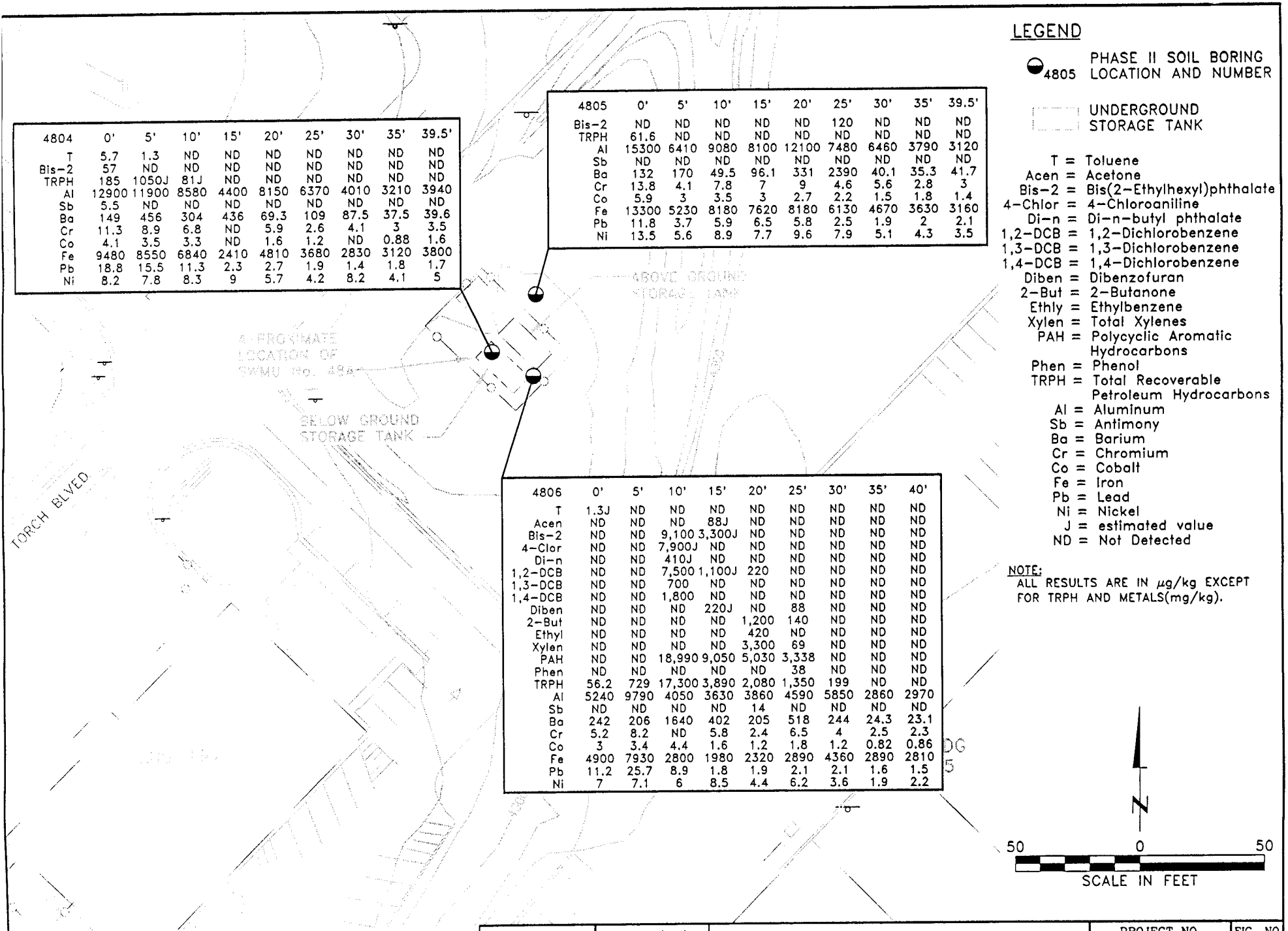
Drawing: T:\CANNON\M9602CC\T5500\FIG5-1.DWG (TSM)
Xrefs: CANI07.DWG

DRN BY: TSSM	DATE: 04/07/99	UNDERGROUND STORAGE TANK - SWMU 48A SITE PLAN CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 5-1
CHK'D BY: .	REVISION: 0			



April 07, 1999 12:01:38 p.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG5-2.DWG (TSM)
Xrefs: CAN107.DWG

DRN BY: TSSM	DATE: 04/07/99	UNDERGROUND STORAGE TANK – SWMU 48A SITE PLAN WITH PHASE I & PHASE II BORING LOCATIONS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 5-2
CHK'D BY: .	REVISION: 0			



4804	0'	5'	10'	15'	20'	25'	30'	35'	39.5'
T	5.7	1.3	ND	ND	ND	ND	ND	ND	ND
Bis-2	57	ND	ND	ND	ND	ND	ND	ND	ND
TRPH	185	1050J	81J	ND	ND	ND	ND	ND	ND
Al	12900	11900	8580	4400	8150	6370	4010	3210	3940
Sb	5.5	ND	ND	ND	ND	ND	ND	ND	ND
Ba	149	456	304	436	69.3	109	87.5	37.5	39.6
Cr	11.3	8.9	6.8	ND	5.9	2.6	4.1	3	3.5
Co	4.1	3.5	3.3	ND	1.6	1.2	ND	0.88	1.6
Fe	9480	8550	6840	2410	4810	3680	2830	3120	3800
Pb	18.8	15.5	11.3	2.3	2.7	1.9	1.4	1.8	1.7
Ni	8.2	7.8	8.3	9	5.7	4.2	8.2	4.1	5

4805	0'	5'	10'	15'	20'	25'	30'	35'	39.5'
Bis-2	ND	ND	ND	ND	ND	120	ND	ND	ND
TRPH	61.6	ND	ND	ND	ND	ND	ND	ND	ND
Al	15300	6410	9080	8100	12100	7480	6460	3790	3120
Sb	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ba	132	170	49.5	96.1	331	2390	40.1	35.3	41.7
Cr	13.8	4.1	7.8	7	9	4.6	5.6	2.8	3
Co	5.9	3	3.5	3	2.7	2.2	1.5	1.8	1.4
Fe	13300	5230	8180	7620	8180	6130	4670	3630	3160
Pb	11.8	3.7	5.9	6.5	5.8	2.5	1.9	2	2.1
Ni	13.5	5.6	8.9	7.7	9.6	7.9	5.1	4.3	3.5

4806	0'	5'	10'	15'	20'	25'	30'	35'	40'
T	1.3J	ND	ND	ND	ND	ND	ND	ND	ND
Acen	ND	ND	ND	88J	ND	ND	ND	ND	ND
Bis-2	ND	ND	9,100	3,300J	ND	ND	ND	ND	ND
4-Clor	ND	ND	7,900J	ND	ND	ND	ND	ND	ND
Di-n	ND	ND	410J	ND	ND	ND	ND	ND	ND
1,2-DCB	ND	ND	7,500	1,100J	220	ND	ND	ND	ND
1,3-DCB	ND	ND	700	ND	ND	ND	ND	ND	ND
1,4-DCB	ND	ND	1,800	ND	ND	ND	ND	ND	ND
Diben	ND	ND	ND	220J	ND	88	ND	ND	ND
2-But	ND	ND	ND	ND	1,200	140	ND	ND	ND
Ethyl	ND	ND	ND	ND	420	ND	ND	ND	ND
Xylen	ND	ND	ND	ND	3,300	69	ND	ND	ND
PAH	ND	ND	18,990	9,050	5,030	3,338	ND	ND	ND
Phen	ND	ND	ND	ND	ND	38	ND	ND	ND
TRPH	56.2	729	17,300	3,890	2,080	1,350	199	ND	ND
Al	5240	9790	4050	3630	3860	4590	5850	2860	2970
Sb	ND	ND	ND	ND	14	ND	ND	ND	ND
Ba	242	206	1640	402	205	518	244	24.3	23.1
Cr	5.2	8.2	ND	5.8	2.4	6.5	4	2.5	2.3
Co	3	3.4	4.4	1.6	1.2	1.8	1.2	0.82	0.86
Fe	4900	7930	2800	1980	2320	2890	4360	2890	2810
Pb	11.2	25.7	8.9	1.8	1.9	2.1	2.1	1.6	1.5
Ni	7	7.1	6	8.5	4.4	6.2	3.6	1.9	2.2

LEGEND

4805 PHASE II SOIL BORING LOCATION AND NUMBER

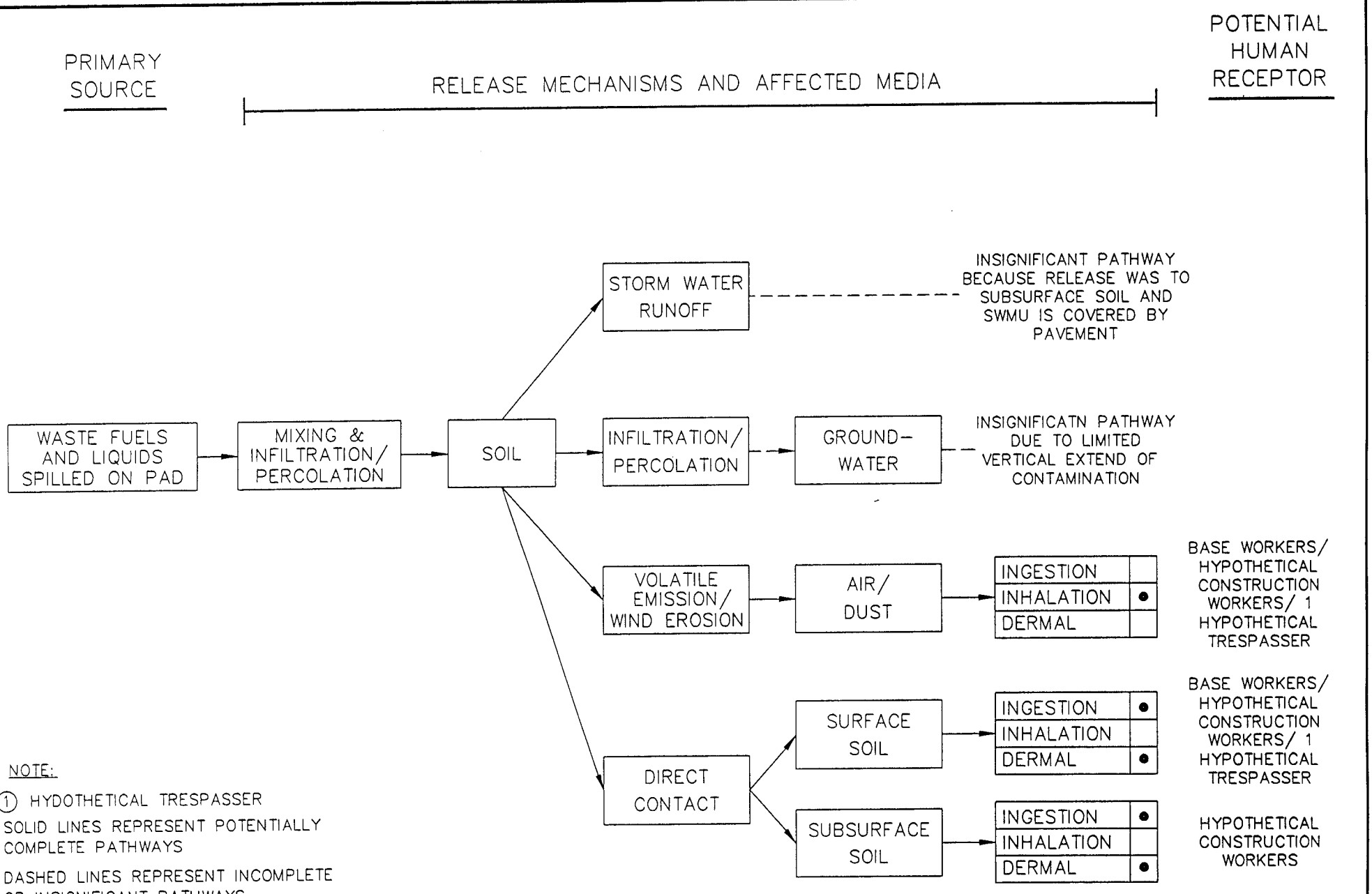
UNDERGROUND STORAGE TANK

T = Toluene
Acen = Acetone
Bis-2 = Bis(2-Ethylhexyl)phthalate
4-Chlor = 4-Chloroaniline
Di-n = Di-n-butyl phthalate
1,2-DCB = 1,2-Dichlorobenzene
1,3-DCB = 1,3-Dichlorobenzene
1,4-DCB = 1,4-Dichlorobenzene
Diben = Dibenzofuran
2-But = 2-Butanone
Ethly = Ethylbenzene
Xylen = Total Xylenes
PAH = Polycyclic Aromatic Hydrocarbons
Phen = Phenol
TRPH = Total Recoverable Petroleum Hydrocarbons
Al = Aluminum
Sb = Antimony
Ba = Barium
Cr = Chromium
Co = Cobalt
Fe = Iron
Pb = Lead
Ni = Nickel
J = estimated value
ND = Not Detected

NOTE:
ALL RESULTS ARE IN $\mu g/kg$ EXCEPT FOR TRPH AND METALS(mg/kg).

July 26, 1999 11:27:00 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG5-3.DWG (TSM)
Xrefs: CANI07.DWG

DRN BY: TSSM	DATE: 07/26/99	UNDERGROUND STORAGE TANK - SWMU 48A CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO.	FIG. NO.
CHK'D BY: .	REVISION: 0		45-FM9602CC.00	5-3



NOTE:

(1) HYDOTHETICAL TRESPASSER

SOLID LINES REPRESENT POTENTIALLY COMPLETE PATHWAYS

DASHED LINES REPRESENT INCOMPLETE OR INSIGNIFICANT PATHWAYS

ONLY FUTURE USE EXPOSURES WILL BE CONSIDERED FOR SOILS PRESENTLY COVERED BY PAVEMENT

July 26, 1999 11:29:47 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG5-4.DWG (TSM)

DRN BY TSSM	DATE 07/26/99	SITE CONCEPTUAL EXPOSURE MODEL UST SWMU 48A CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO.	FIG. NO.
CHK'D BY .	REVISIONS: 0		45-FM9602CC.00	5-4

6.1 SITE DESCRIPTION

The Civil Engineering Container Storage Area (Facility No. 4038) is an open concrete pad measuring approximately 150 feet by 250 feet and is located east of Building 252 and south of the north boundary fence of the Base (Figure 6-1). The concrete pad is secured by an 8-foot-high fence with a locked gate. The pad is the remaining floor of the old Portair Airfield Hangar dating back to the 1930s. The site fenced compound is surrounded by gravel to the east and south. The site is relatively flat.

6.2 SITE HISTORY

This facility was a passenger terminal for Portair Field during the 1930s and was removed by the Army in 1942. According to historical photographs, the concrete foundation slab had been vacant until the 1970s, and it appears to have been used for storage since that time. Approximately one hundred 55-gallon drums were stored at the facility during the RFA Visual Site Inspection (Kearney 1987). A preliminary inspection referenced in the A.T. Kearney report indicated that the drums contained varying amounts of water, oil, solvents, and asphaltic material.

6.3 CURRENT USE

The Civil Engineering Squadron currently stores supplies and used materials on the concrete pad. The stored items include used transformers, street lights and street signs, PVC piping, and heavy equipment parts.

6.4 PREVIOUS INVESTIGATION

Phase I RFI

The objective of sampling at the Civil Engineering Container Storage Area during the Phase I RFI (W-C 1994a) was to determine if a release of SWMU-related chemicals had occurred due to leakage of stored materials and equipment. To test for this occurrence and determine the vertical extent of possible contaminants, six 20-foot soil borings were drilled to sample soils within and at the perimeter of the Storage Area. The locations of the borings are shown on Figure 6-2. Borings were located where it appeared that the likelihood of encountering contamination was maximized, such as channels and low spots where storage pad runoff would flow and collect. Surficial samples were collected from the 0.2- to 0.5-foot depth interval in areas of soil cover to provide a worst-case situation for risk assessment purposes in the event that SVOC contamination was detected during this investigation. The 0.5- to 2-foot depth interval was collected immediately under the concrete pad. Subsurface samples were collected from the 3- to 5-foot, 8- to 10-foot, 13- to 15-foot, and 18- to 20-foot depth intervals. Target analytes for all borings include VOCs, SVOCs, metals, TRPH, polychlorinated biphenyls (PCBs), pesticides, and herbicides. SVOCs were analyzed only for a limited number of samples to allow for risk assessment. Typically, the samples were located at the surface and at a selected depth interval from each boring.

A summary of the analytical results for these soil samples are shown on Figure 6-3 and Tables 6-1a and 6-1b. Tetrachloroethene was detected in Boring No. 07705 at 5 feet (07705-0003). Toluene was detected in Boring Nos. 07701 and 07703 at the surface. Xylene was detected in Boring Nos. 07701 through 07703 at the surface. Carbazole was detected in Boring No. 07706 at the surface and in Boring No. 07705 at 3 feet. Butyl benzyl phthalate was detected in Boring No. 07702 at the surface and in Boring No. 07702 at 13 feet. Di-n-octyl phthalate was detected in Boring No. 07702 at the surface. Anthracene, benzo(a)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, pentachlorophenol, and/or pyrene were detected in one or more samples from the surface and 5 feet in Boring Nos. 07701, 07702, 07705, and 07706. 4-Nitrophenol was detected in Boring No. 07702 at 20 feet. Petroleum hydrocarbons were detected in Boring Nos. 07701, 07702, 07705, and 07706 at the surface and in Boring 07704 at 5 feet. 4,4-DDE was detected in Boring Nos. 07705 and 07706 at the surface. 4,4-DDT was detected in Boring No. 07706 at the surface. Alpha-chlordane and gamma-chlordane were detected in Boring Nos. 07702 and 07706 at the surface. Antimony, cadmium, cobalt, copper lead, silver, and zinc were detected above background in surface samples and/or subsurface samples to 20 feet in one or more of the borings.

Phase II RFI

Five soil borings were drilled and soil samples collected at the Civil Engineering Container Storage Area during the Phase II RFI (W-C 1995c). The borings were drilled to a total depth of 20 feet in the area surrounding the storage area. The boring locations were chosen to further assess the lateral presence and extent of site-related soil contaminants to the 20-foot depth (Figure 6-3 and Table 6-2).

Surface soil samples from all borings were collected from 0 to 2 feet. All borings were also sampled at intervals of 3 to 5 feet, 8 to 10 feet, 13 to 15 feet, and 18 to 20 feet. Samples were analyzed for VOCs, SVOCs, TAL metals, TRPH, chlorinated herbicides, and pesticides/PCBs. A summary of the Phase II analytical results is shown in Figure 6-3 and Table 6-2.

Besides acetone and methylene chloride, which were qualified as nondetect after they were determined to be laboratory contaminants, the only VOCs reported in near-surface soil samples were toluene and 1,2-dichloropropane. Toluene was reported in estimated concentrations of 2.4 μg/kg, 28 μg/kg, and 3.5 μg/kg. 1,2-Dichloropropane was reported only in one sample at an estimated concentration of 2 μg/kg. Several SVOC compounds, mainly in the form of PAHs, were reported in the surface samples. Total PAHs were detected at concentrations of 276,780 μg/kg, 463 μg/kg, 120 μg/kg, and 513 μg/kg. Other SVOCs detected were carbazole, dibenzofuran, 2-methynaphthalene, and di-n-butyl phthalate. Pesticides and PCBs reported in site surface samples included endrin ketone at 120 μg/kg (estimated); 4,4-DDE at 3.7 μg/kg and 14 μg/kg; and 4,4-DDT at 6.8 μg/kg and 10 μg/kg; and Aroclor-1260 at 140 μg/kg. No herbicides were reported for any of the near-surface samples collected at the site. Petroleum hydrocarbons were detected at concentrations of 9,700 mg/kg, 84.3 mg/kg, 1,320 mg/kg, 105 mg/kg, and 113 mg/kg.

Besides acetone and methylene chloride, which were qualified as nondetect after they were determined to be laboratory contaminants, the only VOC reported in subsurface soil samples was toluene at an estimated concentration of 2.2 μg/kg. The only SVOCs reported in subsurface

samples were fluoranthene at 74 μg/kg (estimated) and bis(2-ethylhexyl) phthalate (180 to 740 μg/kg). Two pesticides, 4,4-DDE and 4,4-DDT, were reported in samples at concentrations of 4.1 μg/kg and 2.1 μg/kg (estimated). No herbicides were reported for any of the soil samples collected at the site. Petroleum hydrocarbons were reported in only one subsurface sample (Boring 7707) at a concentration of 63.6 mg/kg.

The maximum concentrations of barium, cadmium, chromium, lead, manganese, nickel, thallium, and zinc exceeded background levels in the Phase II RFI.

TRPH was also addressed in previous investigations. The maximum detected Phase I and Phase II concentrations for TRPH (10,000 mg/kg and 1,320 mg/kg, respectively) exceeded the NMED action level for soil of 1,000 mg/kg. These locations are shown in Figure 6-3. The NMED action levels of 500 mg/kg for BTEX and 10 mg/kg for benzene individually were not exceeded.

6.5 CMS FIELD INVESTIGATION

Additional soil sampling was done at SWMU 77 as part of the CMS at Cannon AFB. Field activities at SWMU 77 included soil borings and sampling. The following section discusses sampling objectives, sampling locations, and frequencies. Sampling equipment and procedures, and sample designation, handling, documentation, and analysis were followed as presented in the Work Plan.

6.5.1 Soil Borings

Nine soil borings were drilled to 4 feet bgs and sampled at SWMU 77 as part of the CMS investigation. Surface and subsurface soil samples were collected from each boring. Surface soil samples were collected from 0 to 0.5 feet bgs for all parameters, except VOCs. Surface soil VOC samples were collected from 0.5 to 1.0 feet bgs. Subsurface soil samples were collected from a 1-foot interval, generally between 2 to 5 feet bgs. All samples were field screened for headspace analysis using a Mini-Rae 10.2 eV lamp photoionization detector (PID).

The soil borings were located around boring locations 07707, 07709, and 07710 from the Phase III investigation (Figure 6-4). Borings HA01 and HA02 were completed near boring 07710. Borings HA03 through HA06 were completed near boring 07709. Borings HA07 through HA09 were completed around Boring 07707.

Soil samples were submitted for the following off-site chemical analyses:

- HA01 and HA02 - two surface and two shallow soil samples for PCBs by EPA Method 8082.
- HA03 through HA06 - four surface and four shallow soil samples for VOCs by USEPA Method 8260A, SVOCs by USEPA Method 3550B/8270B, TRPH by USEPA Method 9071/418.1, and pesticides by USEPA Method 8081. In addition, one sample was analyzed for TPH by USEPA Method 8015 modified.
- HA07 through HA09 - two surface and four shallow soil samples for VOCs by USEPA Method 8260A, SVOCs by USEPA Method 3550B/8260B, and TRPH by USEPA method

9071/418.1. In addition, one sample was analyzed for TPH by USEPA Method 8015 modified.

The samples collected and analyses done are summarized in Table 6-3.

6.5.2 Data Review and Assessment

A full validation was performed on the analytical data generated from the samples collected at SWMU 77 during the CMS. The data were validated following guidance provided in National Functional Guidelines for Organic/Inorganic Review (EPA 1994) using the QC criteria presented in the QAPP (W-C 1998). In general, the validation included the review of QC summary forms and raw data supplied by the laboratory.

The data validation identified methylene chloride contamination in the laboratory method blank samples analyzed for VOCs. All positive methylene chloride results for the samples analyzed for VOCs were qualified as nondetect (U). Whenever the reported concentration of methylene chloride was greater than the reporting limit, but less than ten times the concentration detected in the associated method blank, the reporting limit for each sample was raised to the level of the detected concentration. The data validation also identified bis(2-ethylhexyl) phthalate contamination in the laboratory method blank samples analyzed for semivolatile organic compounds (SVOCs). All positive bis(2-ethylhexyl) phthalate results for the samples analyzed for SVOCs were qualified as nondetect (U) and the reporting limits were raised as necessary.

No additional qualification of data was required based on the data validation process. While some data were qualified as nondetect (U), the data should be considered usable for their intended purpose.

6.5.3 Investigation Results

The physical and chemical results of the CMS field investigation are presented in the following subsections.

6.5.3.1 Geology

The Phase I investigation indicated that soils at this site consist of silty/sandy clays from the surface to the boring's total depth at 20 feet. The soil is varicolored, with brown prevalent at the surface, lightening to salmon pink and buff down section. A light to locally heavy, white to buff caliche matrix cements the grains at depth. More abundant fine sand with silt and clay noted at 11 feet in Boring 07703 suggests that the soil profile consists of thin, interbedded units varying between fine sand and sandy clay. Some thin zones of extremely hard caliche, tan to buff in color, are scattered erratically between the 6-foot and 20-foot intervals of Borings 07701 and 07706.

Logs from the five Phase II RFI borings and nine CMS borings show a subsurface lithology consisting of fine-grained fill material and Ogallala Formation sediments. Borings 7707 and HA07 through HA09 encountered a 6-inch layer of asphalt pavement at the surface. Silty sand fill (USCS symbol SP) was found below the pavement to a depth of 1.2 feet. This fill is brown,

dry, loose, fine-grained, and poorly graded with a trace of asphalt and fine gravel. Borings 7709, 7710 and HA01 through HA06 encountered 0.6 feet and 0.5 feet of silty clay (USCS symbol CL) and silty sand (SP) fill material, respectively. Both types of fill contained trace amounts of fine sand and gravel. Below the fill in Brings 7707, 7709, and 7710 to depths of 5.2 feet, 17 feet, and 4.8 feet, respectively, is a silty clay (USCS symbol CL) described as brown and reddish-brown, dry, stiff, and low plastic with some caliche. This silty clay is present from the surface of Boring 7711 to a depth of 4.7 feet. Below the silty clay in Borings 7707 through 7711 is a clayey silt (USCS symbol ML) to the completion depths of the borings at 20 feet. The clayey silt is described as light reddish-brown, dry, stiff, and low plastic with some caliche.

6.5.3.2 Chemical Results

Chemical results are presented in Tables 6-4 and 6-5 and on Figure 6-5.

HA01 and HA02

Four samples were collected from Borings HA01 and HA02 and analyzed for PCBs only. No PCBs were detected in these four samples.

HA03 through HA06

TPH (Method 418.1) were nondetect in all of the samples from these four borings. TPH (Method 8015B) were analyzed for one sample. TPH-Gasoline Range Organics (GRO) were detected at 11 mg/kg in sample C77-HA06-004.

A low concentration of one VOC (chloromethane) was detected at 12 μg/kg in the 3.0-to 4.0-foot interval of Boring HA04 (Figure 6-5).

Low levels of three SVOCs were detected in samples from these four borings. Di-n-octyl phthalate was detected in four samples at concentrations ranging from 16 μg/kg to 450 μg/kg (Figure 6-5). Di-n-butyl phthalate was detected once at 20 μg/kg, and bis(2-ethylhexyl)phthalate was detected once at 1,700 μg/kg.

Low levels of two pesticides (DDE at 2.7 μg/kg and DDT 3.9 μg/kg) were each detected once. Both detections were from the 0 to 0.5-foot interval of HA04 (Figure 6-5).

HA07 through HA09

No VOCs or TPH (including Methods 318.1 and 8015B-one sample only) were detected in the six samples collected from these three borings. SVOCs were detected in Borings HA07 and HA09, but not HA08.

Low levels of nine SVOCs were detected in Boring HA07 (Tables 6-4 and 6-5, and Figure 6-5). Eight SVOCs were detected in the surface soil sample, and two SVOCs were detected in the subsurface soil sample (Figure 6-5). All but five detected concentrations were estimated below the reporting limits and generally decreased with depth.

Low levels of 12 SVOCs were detected in Boring HA09 (Tables 6-4 and 6-5, and Figure 6-5). Twelve SVOCs were detected in the surface soil sample, and one SVOC was detected in the subsurface soil sample. Eight of thirteen total detected concentrations were estimated, and concentrations generally decreased with depth.

6.6 NATURE AND EXTENT

SWMU 77 is a paved, fenced area used by the Civil Engineering Squadron for storage. Six Phase I borings were advanced to a depth of 20 feet below the surface , two of them through the paved surface and four of them just off the edge of the paving at visible drainage locations. Five Phase II borings were advanced to a depth of 20 feet below the surface in areas just outside of the fence surrounding the SWMU. One boring was drilled through the asphalt pavement west of the facility. An additional nine hand auger borings were completed to a depth of 3 to 5 feet bgs as part of the CMS investigation. Three of these hand auger borings were advanced beneath asphalt. Although there was no visible evidence of contamination during the sampling process, the chemical testing found elevated levels of PAHs and TRPH in several of the Phase I and Phase II borings. The highest concentrations of PAHs were detected in the surface samples from the borings drilled through the asphalt pavement. The Phase II sample also contained asphalt fragments. Because asphalt is a source of PAHs, this sample was not used in the risk evaluation. Relatively low levels of pesticides and other non-PAH SVOCs were also detected. The highest levels of contamination occurred in surface or near-surface soils (Figures 6-3 and 6-5).

6.7 HUMAN HEALTH RISK EVALUATION

6.7.1 Site Conceptual Exposure Model

The SCEM is a schematic representation of the contaminant source areas, chemical release mechanisms, environmental transport media, potential human intake routes, and potential human receptors. A SCEM should identify complete exposure pathways that may result in human health risks and indicate the data needed to evaluate those pathways. An exposure pathway consists of four necessary elements:

- A source and mechanism of chemical release to the environment
- An environmental transport medium for the released chemical (e.g., air, groundwater, or surface water)
- A point of potential human exposure to transported chemicals (e.g., a domestic drinking water well)
- A human intake mechanism (e.g., inhalation or ingestion) at the point of exposure

All four elements must be present for an exposure pathway to be complete and for chemical exposure to occur. In the SCEM, potentially complete exposure pathways are indicated with solid lines; minor (insignificant) pathways are indicated with dashed lines.

The SCEM for SWMU 77 is presented in Figure 6-6. The primary source at SWMU 77 is waste liquids (e.g., fuels, oils, and solvents) that have leaked or been spilled from storage containers or

equipment onto surface soil. Chemicals from the primary source may be transported away from the primary source areas, affecting other media that may in turn act as secondary sources. Mixing and infiltration of the wastes to the subsurface soil are shown as the primary chemical release mechanisms. Subsurface soils are an important secondary source of potential chemical release. Site-related chemicals in soils may infiltrate/percolate through the soil and be released to groundwater.

Other release mechanisms, such as direct contact (soil ingestion and dermal contact), surface runoff, wind erosion, or volatilization to the atmosphere, are also depicted in the SCEM. Transport by storm runoff is not considered a significant pathway for human exposure at SWMU 77 because the site is very flat and there are no developed drainageways on site.

Potential receptors at SWMU 77 include occupational receptors, hypothetical future construction workers, and trespassers. SWMU 77 is located in the industrial area of the Base (Figure 1-2); therefore, residential development is not a likely future land use. Surface soil (upper 2 feet of the soil column) and air emissions (volatile organic chemicals or particulates) from surface soil may provide exposure to occupational receptors and hypothetical future trespassers. Surface soil, subsurface soil, and air emissions (volatile and particulate) may provide exposures to hypothetical future construction workers during excavation activities. If volatile organic chemicals are present in subsurface soils, there is the potential for vapor intrusion from the subsurface to indoor air pathway. The Johnson and Ettinger model (USEPA 2004) will be used to evaluate this pathway when appropriate.

Groundwater is used for domestic purposes on and off Base. However, potential groundwater exposures were not evaluated because fate and transport modeling indicates that groundwater will not be impacted (see Section 6.9).

In summary, the potentially complete human exposure pathways at SWMU 77 are:

Occupational Receptors

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

Hypothetical Future Construction Workers

- Ingestion of subsurface and surface soil
- Dermal Contact with subsurface and surface soil
- Inhalation of volatile emissions and airborne particulate matter from subsurface and surface soil

Hypothetical Future Trespassers

- Ingestion of surface soil
- Dermal Contact with surface soil

- Inhalation of airborne particulate matter from surface soil

6.7.2 Site Classification

Site classification is a prioritization step that is used to judge the urgency of the need for initial response actions and maximizes the effectiveness of limited resources. There are four classes of sites:

Class 1: Immediate threat to human health and safety or sensitive environmental receptors

Class 2: Short-term threat to human health and safety or sensitive environmental receptors

Class 3: Long-term threat to human health and safety or sensitive environmental receptors

Class 4: No demonstrable threat to human health and safety or sensitive environmental receptors

This site presents no explosive threat and contains no free product, no surface water, and no groundwater discharges. There are no public facilities (i.e., daycares, parks, schools, dwellings) located on or near the site. The nearest potable groundwater aquifer is located more than 250 feet bgs. Additionally, access to soils is limited primarily to Base personnel. Therefore, SWMU 77 was considered to be a Class 4 site.

6.7.3 Background Comparison

Metals are natural constituents of soils and water. Metals that occur in concentrations within background levels are not considered site-related chemicals of concern and are not evaluated further. To determine if the concentrations of metals detected in surface and subsurface soil at SWMU 77 exceeded background concentrations, the maximum detected concentrations at the site were compared to calculated background UTLs. The UTLs used in this comparison were calculated as part of the background study for Cannon AFB (W-C 1997). Maximum detected concentrations from surface soils were compared to surface soil UTLs. Maximum detected concentrations from subsurface soils were compared to subsurface UTLs. If the maximum detected concentration exceeded the background UTL, the metal was considered to exceed background and was evaluated in the Tier 1 screen.

Surface Soil

The maximum detected surface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, barium, cadmium, calcium, iron, lead, magnesium, manganese, silver, and zinc were considered to exceed background levels. All other metals were considered to be within background levels. Table 6-6 summarizes the comparison and a discussion is given below.

One of eleven surface soil samples contained aluminum at a concentration (9860 mg/kg) which exceeded the background UTL of 8,950 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

Three of eleven surface soil samples contained cadmium at concentrations (ranging from 0.45 mg/kg to 2.4 mg/kg) which exceeded the background UTL of 0.435 mg/kg. Therefore, cadmium was considered to exceed background levels and was evaluated further.

Four of eleven surface soil samples contained calcium at concentrations (ranging from 46,100 mg/kg to 130,000 mg/kg) which exceeded the background UTL of 44,800 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

One of eleven surface soil samples contained iron at a concentration (10,800 mg/kg) which exceeded the background UTL of 10,100 mg/kg. Therefore, iron was considered to exceed background levels and was evaluated further.

Five of ten surface soil samples contained lead at concentrations (ranging from 19.6 mg/kg to 48.5 mg/kg) which exceeded the background UTL of 12 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

One of eleven surface soil samples contained magnesium at a concentration (2440 mg/kg) which exceeded the background UTL of 1,930 mg/kg. Therefore, magnesium was considered to exceed background levels and was evaluated further.

Four of eleven surface soil samples contained manganese at concentrations (ranging from 357 mg/kg to 440 mg/kg) which exceeded the background UTL of 307 mg/kg. Therefore, manganese was considered to exceed background levels and was evaluated further.

Four of six surface soil samples contained silver at concentrations (ranging from 0.6 mg/kg to 1.6 mg/kg) which exceeded the background UTL of 0.4 mg/kg. Therefore, silver was considered to exceed background levels and was evaluated further.

Three of eleven surface soil samples contained zinc at concentrations (ranging from 38.9 mg/kg to 73.8 mg/kg) which exceeded the background UTL of 32.2 mg/kg. Therefore, zinc was considered to exceed background levels and was evaluated further.

Subsurface Soil

The maximum detected subsurface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, barium, cadmium, calcium, chromium, copper, and lead were considered to exceed background levels. All other metals were considered to be within background levels. Table 6-7 summarizes the comparison and a discussion is given below.

One of forty-six subsurface soil samples contained aluminum at a concentration (12,500 mg/kg) which exceeded the background UTL of 12,214 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

Four of thirty-eight subsurface soil samples contained barium at concentrations (ranging from 982 mg/kg to 2,840 mg/kg) which exceeded the background UTL of 890 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

Six of forty-six subsurface soil samples contained cadmium at concentrations (ranging from 1.5 mg/kg to 3 mg/kg) which exceeded the background UTL of 1.3 mg/kg. Therefore, cadmium was considered to exceed background levels and was evaluated further.

Three of forty-six subsurface soil samples contained calcium at concentrations (ranging from 252,000 to 294,000 mg/kg) which exceeded the background UTL of 237,498 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

One of forty-six subsurface soil samples contained chromium at a concentration (25.4 mg/kg) which exceeded the background UTL of 13.3 mg/kg. Therefore, chromium was considered to exceed background levels and was evaluated further.

One of forty-six subsurface soil samples contained copper at a concentration (14.5 mg/kg) which exceeded the background UTL of 8.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

Two of forty-two subsurface soil samples contained lead at concentrations (9.3 mg/kg and 9.4 mg/kg) which exceeded the background UTL of 8.7 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

Comparison of Site Essential Nutrient Concentrations to RDAs

The maximum detected concentrations of essential nutrients which exceeded background and which do not have EPA Region VI MSSLs established for them were compared to the recommended daily allowances (RDAs) set by the National Research Council.

At SWMU 77, calcium and magnesium were compared to the RDAs. Table 6-8 shows that the maximum detected concentrations of calcium and magnesium did not cause estimated potential site daily intake to exceed the RDAs. Therefore, these inorganics would not pose a human health risk and were not evaluated further.

6.7.4 Tier 1 Evaluation

The Tier 1 evaluation involves the comparison of the maximum detected site concentrations to conservative, nonsite-specific, risk-based screening levels to determine whether site conditions satisfy the criteria for a quick regulatory closure or warrant a more site-specific evaluation.

Chemicals of Potential Concern

COPCs were identified based on the chemical analytical data (both historic and current) presented in Tables 6-1, 6-2, 6-4, and 6-5. Metals which exceeded background levels and all detected organic compounds (except those considered to be laboratory contaminants) were evaluated as COPCs. TPH was not considered to be a COPC because it is a complex chemical mixture with varying constituents. Therefore, individual constituents (e.g., BTEX, PAHs, etc.) were used to evaluate potential impacts from TPH at SWMU 77.

Note: High concentrations of PAHs (10^3 to 10^4 μg/kg) were detected in the surface sample of Boring 7707 during Phase II. This sample is located immediately beneath the asphalt in a parking area west of the C.E. Container Storage Area. TRPH was also detected in this sample at a concentration of 9,700 mg/kg. Boring logs indicate that this sample was taken within the top foot of soil and that it contained asphalt fragments. The deeper samples from this boring were virtually nondetect for organic analytes. This data suggests that the high PAH concentrations are likely due to the presence of asphalt within the sample and are not related to any release from SWMU 77. Therefore, this sample was not used to evaluate potential contamination and risks association with SWMU 77.

Tier 1 Comparison

Maximum detected concentrations of COPCs were compared to the EPA Region VI Residential MSSLs. The comparison is shown in Table 6-9. The table shows that only benzo(a)pyrene (BaP), benzo(b)fluoranthene, and dibenzo(a,h)anthracene exceeded the Tier 1 values. Therefore, these compounds were considered to be COCs at SWMU 77.

Tier 2 Evaluation

The Tier 2 evaluation provides an option to determine the target levels for the COCs identified in the Tier 1 comparison. This step uses site-specific information related to exposure parameters and soil properties to develop site-specific target levels (SSTLs).

At SWMU 77, the SSTL(s) were calculated using the RBCA Tool Kit for Chemical Releases developed by Groundwater Services, Inc. (GSI 1999). The site-specific information used to develop the SSTLs included the assumption of a commercial and construction worker exposure scenarios. Tier 1 values assumed residential exposure which is highly conservative for this SWMU. SWMU 77 is located in an industrial area of the Base and is still used for storage of materials. Therefore, industrial exposures are more appropriate for this site. The following exposure assumptions were used to calculate the SSTLs for COCs at SWMU 77.

An exposure frequency of 60 days per year was assumed for the commercial worker scenario. SWMU 77 is an active site; however, no one works routinely (8 hours/day, 250 days/year) at the SWMU. Exposures would be limited to the time spent dropping off and removing stored materials. Additionally, the site does not require significant ground maintenance/landscaping because ground cover in the immediate area is predominantly asphalt, concrete, and gravel. A grass area is located outside the north fenceline; however, little maintenance is required due to the minimal rainfall at the Base. Therefore, exposure of Base workers to soils at SWMU 77 is unlikely and the assumption of 60 days per year (5 days per month) is conservative and provides protection for Base workers. Standard default values were used for all other exposure parameters for commercial workers and all exposure assumptions for hypothetical construction workers. Appendix C shows all the input parameters and assumptions used to calculate the SSTLs at SWMU 77.

The SSTLs for COCs at SWMU 77 and their maximum detected concentrations are shown below.

COCs	SSTLs	Maximum Concentrations
Benzo(a)pyrene	0.43 mg/kg .78	0.35 mg/kg ok
Benzo(b)fluoranthene	1.3 mg/kg 7.8	0.63 mg/kg ok
Dibenzo(a,h)anthracene	3.7 mg/kg 0.78	0.073 mg/kg ok

The maximum detected concentrations for the three COCs at SWMU 77 do not exceed the SSTLs.

6.8 ECOLOGICAL RISK EVALUATION

Certain nondomesticated plants and animals will occur, at least at times, in almost any area that is outdoors, regardless of the absence of "natural" habitat and/or the omnipresence of human activity and artificial structures (buildings, pavement). Thus, strictly speaking, virtually any area outside of a building might include "habitat for ecological receptors." Such essentially artificial habitats are not, however, considered *directly* ecologically relevant because they exist and are configured to support human (industrial) functions. Understanding the concept of "direct ecological relevance" is very important in assessing ecological risk at an active military site.

The initial step in ecological evaluation of a site is determining whether the unit has an *ecological component*. This determination is based on the availability, within the subject unit, of *habitat*. Simply defined, the term habitat means the "place where a plant or animal lives" (USACE 1996; USEPA 1997a), but a more functional definition can be paraphrased as the *type of environment* where an organism (or community of similarly adapted organisms) *normally* lives. If no ecological components are identified, it is concluded that the unit is not of potential ecological concern and no further ecological evaluation is warranted. It is not believed that individual organisms that are occasionally present constitute an ecological component because individuals (unless accorded official protection as endangered or threatened) are not appropriate as assessment endpoints for an ecological risk assessment. As stated by USEPA (1997a), "Ecological effects of most concern are those that can impact populations (or higher levels of biological organization)." By definition, an occasional individual does not constitute a population nor would any effects on an occasional individual be expected to translate into an effect on a population.

SWMU 77 consists of an open concrete pad measuring 150 feet by 250 feet. An 8-foot fence surrounds this pad. As the site contains no vegetation, the only shelter for ecological resources is below ground under the pad. Certain fossorial mammals and reptiles may be present under the pad. These animals, however, would not be expected to forage within the unit, but merely use it for shelter. Given the size of the pad and the consistent human activity associated with the site, the quantity and quality of the biological resources is expected to be minimal. Certain birds (e.g., those that consume significant amounts of seeds) may at times pick up the pea gravel for use as grinding stones within their crops. None of these expected biological resources would constitute a population, nor would there be significant biomass production associated with the site such that a potential indirect exposure could be significant. Given that the site is fenced and subject to significant human activity, it is unlikely that significant visitation by relevant

ecological resources would occur. Based on this, SWMU 77 does not contain any significant ecological component such that a formal ecological risk assessment is warranted.

6.9 VADOSE ZONE CONTAMINANT FATE AND TRANSPORT MODELING

Because chemicals were detected in soil above MSSLs at SWMU 77, the fate and transport of contaminants in the vadose, or unsaturated, zone was modeled to evaluate the potential for contaminants in soil to be transported to underlying groundwater. The following provides a brief description of the modeling effort and presents model-predicted concentrations for SWMU 77.

6.9.1 Description of Modeling Effort

The mathematical models HELP and MULTIMED were applied to a conceptual vadose zone model developed for SWMUs 31, 77, and 127, all of which had chemicals detected above MSSLs and which have similar geology and site conditions. The HELP model was used to estimate a net infiltration rate for input into MULTIMED. MULTIMED was then used to model contaminant migration through the vadose zone to the water table.

MULTIMED was run for each chemical detected above MSSLs under steady-state, pulse source, and source decay conditions while considering both sorption and sorption/biodegradation as attenuation mechanisms. Results were used to calculate attenuation factors (AFs) and dilution-attenuation factors (DAFs) which can then be used to predict concentrations, respectively, at the bottom of the unsaturated zone and at the water table after initial mixing in groundwater.

Appendix D provides a detailed description of the modeling approach, model documentation, input parameters, and model output for SWMUs 31, 77, and 127.

6.9.2 Model-Predicted Concentrations

Initial leachate concentrations were calculated for each chemical detected in soil above MSSLs at SWMU 77 using the following equilibrium partitioning equation from the Soil Screening Technical Background Document (USEPA 1996):

$$Cs = Cw \cdot \left[Kd + \frac{\theta w + \theta a \cdot H'}{\rho b} \right]$$

In the above equation, Cw is the initial leachate concentration (mg/L) and Cs is the maximum detected soil concentration (mg/kg) at the SWMU. Kd is the distribution coefficient (L/kg or mL/g), θw is the water-filled soil porosity, θa is the air-filled soil porosity, H' is the dimensionless Henry's law constant, and ρb is the dry bulk density (kg/L, g/mL, or g/cm^3). For organic compounds, Kd is the product of the normalized organic carbon distribution coefficient, Koc, and fraction organic carbon content, foc. Porosity and bulk density are taken from the HELP layer 1 (sandy clay loam) at field capacity. Values for Koc, Kd, and H' are taken from USEPA 1996. Other values are the same as used in the MULTIMED model. Calculations for each chemical are shown in Table 6-10.

AFs and DAFs for each chemical and type of model run were then applied to these initial leachate concentrations. The results of this analysis are shown in Table 6-11. Predicted concentrations that exceed USEPA Region VI tap water MSSLs or MCLs are shaded.

For all modeled chemicals (SVOCs), predicted concentrations for steady-state, nontransport decay analyses, are above tap water MSSLs and/or MCLs. However, in general, contaminant source mass is expected to decrease over time due to such processes as sorption, volatilization, and biodegradation. Therefore, the assumption of a constant, infinite source (i.e., steady-state) is believed to be unrealistic and overly conservative. The results for other analyses are discussed further.

As shown in Table 6-11, predicted concentrations for sorption-only analyses (plus dispersion) are usually at least one order of magnitude, or ten times, below the tap water MSSL. When biodegradation is also considered, predicted concentrations are zero.

6.9.3 Assumptions and Limitations

The results of the vadose zone contaminant fate and transport modeling at SWMUs 31, 77, and 127 and predicted concentrations at each SWMU are based on a conservative, analytical approach with many simplifying assumptions. These assumptions and limitations are described in Appendix D. However, to summarize, the implementation of a more complex, numerical model (e.g., typical for RBCA Tier 3) would most likely produce results that are more representative of actual flow and transport processes that presumably occur at SWMUs 31, 77, and 127, due to its semiarid climate. These processes include the effects of capillary forces and soil hysteresis. The use of a numerical model might even result in lower predicted concentrations at the water table for similar assumed source conditions.

6.9.4 Summary of Results

The result of the vadose zone fate and transport modeling for SWMU 77, assuming sorption, dispersion, and biodegradation occurs, indicate that chemicals of concern will not reach groundwater above tap water screening levels.

6.10 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVE

Results of the human health and ecological risk evaluations indicate that there is minimal risk to human health and the environment based on the maximum detected concentrations of chemicals of concern in soil at SWMU 77. Furthermore, results of vadose zone fate and transport modeling show that chemicals of concern will not reach groundwater above allowable concentrations for tap water. Therefore, the "No Further Action' alternative was evaluated based on the criteria listed in Section 2.3 and as outlined in the CMS Work Plan (W-C 1998).

1. Technical

   - Performance - the No Further Action alternative is effective at being protective of human health and the environment over extended periods of time. This has been demonstrated

through Tier I and Tier II human health and ecological risk evaluations, and fate and transport modeling.

- Reliability - the No Further Action alternative does not require any operation or maintenance activities and has been proven to be effective before for similar sites and conditions.
- Implementability - the No Further Action alternative is easy to implement and will meet or exceed applicable standards.
- Safety - the No Action Alternative poses no threat to the safety of nearby workers.

2. Human Health
   - The No Further Action alternative was determined following the Risk-Based Corrective Action (RBCA) process as outlined in ASTM E1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.
   - Maximum concentrations of chemicals of concern left in place are less than conservative Tier I EPA Region VI Media Specific Screening Levels (MSSLs) and calculated Tier II Site-Specific Target Levels (SSTLs).
3. Environmental
   - No valued ecological resources are present.
4. Cost
   - The No Further Action alternative is protective of human health and the environment and at the lowest cost.

TABLE 6-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR-SURFACE SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-0771-0000			CAN077-0771-7703			CAN077-0772-0000			CAN077-0772-0003			CAN077-0773-0000			CAN077-0773-0003		
LAB SAMPLE NUMBER	0311810007SA			0311810009SA			0311890001SA			0311890002SA			0313790015SA			0313790016SA		
COLLECT DATE	09/11/93			09/11/93			09/11/93			09/11/93			09/22/93			09/22/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (μg/kg)																		
Tetrachloroethene	<	5.2	U	<	5.7	U	<	5.4	U	<	5.9	U	<	5.8	U	<	5.6	U
Toluene	7.5	5.2		<	5.7	U	<	5.4	U	<	5.9	U	3.2	5.8	J	<	5.6	U
Xylenes (total)	6.8	5.2		<	5.7	U	1.9	5.4	J	<	5.9	U	6.1	5.8		<	5.6	U
Semivolatile Organics (μg/kg)																		
Anthracene	<	340	U	<	380	U	67	360	J	<	390	U	<	380	U	<	370	U
Benzo(a)anthracene	69	340	J	<	380	U	330	360	J	<	390	U	<	380	U	<	370	U
Benzo(a)pyrene	60	340	J	<	380	U	260	360	J	<	390	U	<	380	U	<	370	U
Benzo(b)fluoranthene	110	340	J	<	380	U	510	360		<	390	U	<	380	U	<	370	U
Benzo(g,h,i)perylene	37	340	J	<	380	UJ	140	360	J	<	390	U	<	380	U	<	370	U
Butyl benzyl phthalate	<	340	U	<	380	U	39	360	J	<	390	U	<	380	U	<	370	U
Carbazole	<	340	UJ	<	380	UJ	<	360	U	<	390	U	<	380	U	<	370	U
Chrysene	67	340	J	<	380	UJ	350	360	J	<	390	U	<	380	U	<	370	U
Di-n-octyl phthalate	<	340	U	<	380	U	160	360	J	<	390	U	<	380	U	<	370	U
Dibenz(a,h)anthracene	<	340	U	<	380	U	73	360	J	<	390	U	<	380	U	<	370	U
Fluoranthene	130	340	J	<	380	U	610	360		<	390	U	<	380	U	<	370	U
Indeno(1,2,3-cd)pyrene	<	340	UJ	<	380	UJ	120	360	J	<	390	U	<	380	U	<	370	U
Pentachlorophenol	<	1700	U	<	1800	U	<	1700	U	<	1900	U	<	1800	U	<	1800	U
Phenanthrene	57	340	J	<	380	U	410	360		<	390	U	<	380	U	<	370	U
Pyrene	130	340	J	<	380	U	750	360		<	390	U	<	380	U	<	370	U
Pesticides/PCB's (μg/kg)																		
4,4'-DDE	<	3.4	U	<	3.8	U	<	14	U	<	3.9	U	<	3.8	U	<	3.7	U
4,4'-DDT	<	3.4	U	<	3.8	U	<	14	U	<	3.9	U	<	3.8	U	<	3.7	U
alpha-Chlordane	<	1.8	U	<	1.9	U	7.8	7.4		<	2	U	<	2	U	<	1.9	U
gamma-Chlordane	<	1.8	U	<	1.9	U	6.5	7.4	J	<	2	U	<	2	U	<	1.9	U

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J = Estimated value.
R = Rejected value. Qual = Qualification
U = Nondetected value. RL = Reporting Limit.

Metals (mg/kg)																		
Aluminum	7100	10.4		7050	22.9		4140	10.8		3240	23.4		7410	11.5		7460	11.2	J

TABLE 6-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR-SURFACE SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-0771-0000			CAN077-0771-7703			CAN077-0772-0000			CAN077-0772-0003			CAN077-0773-0000			CAN077-0773-0003		
LAB SAMPLE NUMBER	0311810007SA			0311810009SA			0311890001SA			0311890002SA			0313790015SA			0313790016SA		
COLLECT DATE	09/11/93			09/11/93			09/11/93			09/11/93			09/22/93			09/22/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Antimony	<	6.2	U	<	13.7	U	<	6.5	U	3.1	14	J	<	6.9	U	<	6.7	U
Arsenic	2.3	0.52		2.9	0.57		1.7	0.54		2.2	0.59		2.5	0.58		2.1	0.56	
Barium			R			R	135	1.1		130	2.3		79.3	1.2		60.2	1.1	J
Beryllium	0.47	0.21		0.48	0.46		0.25	0.22		<	0.47	U	0.58	0.23		0.54	0.22	J
Cadmium	<	0.52	U	<	1.1	U	<	0.54	U	3	1.2		<	0.58	U	<	0.56	J
Calcium	10900	20.8		115000	45.8		15000	21.7		175000	46.8		2080	23.1		17700	22.5	J
Chromium	8	1		4.1	2.3		6.9	1.1		<	2.3	U	9.5	1.2		7.6	1.1	J
Cobalt	3.3	1		3.5	2.3		2.2	1.1		1.7	2.3	J	4.4	1.2		4	1.1	J
Copper	9.7	2.1		4.2	4.6	J	11	2.2		3.1	4.7	J	8.2	2.3		7.2	2.2	J
Iron	8820	10.4		6900	22.9		6450	10.8		2990	23.4		9330	11.5		7780	11.2	J
Lead	19.6	2.6	J	5.5	0.57	J	27.8	2.7		3.5	0.59		7.5	0.58		7	0.56	
Magnesium	1380	20.8		2940	45.8		1170	21.7		2340	46.8		1360	23.1		1820	22.5	J
Manganese	187	1	J	116	2.3	J	196	1.1		40.2	2.3		244	1.2	J	167	1.1	J
Nickel	6.7	4.2		7.8	9.2	J	5.1	4.3		4.3	9.4	J	7.9	4.6		8.5	4.5	J
Potassium	1440	520		1330	1140		979	541		621	1170	J	1440	577		1500	562	
Silver	<	1	UJ	<	2.3	UJ	0.6	1.1	J	2	2.3	J	0.72	1.2	J	0.56	1.1	J
Vanadium	17.6	1		21.3	2.3		13.7	1.1		10.2	2.3		20.9	1.2		16.9	1.1	
Zinc	38.9	2.1		15	4.6		73.8	2.2		7.5	4.7		19.6	2.3		17.3	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	129	41.6		<	45.8	U	158	43.3		<	46.8	U	<	46.1	U	<	45	U
Water Quality (percent)																		
Water	3.8	0.1		13	0.1		7.7	0.1		15	0.1		13	0.1		11	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J = Estimated value.
R = Rejected value. Qual = Qualification
U = Nondetected value. RL = Reporting Limit.

TABLE 6-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR-SURFACE SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-0774-0000			CAN077-0774-0003			CAN077-0775-0000			CAN077-0775-0003			CAN077-0776-0000			CAN077-0776-0003		
LAB SAMPLE NUMBER	0313790001SA			0313790002SA			0311890006SA			0311890007SA			0311810001SA			0311810002SA		
COLLECT DATE	09/22/93			09/22/93			09/10/93			09/10/93			09/11/93			09/11/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (ug/kg)																		
Tetrachloroethene	<	5.9	U	<	5.8	U	<	5.2	U	1.3	5.4	J	<	5.4	U	<	5.6	U
Toluene	<	5.9	U	<	5.8	U	<	5.2	U	<	5.4	U	<	5.4	U	<	5.6	U
Xylenes (total)	<	5.9	U	<	5.8	U	<	5.2	U	<	5.4	U	<	5.4	U	<	5.6	U
Semivolatile Organics (ug/kg)																		
Anthracene	<	390	U	<	3800	U	<	340	U	150	360	J	57	360	J	<	370	U
Benzo(a)anthracene	<	390	U	<	3800	U	56	340	J	370	360		280	360	J	<	370	U
Benzo(a)pyrene	<	390	U	<	3800	U	54	340	J	350	360	J	200	360	J	<	370	U
Benzo(b)fluoranthene	<	390	U	<	3800	U	120	340	J	630	360		500	360		<	370	U
Benzo(g,h,i)perylene	<	390	U	<	3800	U	<	340	U	160	360	J	110	360	J	<	370	UJ
Butyl benzyl phthalate	<	390	U	<	3800	U	<	340	U	<	360	U	<	360	U	<	370	U
Carbazole	<	390	U	<	3800	U	<	340	U	43	360	J	41	360	J	<	370	UJ
Chrysene	<	390	U	<	3800	U	68	340	J	500	360		420	360	J	<	370	UJ
Di-n-octyl phthalate	<	390	U	<	3800	U	<	340	U	<	360	U	<	360	U	<	370	U
Dibenz(a,h)anthracene	<	390	U	<	3800	U	<	340	U	<	360	U	<	360	U	<	370	U
Fluoranthene	<	390	U	<	3800	U	140	340	J	1100	360		830	360		<	370	U
Indeno(1,2,3-cd)pyrene	<	390	U	<	3800	U	<	340	U	150	360	J	99	360	J	<	370	UJ
Pentachlorophenol	<	1900	U	<	18000	UJ	<	1700	U	<	1700	U	63	1700	J	<	1800	U
Phenanthrene	<	390	U	<	3800	U	94	340	J	800	360		400	360		<	370	U
Pyrene	<	390	U	<	3800	U	120	340	J	820	360		900	360		<	370	U
Pesticides/PCB's (ug/kg)																		
4,4'-DDE	<	3.9	U	<	3.8	U	2.3	3.4	J	<	3.6	U	3.8	7.1	J	<	3.7	U
4,4'-DDT	<	3.9	U	<	3.8	U	<	3.4	U	<	3.6	U	30	7.1		<	3.7	U
alpha-Chlordane	<	2	U	<	2	U	<	1.8	U	<	1.8	U	3.3	3.7	J	<	1.9	U
gamma-Chlordane	<	2	U	<	2	U	<	1.8	U	<	1.8	U	10	3.7		<	1.9	U

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J = Estimated value.
R = Rejected value. Qual = Qualification
U = Nondetected value. RL = Reporting Limit.

Metals (mg/kg)																		
Aluminum	9860	11.7		8330	11.6		2300	20.8		5890	10.8		5420	10.8		5670	11.2	

TABLE 6-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR-SURFACE SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-0774-0000			CAN077-0774-0003			CAN077-0775-0000			CAN077-0775-0003			CAN077-0776-0000			CAN077-0776-0003		
LAB SAMPLE NUMBER	0313790001SA			0313790002SA			0311890006SA			0311890007SA			0311810001SA			0311810002SA		
COLLECT DATE	09/22/93			09/22/93			09/10/93			09/10/93			09/11/93			09/11/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Antimony	<	7	U	<	6.9	U	<	12.5	U	<	6.5	U	<	6.5	U	5.9	6.7	J
Arsenic	2	0.59		1.5	0.58		2.5	0.52		2.1	0.54		2.3	0.54		1.8	0.56	
Barium	85.6	1.2		73.4	1.2		400	2.1		116	1.1	J			R			R
Beryllium	0.66	0.23		0.6	0.23		<	0.42	U	0.37	0.22		0.37	0.22		0.36	0.22	
Cadmium	<	0.59	U	<	0.58	U	2.4	1		0.62	0.54		<	0.54	U	<	0.56	U
Calcium	2090	23.4		1910	23.1		130000	41.7		48100	21.6	J	12300	21.6		81300	22.4	J
Chromium	10.4	1.2		9.3	1.2		2.1	2.1		6.6	1.1		8.6	1.1		4.6	1.1	
Cobalt	4.8	1.2		4.3	1.2		1.4	2.1	J	3.2	1.1		2.7	1.1		2.6	1.1	
Copper	8.4	2.3		8.2	2.3		4.4	4.2		6.8	2.2		7.3	2.2		4.1	2.2	
Iron	10800	11.7		9340	11.6		4430	20.8		6550	10.8		6490	10.8		5410	11.2	
Lead	8.1	0.59		8	0.58		9.1	1		9.3	1.1		41	2.7	J	5.9	0.56	J
Magnesium	1770	23.4		1670	23.1		1780	41.7		1570	21.6		1070	21.6		1850	22.4	
Manganese	252	1.2	J	228	1.2	J	410	2.1		206	1.1		182	1.1	J	74.9	1.1	J
Nickel	8.6	4.7		8.2	4.6		4	8.3	J	6.9	4.3		5.2	4.3		5.9	4.5	
Potassium	1770	586		1610	578		517	1040	J	1070	541		1010	539		1030	561	
Silver	0.8	1.2	J	0.78	1.2	J	1.6	2.1	J	0.69	1.1	J	<	1.1	UJ	<	1.1	UJ
Vanadium	22.5	1.2		17.9	1.2		11.1	2.1		18.8	1.1		14.4	1.1		12.6	1.1	
Zinc	22.9	2.3		23.6	2.3		17.3	4.2		19.2	2.2		6.2	2.2		11.9	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	46.9	U	10000	925		64	41.7		<	43.3	U	321	43.1		<	44.9	U
Water Quality (percent)																		
Water	15	0.1		14	0.1		4	0.1		7.5	0.1		7.2	0.1		11	0.1	

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A complete summary of chemical results are presented in Appendix A.
J = Estimated value.
R = Rejected value. Qual = Qualification
U = Nondetected value. RL = Reporting Limit.

TABLE 6-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-0771-7708			CAN077-0771-7713			CAN077-0771-7718			CAN077-0772-0008			CAN077-0772-0013			CAN077-0772-0018		
LAB SAMPLE NUMBER	0311810010SA			0311810011SA			0311810012SA			0311890003SA			0311890004SA			0311890005SA		
COLLECT DATE	09/11/93			09/11/93			09/11/93			09/11/93			09/11/93			09/11/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Toluene	<	5.8	U	2.6	5.5	J	<	5.6	U	<	5.5	U	<	5.8	U	<	5.7	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate	<	380	U	<	360	U	<	370	U	<	370	U	83	380	J	<	380	U
4-Nitrophenol	<	1800	U	<	1800	U	<	1800	U	<	1800	U	<	1800	U	58	1800	J
Metals (mg/kg)																		
Aluminum	3910	57.7		4910	21.9		4520	22.2		4740	11.1		5680	23		5540	22.8	
Antimony	<	34.6	U	15.2	13.1		<	13.3	U	<	6.7	U	<	13.8	U	<	13.7	U
Arsenic	1.6	0.58		1.3	0.55		1.1	0.56		1.7	0.55		1.7	0.58		1.6	0.57	
Barium			R			R			R	503	1.1		372	2.3		341	2.3	
Beryllium	<	1.2	U	<	0.44	U	<	0.44	U	0.34	0.22		<	0.46	U	<	0.46	U
Cadmium	<	2.9	U	<	1.1	U	<	1.1	U	1.3	0.55		1.5	1.2		2.1	1.1	
Calcium	252000	115		154000	43.8		119000	44.4		98500	22.2		156000	46		167000	45.6	
Chromium	<	5.8	U	<	2.2	U	1.3	2.2	J	3.1	1.1		<	2.3	U	3.2	2.3	
Cobalt	<	5.8	U	1.7	2.2	J	2	2.2	J	1.7	1.1		2.4	2.3		1.8	2.3	J
Copper	<	11.5	U	<	4.4	U	1.2	4.4	J	3	2.2		2.3	4.6	J	2.5	4.6	J
Iron	2980	57.7		3610	21.9		3460	22.2		3040	11.1		3990	23		3660	22.8	
Lead	2.9	0.58	J	3.3	0.55	J	2.7	0.56	J	5.2	0.55		3.8	0.58		3	0.57	
Magnesium	5070	115		5530	43.8		5710	44.4		3410	22.2		6300	46		7820	45.6	
Manganese	35.3	5.8	J	46.6	2.2	J	52.9	2.2	J	62.2	1.1		48.6	2.3		41.9	2.3	
Nickel	<	23.1	U	5.1	8.8	J	4.3	8.9	J	3.8	4.4	J	6.2	9.2	J	4.2	9.1	J
Potassium	703	2880	J	1050	1090	J	761	1110	J	959	555		1320	1150		1160	1140	
Silver	<	5.8	UJ	<	2.2	UJ	<	2.2	UJ	0.6	1.1	J	1.3	2.3	J	1.6	2.3	J
Sodium	<	2880	U	<	1090	U	<	1110	U	<	555	U	<	1150	U	<	1140	U
Vanadium	11.6	5.8		11.6	2.2		12.6	2.2		8	1.1		15	2.3		17	2.3	
Zinc	6.8	11.5	J	8.3	4.4	J	7.5	4.4		8.6	2.2		7.4	4.6		5.9	4.6	
Water Quality (percent)																		
Water	13	0.1		8.6	0.1		9.9	0.1		9.9	0.1		13	0.1		12	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.

J = Estimated value
R = Rejected value
U = Nondetected value
Qual = Qualification
RL = Reporting Limit

TABLE 6-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-0773-0008			CAN077-0773-0013			CAN077-0773-0018			CAN077-0774-0008			CAN077-0774-0013			CAN077-0774-0018		
LAB SAMPLE NUMBER	0313790017SA			0313790018SA			0313790019SA			0313790003SA			0313790004SA			0313790005SA		
COLLECT DATE	09/22/93			09/22/93			09/22/93			09/22/93			09/22/93			09/22/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (μg/kg)																		
Toluene	<	5.6	U	<	5.4	U	<	5.6	U	<	5.7	U	<	5.6	U	<	5.6	U
Semivolatile Organics (μg/kg)																		
Butyl benzyl phthalate	<	370	U	<	360	U	<	370	U	<	370	U	<	370	U	<	370	U
4-Nitrophenol	<	1800	U	<	1700	U	<	1800	U	<	1800	U	<	1800	U	<	1800	U
Metals (mg/kg)																		
Aluminum	3670	22.5		3010	10.8		5110	11.2		4030	22.7		5450	22.5		5360	11.2	
Antimony	<	13.5	U	<	6.5	U	<	6.7	U	<	13.6	U	<	13.5	U	<	6.7	U
Arsenic	1.1	0.56		1	0.54		2.2	0.56		1.2	0.57		0.99	0.56		1.3	0.56	
Barium	190	2.3		38.9	1.1		106	1.1		597	2.3		454	2.3		85.8	1.1	
Beryllium	0.37	0.45	J	0.26	0.22		0.46	0.22		0.37	0.45	J	0.37	0.45	J	0.39	0.22	
Cadmium	2.7	1.1		0.73	0.54		0.92	0.56		2.2	1.1		1.6	1.1		1.2	0.56	
Calcium	183000	45.1		43700	21.6		66000	22.5		162000	45.4		158000	45.1		105000	22.4	
Chromium	2.5	2.3		3.2	1.1		4	1.1		<	2.3	U	3.5	2.3		3.8	1.1	
Cobalt	2.1	2.3	J	2.1	1.1		3.1	1.1		2.2	2.3	J	2.7	2.3		2.4	1.1	
Copper	2.6	4.5	J	2.2	2.2		4.2	2.2		2.2	4.5	J	2.4	4.5	J	2.6	2.2	
Iron	2870	22.5		3190	10.8		4330	11.2		2970	22.7		4190	22.5		3890	11.2	
Lead	3.4	5.6	J	3.7	2.7		5.6	0.56		3.2	5.7	J	3	0.56		4.3	5.6	J
Magnesium	4160	45.1		1920	21.6		4180	22.5		4170	45.4		5370	45.1		6270	22.4	
Manganese	62.9	2.3	J	62.4	1.1	J	124	1.1	J	70.1	2.3	J	54.9	2.3	J	56.9	1.1	J
Nickel	4	9	J	3.9	4.3	J	5.6	4.5		4.7	9.1	J	6	9	J	5.5	4.5	
Potassium	750	1130	J	944	541		1550	562		902	1130	J	1580	1130		1460	561	
Silver	1.3	2.3	J	0.59	1.1	J	0.71	1.1	J	1.3	2.3	J	1.2	2.3	J	0.49	1.1	J
Sodium	<	1130	U	171	541	J	336	562	J	<	1130	U	389	1130	J	349	561	J
Vanadium	10.6	2.3		10.2	1.1		18.4	1.1		10.9	2.3		13.1	2.3		16.2	1.1	
Zinc	8	4.5		8.2	2.2		12.4	2.2		8.8	4.5		10.6	4.5		10.4	2.2	
Water Quality (percent)																		
Water	11	0.1		7.6	0.1		11	0.1		12	0.1		11	0.1		11	0.1	

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A complete summary of chemical results is presented in Appendix A.

J = Estimated value
R = Rejected value Qual = Qualification
U = Nondetected value RL = Reporting Limit

TABLE 6-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-0775-0008			CAN077-0775-0013			CAN077-0775-0018			CAN077-0776-0008			CAN077-0776-0013			CAN077-0776-0018		
LAB SAMPLE NUMBER	0311890009SA			0311890010SA			0311890011SA			0311810004SA			0311810005SA			0311810006SA		
COLLECT DATE	09/10/93			09/10/93			09/10/93			09/11/93			09/11/93			09/11/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (μg/kg)																		
Toluene	<	5.4	U	<	5.6	U	<	5.5	U	<	5.7	U	<	5.7	U	<	5.7	U
Semivolatile Organics (μg/kg)																		
Butyl benzyl phthalate	<	360	U	<	370	U	<	360	U	<	380	U	<	380	U	<	380	U
4-Nitrophenol	<	1700	U	<	1800	U	<	1800	U	<	1800	U	<	1800	U	<	1800	U
Metals (mg/kg)																		
Aluminum	4940	10.8		4140	11.1		3110	11		7220	22.8		3080	56.9		6310	22.8	
Antimony	<	6.5	U	<	6.7	U	<	6.6	U	<	13.7	U	<	34.1	U	<	13.7	U
Arsenic	2.1	0.54		1.6	0.56		1.3	0.55		1.7	0.57		1.1	0.57		0.95	0.57	
Barium	280	1.1		165	1.1		55.3	1.1				R			R			R
Beryllium	0.33	0.22		0.3	0.22		0.25	0.22		0.49	0.46		<	1.1	U	0.23	0.46	J
Cadmium	0.58	0.54		<	0.56	U	<	0.55	U	<	1.1	U	<	2.8	U	<	1.1	U
Calcium	71700	21.7		42100	22.3		35300	22		102000	45.6		275000	114		91100	45.7	
Chromium	6.1	1.1		3.4	1.1		3	1.1		4	2.3		<	5.7	U	3.5	2.3	
Cobalt	2.5	1.1		2	1.1		1.9	1.1		2.1	2.3	J	<	5.7	U	1.7	2.3	J
Copper	6.4	2.2		7.9	2.2		2.8	2.2		4	4.6	J	<	11.4	U	<	4.6	U
Iron	5170	10.8		4330	11.1		3610	11		5750	22.8		2040	56.9		4380	22.8	
Lead	9.4	1.1		5.5	0.56		5.7	1.1		5.7	0.57	J	1.1	0.57	J	3.2	0.57	J
Magnesium	1770	21.7		2090	22.3		1720	22		3320	45.6		5900	114		6100	45.7	
Manganese	120	1.1		90.8	1.1		88.9	1.1		95	2.3	J	12.4	5.7	J	43.4	2.3	J
Nickel	5.6	4.3		5.2	4.5		3.6	4.4	J	5.7	9.1	J	<	22.8	U	4.7	9.1	J
Potassium	883	542		892	557		790	551		1300	1140		383	2840	J	1140	1140	
Silver	0.69	1.1	J	0.69	1.1	J	0.86	1.1	J	<	2.3	UJ	<	5.7	UJ	<	2.3	UJ
Sodium	<	542	U	<	557	U	<	551	U	<	1140	U	<	2840	U	<	1140	U
Vanadium	14.9	1.1		17.1	1.1		10.6	1.1		13.7	2.3		10.2	5.7		13.7	2.3	
Zinc	16.2	2.2		10.5	2.2		8.4	2.2		14	4.6		<	11.4	U	10	4.6	
Water Quality (percent)																		
Water	7.7	0.1		10	0.1		9.2	0.1		12	0.1		12	0.1		12	0.1	

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A complete summary of chemical results is presented in Appendix A.

J = Estimated value
R = Rejected value Qual = Qualification
U = Nondetected value RL = Reporting Limit

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7707-0000			CAN077-7707-0005			CAN077-7707-7762[1]			CAN077-7707-0010			CAN077-7707-0014			CAN077-7707-0020		
LAB SAMPLE NUMBER	0396860012SA			0396860013SA			0396860017SA			0396860014SA			0396860015SA			0396860016SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	15	UJ	<	12	U	<	14	U	<	13	U	<	11	U	<	11	U
1,2-Dichloropropane	2	5.2	J	<	5.6	U	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U
Methylene chloride	<	5.2	UJ	<	5.6	U	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U
Toluene	28	5.2	J	<	5.6	U	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	980	6900	J	<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Anthracene	4600	6900	J	<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Benzo(a)anthracene	20000	6900		<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Benzo(a)pyrene	21000	6900		<	370	U	<	370	U	<	360	U	<	360	UJ	<	370	U
Benzo(b)fluoranthene	21000	6900		<	370	U	<	370	U	<	360	U	<	360	UJ	<	370	U
Benzo(g,h,i)perylene	11000	6900		<	370	U	<	370	U	<	360	U	<	360	UJ	<	370	U
Benzo(k)fluoranthene	27000	6900		<	370	U	<	370	U	<	360	U	<	360	UJ	<	370	U
bis(2-Ethylhexyl)phthalate	<	6900	U	<	370	U	<	370	U	180	360	J	200	360	J	<	370	U
Carbazole	7200	6900		<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Chrysene	2400	6900	J	<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Di-n-butyl phthalate	<	6900	U	<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Dibenz(a,h)anthracene	5100	6900	J	<	370	U	<	370	U	<	360	U	<	360	UJ	<	370	U
Dibenzofuran	1200	6900	J	<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Fluoranthene	64000	6900		74	370	J	61	370	J	<	360	U	<	360	U	<	370	U
Fluorene	1200	6900	J	<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Indeno(1,2,3-cd)pyrene	11000	6900		<	370	U	<	370	U	<	360	U	<	360	UJ	<	370	U
2-Methylnaphthalene	3200	6900	J	<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Naphthalene	1500	6900	J	<	370	U	<	370	U	<	360	U	<	360	U	<	370	U
Phenanthrene	41000	6900		<	370	U	42	370	J	<	360	U	<	360	U	<	370	U
Pyrene	45000	6900		49	370	J	45	370	J	<	360	U	<	360	U	<	370	U
Pesticides/PCBs (µg/kg)																		
Aroclor 1260	<	1700	U	<	37	U	<	37	U	<	36	U	<	36	U	<	37	U
4,4'-DDE	<	170	U	<	3.7	U	<	3.7	U	<	3.6	U	<	3.6	U	<	3.7	U
4,4'-DDT	<	170	U	<	3.7	U	<	3.7	U	<	3.6	U	<	3.6	U	<	3.7	U
Endrin ketone	120	170	J	<	3.7	U	<	3.7	U	<	3.6	U	<	3.6	U	<	3.7	U

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7707-0000			CAN077-7707-0005			CAN077-7707-7762[1]			CAN077-7707-0010			CAN077-7707-0014			CAN077-7707-0020		
LAB SAMPLE NUMBER	0396860012SA			0396860013SA			0396860017SA			0396860014SA			0396860015SA			0396860016SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Aluminum	3500	10.4		9920	11.2		10500	11.1		7520	10.9		3120	54.7		4420	22.1	
Arsenic	3.6	0.52	J	1.8	0.56	J	1.9	0.56	J	2.3	0.55	J	2.1	0.55	J	1.2	0.55	J
Barium	538	1	J	81.1	1.1	J	78.4	1.1	J	483	1.1	J	982	5.5	J	1680	2.2	J
Beryllium	0.22	0.21		0.57	0.22		0.58	0.22		0.44	0.22		<	1.1	U	<	0.44	U
Cadmium	<	0.52	U	<	0.56	U	<	0.56	U	0.38	0.55	J	<	2.7	U	<	1.1	U
Calcium	59400	20.8		28500	22.4		39500	22.3		107000	21.9		294000	109		177000	44.3	
Chromium	9.2	1	J	9.6	1.1	J	9.5	1.1	J	6.8	1.1	J	<	5.5	UJ	4.1	2.2	J
Cobalt	3.2	1		4.6	1.1		4.4	1.1		3	1.1		<	5.5	U	<	2.2	U
Copper	5	2.1		8	2.2		7.8	2.2		4.9	2.2		3.1	10.9	J	1.6	4.4	J
Iron	5640	10.4		9580	11.2		9520	11.1		6220	10.9		1760	54.7		2680	22.1	
Lead	26.2	5.2		4.4	1.1		5.2	2.8		5.1	2.7		0.85	0.55		1.3	0.55	
Magnesium	2440	20.8	J	2290	22.4	J	2500	22.3	J	3520	21.9	J	9840	109	J	8840	44.3	J
Manganese	357	1		206	1.1		186	1.1		107	1.1		13.6	5.5		23.4	2.2	
Nickel	6.7	4.2		10.8	4.5		9.1	4.5		6.5	4.4		<	21.9	U	5.2	8.9	J
Potassium	516	521	J	1780	560		1860	557		1330	547		516	2730	J	676	1110	J
Thallium	<	1	UJ	0.12	0.56	J	0.14	0.56	J	0.13	0.55	J	<	1.1	UJ	<	1.1	UJ
Vanadium	16	1		17.1	1.1		16.8	1.1		19.7	1.1		14.2	5.5		12.5	2.2	
Zinc	17.4	2.1		23.3	2.2		23.7	2.2		16.1	2.2		4.4	10.9	J	6.9	4.4	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons	9700	834		63.6	44.8		<	44.6	U	<	43.8	U	<	43.7	U	<	44.3	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value
R = Rejected value
D = Sample was diluted for analysis
U = Nondetected value
RL = Reporting Limit
[1] Duplicate for preceding sample number.

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7708-0000			CAN077-7708-0005			CAN077-7708-0010			CAN077-7708-0015			CAN077-7708-0020			CAN077-7709-0000		
LAB SAMPLE NUMBER	0396880001SA			0396880002SA			0396880003SA			0396880004SA			0396880005SA			0396910001SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
1,2-Dichloropropane	<	5.6	U	<	5.6	U	<	5.5	U	<	5.3	U	<	5.6	U	<	5.4	U
Methylene chloride	2.2	5.6	J	2.5	5.6	J	2.1	5.5	J	1.5	5.3	J	2	5.6	J	<	5.4	U
Toluene	<	5.6	U	<	5.6	U	<	5.5	U	<	5.3	U	<	5.6	U	2.4	5.4	J
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Anthracene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Benzo(a)anthracene	37	370	J	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Benzo(a)pyrene	50	370	J	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Benzo(b)fluoranthene	100	370	J	<	370	U	<	360	U	<	350	U	<	370	U	41	350	J
Benzo(g,h,i)perylene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Benzo(k)fluoranthene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
bis(2-Ethylhexyl)phthalate	770	370		660	370		540	360		740	350		350	370	J	<	350	U
Carbazole	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Chrysene	76	370	J	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Di-n-butyl phthalate	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Dibenz(a,h)anthracene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Dibenzofuran	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Fluoranthene	100	370	J	<	370	U	<	360	U	<	350	U	<	370	U	39	350	J
Fluorene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Indeno(1,2,3-cd)pyrene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
2-Methylnaphthalene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Naphthalene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Phenanthrene	<	370	U	<	370	U	<	360	U	<	350	U	<	370	U	<	350	U
Pyrene	100	370	J	<	370	U	<	360	U	<	350	U	<	370	U	40	350	J
Pesticides/PCBs (µg/kg)																		
Aroclor 1260	<	37	U	<	37	U	<	36	U	<	35	U	<	37	U	<	35	U
4,4'-DDE	<	3.7	U	<	3.7	U	<	3.6	U	<	3.5	U	<	3.7	U	3.7	3.5	
4,4'-DDT	<	3.7	U	<	3.7	U	<	3.6	U	<	3.5	U	<	3.7	U	6.8	3.5	
Endrin ketone	<	3.7	U	<	3.7	U	<	3.6	U	<	3.5	U	<	3.7	U	<	3.5	U

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7708-0000			CAN077-7708-0005			CAN077-7708-0010			CAN077-7708-0015			CAN077-7708-0020			CAN077-7709-0000		
LAB SAMPLE NUMBER	0396880001SA			0396880002SA			0396880003SA			0396880004SA			0396880005SA			0396910001SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Aluminum	2420	11.3		5370	22.3		6760	11		5350	21.3		5880	22.4		5220	10.7	
Arsenic	2.8	0.56	J	2.2	0.56	J	2	0.55	J	1.5	0.53	J	1.2	0.56	J	2.6	0.54	
Barium	691	1.1	J	578	2.2	J	327	1.1	J	1820	2.1	J	87.3	2.2	J	248	1.1	J
Beryllium	0.15	0.23	J	0.23	0.45	J	0.48	0.22		0.27	0.43	J	0.26	0.45	J	0.25	0.21	
Cadmium	0.36	0.56	J	<	1.1	U	<	0.55	U	<	1.1	U	<	1.1	U	0.57	0.54	
Calcium	99300	22.5		185000	44.6		46000	21.9		160000	42.5		144000	44.9		46100	21.5	
Chromium	3.7	1.1		4	2.2		6.1	1.1		4.5	2.1		25.4	2.2		5.6	1.1	
Cobalt	1.1	1.1		<	2.2	U	2.7	1.1		2.6	2.1		2.1	2.2	J	2.2	1.1	
Copper	5.5	2.3		3.1	4.5	J	3.8	2.2		3.1	4.3	J	14.5	4.5		8.4	2.1	
Iron	5170	11.3		4210	22.3		6210	11		4020	21.3		9250	22.4		6400	10.7	
Lead	<		R	<		R	<		R	<		R	<		R	48.5	10.7	
Magnesium	1410	22.5		2530	44.6		2660	21.9		3620	42.5		7240	44.9		1400	21.5	
Manganese	440	1.1		42.4	2.2		114	1.1		87.7	2.1		90.3	2.2		409	1.1	J
Nickel	4	4.5	J	5.1	8.9	J	5.4	4.4		5.3	8.5	J	13.9	9		5.8	4.3	
Potassium	464	563	J	836	1110	J	1230	549		1210	1060		1020	1120	J	1030	537	
Thallium	<	0.56	U	<	0.56	U	<	0.55	U	<	1.1	U	<	1.1	U	0.12	0.54	J
Vanadium	19.1	1.1		14.4	2.2		21.5	1.1		9.6	2.1		10.5	2.2		16.3	1.1	
Zinc	17.9	2.3		10.4	4.5		14.5	2.2		11.3	4.3		14.6	4.5		26	2.1	J
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons	84.3	45		<	44.6	U	<	43.9	U	<	42.5	U	<	44.9	U	1320	172	

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value
R = Rejected value
D = Sample was diluted for analysis
U = Nondetected value
RL = Reporting Limit
(1) Duplicate for preceding sample number.

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7709-0005			CAN077-7709-0010			CAN077-7709-0015			CAN077-7709-0020			CAN077-7710-0000			CAN077-7710-0005		
LAB SAMPLE NUMBER	0396910002SA			0396910003SA			0396910004SA			0396910005SA			0396910007SA			0396910008SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	6.5	12	J	10	11	J	7.7	11	J	9.2	11	J	<	11	U	<	11	U
1,2-Dichloropropane	<	5.9	U	<	5.7	U	<	5.5	U	<	5.6	U	<	5.3	U	<	5.5	U
Methylene chloride	2.2	5.9	J	1.6	5.7	J	2	5.5	J	1.9	5.6	J	1.7	5.3	J	3.1	5.5	J
Toluene	<	5.9	U	<	5.7	U	<	5.5	U	<	5.6	U	<	5.3	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Anthracene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Benzo(a)anthracene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Benzo(a)pyrene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Benzo(b)fluoranthene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Benzo(g,h,i)perylene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Benzo(k)fluoranthene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
bis(2-Ethylhexyl)phthalate	<	390	U	<	380	U	<	370	U	<	370	U	73	350	J	<	360	U
Carbazole	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Chrysene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Di-n-butyl phthalate	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Dibenz(a,h)anthracene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Dibenzofuran	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Fluoranthene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Fluorene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Indeno(1,2,3-cd)pyrene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
2-Methylnaphthalene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Naphthalene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Phenanthrene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Pyrene	<	390	U	<	380	U	<	370	U	<	370	U	<	350	U	<	360	U
Pesticides/PCBs (µg/kg)																		
Aroclor 1260	<	39	U	<	38	U	<	37	U	<	37	U	140	70		<	36	U
4,4'-DDE	<	3.9	U	<	3.8	U	<	3.7	U	<	3.7	U	<	7	U	<	3.6	U
4,4'-DDT	<	3.9	U	<	3.8	U	<	3.7	U	<	3.7	U	<	7	U	<	3.6	U
Endrin ketone	<	3.9	U	<	3.8	U	<	3.7	U	<	3.7	U	<	7	U	<	3.6	U

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7709-0005			CAN077-7709-0010			CAN077-7709-0015			CAN077-7709-0020			CAN077-7710-0000			CAN077-7710-0005		
LAB SAMPLE NUMBER	0396910002SA			0396910003SA			0396910004SA			0396910005SA			0396910007SA			0396910008SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Aluminum	4530	59.4		6680	22.9		4980	22.2		6910	22.4		2810	10.5		9330	10.9	
Arsenic	2.1	0.59		2.3	0.57		1.2	0.55		0.93	0.56		2.1	0.53		2.2	0.55	
Barium	219	5.9	J	202	2.3	J	674	2.2		91	2.2		255	1.1	J	109	1.1	J
Beryllium	<	1.2	U	0.49	0.46		0.36	0.44	J	0.42	0.45	J	0.13	0.21	J	0.51	0.22	
Cadmium	<	3	U	<	1.1	U	<	1.1	U	<	1.1	U	<	0.53	U	<	0.55	U
Calcium	232000	119		178000	45.8		217000	44.4		148000	44.9		27000	21.1		61300	21.9	
Chromium	<	5.9	U	4.4	2.3		4.2	2.2		5.5	2.2		3.8	1.1		8.5	1.1	
Cobalt	<	5.9	U	2.7	2.3		1.6	2.2	J	1.4	2.2	J	1.7	1.1		3.7	1.1	
Copper	<	11.9	U	2.6	4.6	J	2.5	4.4	J	2.7	4.5	J	6.1	2.1		7.5	2.2	
Iron	3740	59.4		5380	22.9		3790	22.2		4720	22.4		7400	10.5		8670	10.9	
Lead	3.1	0.59	J	4.4	0.57		4.7	0.55		3.5	0.56		7.6	0.53	J	6.6	0.55	J
Magnesium	2910	119		4220	45.8		3530	44.4		8550	44.9		1430	21.1		2600	21.9	
Manganese	38.6	5.9	J	56.5	2.3	J	48.7	2.2		49.5	2.2		223	1.1	J	157	1.1	J
Nickel	<	23.7	U	10.5	9.2		2.5	8.9	J	7.2	9	J	6.1	4.2		9.5	4.4	
Potassium	470	2970	J	989	1140	J	1000	1110	J	1180	1120		512	527	J	1740	547	
Thallium	<	1.2	UJ	<	0.57	U	<	0.55	U	<	1.1	U	<	0.53	U	<	0.55	U
Vanadium	10	5.9		16.3	2.3		9.5	2.2		20.4	2.2		11.9	1.1		15.9	1.1	
Zinc	8.8	11.9	J	12.1	4.6	J	10.4	4.4		11.7	4.5		24.7	2.1	J	20.3	2.2	J
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons	<	47.5	U	<	45.8	U	<	44.4	U	<	44.9	U	105	42.2		<	43.7	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value
R = Rejected value
D = Sample was diluted for analysis
U = Nondetected value
RL = Reporting Limit
(1) Duplicate for preceding sample number.

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7710-7761[1]			CAN077-7710-0010			CAN077-7710-0015			CAN077-7710-0020			CAN077-7711-0000		
LAB SAMPLE NUMBER	0396910006SA			0396910009SA			0396910010SA			0396910011SA			0396910012SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)															
Acetone	16	11		21	11		<	11	U	<	11	U	<	11	U
1,2-Dichloropropane	<	5.6	U	<	5.5	U	<	5.4	U	<	5.5	U	<	5.4	U
Methylene chloride	1.9	5.6	J	3	5.5	J	2.9	5.4	J	2.1	5.5	J	2.4	5.4	J
Toluene	1.2	5.6	J	<	5.5	U	<	5.4	U	<	5.5	U	3.5	5.4	J
Semivolatile Organics (µg/kg)															
Acenaphthene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Anthracene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Benzo(a)anthracene	<	370	U	<	360	U	<	360	U	<	360	U	54	350	J
Benzo(a)pyrene	<	370	U	<	360	U	<	360	U	<	360	U	56	350	J
Benzo(b)fluoranthene	<	370	U	<	360	U	<	360	U	<	360	U	110	350	J
Benzo(g,h,i)perylene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Benzo(k)fluoranthene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
bis(2-Ethylhexyl)phthalate	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Carbazole	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Chrysene	<	370	U	<	360	U	<	360	U	<	360	U	50	350	J
Di-n-butyl phthalate	<	370	U	<	360	U	<	360	U	<	360	U	910	350	
Dibenz(a,h)anthracene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Dibenzofuran	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Fluoranthene	<	370	U	<	360	U	<	360	U	<	360	U	89	350	J
Fluorene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Indeno(1,2,3-cd)pyrene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
2-Methylnaphthalene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Naphthalene	<	370	U	<	360	U	<	360	U	<	360	U	<	350	U
Phenanthrene	<	370	U	<	360	U	<	360	U	<	360	U	58	350	J
Pyrene	<	370	U	<	360	U	<	360	U	<	360	U	96	350	J
Pesticides/PCBs (µg/kg)															
Aroclor 1260	<	37	U	<	36	U	<	36	U	<	36	U	<	35	U
4,4'-DDE	<	3.7	U	<	3.6	U	<	3.6	U	<	3.6	U	14	3.5	
4,4'-DDT	<	3.7	U	<	3.6	U	<	3.6	U	<	3.6	U	10	3.5	
Endrin ketone	<	3.7	U	<	3.6	U	<	3.6	U	<	3.6	U	<	3.5	U

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7710-7761[1]			CAN077-7710-0010			CAN077-7710-0015			CAN077-7710-0020			CAN077-7711-0000		
LAB SAMPLE NUMBER	0396910006SA			0396910009SA			0396910010SA			0396910011SA			0396910012SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)															
Aluminum	12500	11.2		7530	22.1		8210	10.8		11600	11		5590	10.7	
Arsenic	1.8	0.56		1.8	0.55		1.3	0.54		1.5	0.55		2.7	0.54	
Barium	203	1.1	J	2840	2.2	J	542	1.1	J	486	1.1	J	336	1.1	J
Beryllium	0.6	0.22		0.59	0.44		0.39	0.22		0.48	0.22		0.3	0.21	
Cadmium	<	0.56	U	<	1.1	U	<	0.54	U	<	0.55	U	0.45	0.54	J
Calcium	82000	22.4		136000	44.1		76400	21.7		79000	22.1		18300	21.5	
Chromium	10.7	1.1		5.1	2.2		6.3	1.1		7.9	1.1		8.4	1.1	
Cobalt	4.3	1.1		2.8	2.2		2.5	1.1		2.5	1.1		3.1	1.1	
Copper	7.8	2.2		3	4.4	J	2.9	2.2		3.1	2.2		13.4	2.1	
Iron	10300	11.2		5510	22.1		6430	10.8		7380	11		9020	10.7	
Lead	6.7	0.56		4.9	0.55	J	4.7	0.54	J	4.4	1.1	J	27	5.4	J
Magnesium	3310	22.4		4320	44.1		3770	21.7		8330	22.1		1380	21.5	
Manganese	161	1.1	J	96.9	2.2	J	78.8	1.1	J	74.5	1.1	J	190	1.1	J
Nickel	10.8	4.5		6.2	8.8	J	5.7	4.3		7.7	4.4		7.7	4.3	
Potassium	2200	560		1460	1100		1960	541		2500	552		1380	536	
Thallium	<	0.56	U	<	1.1	UJ	0.25	0.54	J	<	0.55	U	<	0.54	U
Vanadium	19	1.1		14.4	2.2		15.6	1.1		27.5	1.1		16	1.1	
Zinc	24.3	2.2	J	14.7	4.4	J	16.1	2.2	J	18.9	2.2	J	64.8	2.1	J
TRPH (mg/kg)															
Total Recoverable Petroleum Hydrocarbons	<	44.8	U	<	44.1	U	<	43.3	U	<	44.2	U	113	42.9	

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value
R = Rejected value
D = Sample was diluted for analysis
U = Nondetected value
RL = Reporting Limit
[1] Duplicate for preceding sample number.

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7711-0005			CAN077-7711-0010			CAN077-7711-0015			CAN077-7711-0020		
LAB SAMPLE NUMBER	0396910013SA			0396910014SA			0396910015SA			0396910016SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Acetone	19	11		18	11		19	11		<	10	U
1,2-Dichloropropane	<	5.3	U	<	5.5	U	<	5.6	U	<	5.2	U
Methylene chloride	1.7	5.3	J	1.9	5.5	J	2	5.6	J	<	5.2	U
Toluene	2.2	5.3	J	2.2	5.5	J	<	5.6	U	<	5.2	U
Semivolatile Organics (µg/kg)												
Acenaphthene	<	350	U	<	360	U	<	370	U	<	350	U
Anthracene	<	350	U	<	360	U	<	370	U	<	350	U
Benzo(a)anthracene	<	350	U	<	360	U	<	370	U	<	350	U
Benzo(a)pyrene	<	350	U	<	360	U	<	370	U	<	350	U
Benzo(b)fluoranthene	<	350	U	<	360	U	<	370	U	<	350	U
Benzo(g,h,i)perylene	<	350	U	<	360	U	<	370	U	<	350	U
Benzo(k)fluoranthene	<	350	U	<	360	U	<	370	U	<	350	U
bis(2-Ethylhexyl)phthalate	<	350	U	<	360	U	<	370	U	<	350	U
Carbazole	<	350	U	<	360	U	<	370	U	<	350	U
Chrysene	<	350	U	<	360	U	<	370	U	<	350	U
Di-n-butyl phthalate	<	350	U	<	360	U	<	370	U	<	350	U
Dibenz(a,h)anthracene	<	350	U	<	360	U	<	370	U	<	350	U
Dibenzofuran	<	350	U	<	360	U	<	370	U	<	350	U
Fluoranthene	<	350	U	<	360	U	<	370	U	<	350	U
Fluorene	<	350	U	<	360	U	<	370	U	<	350	U
Indeno(1,2,3-cd)pyrene	<	350	U	<	360	U	<	370	U	<	350	U
2-Methylnaphthalene	<	350	U	<	360	U	<	370	U	<	350	U
Naphthalene	<	350	U	<	360	U	<	370	U	<	350	U
Phenanthrene	<	350	U	<	360	U	<	370	U	<	350	U
Pyrene	<	350	U	<	360	U	<	370	U	<	350	U
Pesticides/PCBs (µg/kg)												
Aroclor 1260	<	35	U	<	36	U	<	37	U	<	35	U
4,4'-DDE	4.1	3.5		<	3.6	U	<	3.7	U	<	3.5	U
4,4'-DDT	2.1	3.5	J	<	3.6	U	<	3.7	U	<	3.5	U
Endrin ketone	<	3.5	U	<	3.6	U	<	3.7	U	<	3.5	U

TABLE 6-2

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED FROM SWMU 77

LOCATOR	CAN077-7711-0005			CAN077-7711-0010			CAN077-7711-0015			CAN077-7711-0020		
LAB SAMPLE NUMBER	0396910013SA			0396910014SA			0396910015SA			0396910016SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)												
Aluminum	8780	21.3		7460	22.1		9100	11.1		9750	10.5	
Arsenic	2.2	0.53		1.4	0.55		1.3	0.56		1.5	0.52	
Barium	459	2.1	J	133	2.2	J	105	1.1	J	156	1	J
Beryllium	0.57	0.43		0.69	0.44		0.47	0.22		0.41	0.21	
Cadmium	<	1.1	U	<	1.1	U	<	0.56	U	<	0.52	U
Calcium	129000	42.6		141000	44.2		104000	22.3		67400	21	
Chromium	7.6	2.1		3.7	2.2		6.9	1.1		6.6	1	
Cobalt	2.8	2.1		2.3	2.2		3.7	1.1		3.4	1	
Copper	6.6	4.3		3.5	4.4	J	3.8	2.2		3.7	2.1	
Iron	7930	21.3		4960	22.1		6940	11.1		7080	10.5	
Lead	7.3	0.53	J	4.4	0.55	J	5	0.56	J	4.8	0.52	J
Magnesium	2920	42.6		4210	44.2		4440	22.3		6700	21	
Manganese	140	2.1	J	61.3	2.2	J	88.5	1.1	J	120	1	J
Nickel	7.8	8.5	J	5	8.8	J	8	4.5		7	4.2	
Potassium	1330	1060		1170	1100		2100	557		2250	524	
Thallium	<	0.53	U	<	0.55	U	<	0.56	U	<	0.52	U
Vanadium	18.4	2.1		12.5	2.2		17.9	1.1		20.3	1	
Zinc	24.5	4.3	J	12.6	4.4	J	17.4	2.2	J	19.4	2.1	J
TRPH (mg/kg)												
Total Recoverable Petroleum Hydrocarbons	<	42.6	U	<	44.2	U	<	44.5	U	<	41.9	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review. A complete summary of chemical results is presented in Appendix A.

J = Estimated value

R = Rejected value

D = Sample was diluted for analysis

U = Nondetected value

RL = Reporting Limit

(1) Duplicate for preceding sample number.

TABLE 6-3

SUMMARY OF CMS ANALYTICAL SAMPLES FOR SWMU 77
CANNON AFB, NEW MEXICO

Sampling Location	Sample Identification		Sample Date	VOCs 8260A	TPH 8015	TRPH 418.1	SVOCs 8270	Pesticides 8081	PCBs 8081
HA01	C77-HA01-001		12/03/1998						X
	C77-HA01-101	MS/MSD	12/03/1998						X
	C77-HA01-003		12/03/1998						X
	C77-HA01-303	QA SPLIT	12/04/1998						X
HA02	C77-HA02-001		12/03/1998						X
	C77-HA02-003		12/03/1998						X
	C77-HA02-203	Duplicate	12/03/1998						X
HA03	C77-HA03-001		12/03/1998	X		X	X	X	
	C77-HA03-004		12/03/1998	X		X	X	X	
HA04	C77-HA04-001		12/05/1998	X		X	X	X	
	C77-HA04-004		12/05/1998	X		X	X	X	
HA05	C77-HA05-001		12/05/1998	X		X	X	X	
	C77-HA05-004		12/05/1998	X		X	X	X	
	C77-HA05104	MS/MSD	12/05/1998	X		X	X	X	
HA06	C77-HA06-001		12/05/1998	X		X	X	X	
	C77-HA06-004		12/05/1998	X	X[1]	X	X	X	
	C77-HA06-304	QA SPLIT	12/05/1998	X		X	X	X	
	C77-HA56-204	Duplicate	12/06/1998	X		X	X	X	
HA07	C77-HA07-002		12/06/1998	X		X	X		
	C77-HA07-005		12/06/1998	X		X	X		
HA08	C77-HA08-003		12/06/1998	X		X	X		
	C77-HA08-006		12/06/1998	X		X	X		
HA09	C77-HA09-002		12/06/1998	X	X[1]	X	X		
	C77-HA09-005		12/06/1998	X		X	X		

[1] 8015 TPH DRO and GRO

TABLE 6-4

COMPOUNDS DETECTED IN CMS SURFACE SOILS AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA03-001			C77-HA04-001			C77-HA05-001			C77-HA06-001			C77-HA07-002			C77-HA09-002		
COLLECT DATE			12/03/98			12/05/98			12/05/98			12/05/98			12/06/98			12/06/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8260) (μg/kg)																				
Chloromethane	12	1/14	<	33	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg)																				
Benzo(a)anthracene	35	2/14	<	37	U	<	37	U	<	38	U	<	37	U	9	37	J	35	38	J
Benzo(a)pyrene	39	2/14	<	37	U	<	37	U	<	38	U	<	37	U	9	37	J	39	38	
Benzo(b)fluoranthene	36	2/14	<	37	U	<	37	U	<	38	U	<	37	U	9	37	J	36	38	J
Benzo(g,h,i)perylene	13	1/14	<	37	U	<	37	U	<	38	U	<	37	U	<	37	U	13	38	J
Benzo(k)fluoranthene	32	2/14	<	37	U	<	37	U	<	38	U	<	37	U	10	37	J	32	38	J
bis(2-Ethylhexyl) Phthalate	1700	1/14	<	37	U	1700	37		<	38	U	<	37	U	<	37	U	<	38	U
Chrysene	39	2/14	<	37	U	<	37	U	<	38	U	<	37	U	11	37	J	39	38	
Di-N-Butyl Phthalate	20	1/14	<	37	U	20	37	J	<	38	U	<	37	U	<	37	U	<	38	U
Di-N-Octylphthalate	450	6/14	<	37	U	16	37	J	450	38		<	37	U	<	37	U	160	38	
Dibenz(a,h)anthracene	10	1/14	<	37	U	<	37	U	<	38	U	<	37	U	<	37	U	10	38	J
Fluoranthene	87	4/14	<	37	U	<	37	U	<	38	U	<	37	U	25	37	J	87	38	
Indeno(1,2,3-c,d)pyrene	25	1/14	<	37	U	<	37	U	<	38	U	<	37	U	<	37	U	25	38	J
Phenanthrene	35	2/14	<	37	U	<	37	U	<	38	U	<	37	U	11	37	J	35	38	J
Pyrene	72	2/14	<	37	U	<	37	U	<	38	U	<	37	U	19	37	J	72	38	
PESTICIDES/PCB (μg/kg)																				
DDE	2.7	1/8	<	3.7	U	2.7	3.7	J	<	3.8	U	<	3.7	U						
DDT	3.9	1/8	<	3.7	U	3.9	3.7		<	3.8	U	<	3.7	U						

μg/kg - microgram per kilogram
J - Estimated
U - Nondetect

TABLE 6-5

COMPOUNDS DETECTED IN CMS SUBSURFACE SOILS AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA03-004			C77-HA04-004			C77-HA05-004			C77-HA06-004			C77-HA07-005			C77-HA09-005		
COLLECT DATE			12/03/98			12/05/98			12/05/98			12/05/98			12/06/98			12/06/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8260) (μg/kg)																				
Chloromethane	12	1/14	<	33	U	12	32		<	34	U	<	33	U	<	33	U	<	34	U
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg)																				
Benzo(a)anthracene	35	2/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Benzo(a)pyrene	39	2/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Benzo(b)fluoranthene	36	2/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Benzo(g,h,i)perylene	13	1/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Benzo(k)fluoranthene	32	2/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
bis(2-Ethylhexyl) Phthalate	1700	1/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Chrysene	39	2/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Di-N-Butyl Phthalate	20	1/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Di-N-Octylphthalate	450	6/14	25	37	J	<	36	U	16	37	J	<	37	U	34	37	J	<	37	U
Dibenz(a,h)anthracene	10	1/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Fluoranthene	87	4/14	<	37	U	<	36	U	<	37	U	<	37	U	8	37	J	9	37	J
Indeno(1,2,3-c,d)pyrene	25	1/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Phenanthrene	35	2/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
Pyrene	72	2/14	<	37	U	<	36	U	<	37	U	<	37	U	<	37	U	<	37	U
PESTICIDES/PCB (μg/kg)																				
DDE	2.7	1/8	<	3.6	U	<	3.5	U	<	3.7	U	<	3.6	U						
DDT	3.9	1/8	<	3.6	U	<	3.5	U	<	3.7	U	<	3.6	U						
TPH (mg/kg)																				
TPH-GRO												11	5.5							

μg/kg - microgram per killogram
J - Estimated
U - Nondetect

TABLE 6-6

COMPARISON OF SWMU 77 METALS CONCENTRATIONS IN SURFACE SOIL WITH BACKGROUND UTLs CANNON AFB, NEW MEXICO

Chemical	Frequency Detected	Field Sample ID for Maximum Hit	Maximum Detected Concentration (mg/kg)	Qualifiers for Maximum Hit	Background Surface Soil UTL Concentration[1] (mg/kg)	Exceeds Background UTL	Frequency of Exceedance of UTL	Frequency of Exceedance (%)	Does Metal Exceed Background?
METALS									
Aluminum	11/11	CAN077-0774-0000	9860		8,950	YES	1/11	9	**YES**
Arsenic	11/11	CAN077-7707-0000	3.6	J	3.6	NO			NO
Barium	9/9	CAN077-7708-0000	691	J	670	YES	1/9	11	**YES**
Beryllium	10/11	CAN077-0774-0000	0.66		0.78	NO			NO
Cadmium	4/11	CAN077-0775-0000	2.4		0.435	YES	3/11	27	**YES**
Calcium	11/11	CAN077-0775-0000	130000		44,800	YES	4/11	36	**YES**
Chromium, Total	11/11	CAN077-0774-0000	10.4		10.5	NO			NO
Cobalt	11/11	CAN077-0774-0000	4.8		6.6	NO			NO
Copper	11/11	CAN077-7711-0000	13.4		18.3	NO			NO
Iron	11/11	CAN077-0774-0000	10800		10100	YES	1/11	9	**YES**
Lead	10/10	CAN077-7709-0000	48.5		12	YES	5/10	50	**YES**
Magnesium	11/11	CAN077-7707-0000	2440	J	1,930	YES	1/11	9	**YES**
Manganese	11/11	CAN077-7708-0000	440		307	YES	4/11	55	**YES**
Nickel	11/11	CAN077-0774-0000	8.6		11	NO			NO
Potassium	11/11	CAN077-0774-0000	1770		2691	NO			NO
Silver	4/6	CAN077-0775-0000	1.6	J	0.4	YES	4/6	67	**YES**
Thallium	1/5	CAN077-7709-0000	0.12	J	0.6	NO			NO
Vanadium	11/11	CAN077-0774-0000	22.5		23.3	NO			NO
Zinc	11/11	CAN077-0772-0000	73.8		32.2	YES	3/11	27	**YES**

[1] Upper Tolerance Limit of Background (90% limit of 95th percentile). See Table 6-3 of W-C 1997.
mg/kg = milligram per kilogram
J = Estimated

TABLE 6-7

COMPARISON OF SWMU 77 METALS CONCENTRATIONS IN SUBSURFACE SOIL WITH BACKGROUND UTLs CANNON AFB, NEW MEXICO

Chemical	Frequency Detected	Field Sample ID for Maximum Hit	Maximum Detected Concentration (mg/kg)	Qualifiers for Maximum Hit	Background Surface Soil UTL Concentration[1] (mg/kg)	Exceeds Background UTL	Frequency of Exceedance of UTL	Frequency of Exceedance (%)	Does Metal Exceed Background?
METALS									
Aluminum	46/46	CAN077-7710-7761	12500		12,214	YES	1	2	**YES**
Antimony	3/24	CAN077-0771-7713	15.2		16	NO			NO
Arsenic	46/46	CAN077-0771-7703	2.9		4.3	NO			NO
Barium	38/38	CAN077-7710-0010	2840	J	890	YES	4	11	**YES**
Beryllium	33/46	CAN077-7711-0010	0.69		0.73	NO			NO
Cadmium	19/46	CAN077-0772-0003	3		1.3	YES	6	13	**YES**
Calcium	46/46	CAN077-7707-0014	294,000		237,498	YES	3	7	**YES**
Chromium, Total	38/46	CAN077-7708-0020	25.4		13.3	YES	1	2	**YES**
Cobalt	40/46	CAN077-7707-0005	4.6		4.7	NO			NO
Copper	41/46	CAN077-7708-0020	14.5		8.3	YES	1	2	**YES**
Iron	46/46	CAN077-7710-7761	10,300		13,148	NO			NO
Lead	42/42	CAN077-0775-0008	9.4		8.7	YES	2	5	**YES**
Magnesium	46/46	CAN077-7707-0014	9840	J	19,300	NO			NO
Manganese	46/46	CAN077-0774-0003	228		333	NO			NO
Nickel	42/46	CAN077-7708-0020	13.9		14.9	NO			NO
Potassium	46/46	CAN077-7710-0020	2550		2,512	NO			NO
Silver	16/24	CAN077-0772-0018	1.6	J	2.65	NO			NO
Sodium	4/18	CAN077-0774-0013	389	J	1,227	NO			NO
Thallium	4/22	CAN077-7710-0015	0.25	J	2.65	NO			NO
Vanadium	46/46	CAN077-7710-0020	27.5		32.8	NO			NO
Zinc	46/46	CAN077-7711-0005	24.5	J	30.6	NO			NO

[1] Upper Tolerance Limit of Background (90% limit of 95th percentile). See Table 6-3 of W-C 1997.
mg/kg = milligram per kilogram
J = Estimated

TABLE 6-8

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCs IN SOIL AT SWMU 77 CANNON AFB, NEW MEXICO

Chemical	Detected Concentration[1] (mg/kg)	Ingestion Rate[2] (mg/d)	Conversion Factor (kg/mg)	Daily Intake from the site[3] (mg/d)	Recommended Daily Allowance (RDA)[4] (mg/d)
Calcium	294,000	100	1.00E-06	29.4	1,200
Magnesium	9,840	100	1.00E-06	0.984	400

[1] Maximum detected concentration at SWMU 77. See Table 6-6 or 6-7.
[2] Estimation of potential chemical ingestion rate for receptors at SD-11.
[3] Daily Intake = Detected Concentration * Ingestion Rate * Conversion Factor
[4] National Research Council

TABLE 6-9

COMPARISON OF SWMU 77 MAXIMUM SOIL CONCENTRATIONS TO MSSLs
CANNON AFB, NEW MEXICO

Chemical	Maximum Detected Concentration (mg/kg)	Qual	Residential Soil MSSL Concentration[1] (mg/kg)	Exceeds MSSL?
VOLATILE ORGANICS				
1,2-Dichloropropane	0.002		0.35	NO
Acetone	0.021		1400	NO
Chloromethane	0.012		1.2	NO
Methylene Chloride	0.0031		8.5	NO
Tetrachloroethene	0.0013		4.7	NO
Toluene	0.0075		520	NO
Xylenes	0.0068		210	NO
SEMIVOLATILE ORGANICS				
Anthracene	0.15		14000	NO
Benzo(a)anthracene	0.37		0.56	NO
Benzo(a)pyrene	0.35		0.056	**YES**
Benzo(b)fluoranthene	0.63		0.56	**YES**
Benzo(g,h,i)perylene*	0.16		55	NO
Bis(2-ethylhexyl)phthalate	1.7		32	NO
Butylbenzylphthalate	0.083		240	NO
Carbazole	7.2		22	NO
Chrysene	0.5		56	NO
Dibenzo(a,h)anthracene	0.073		0.056	**YES**
Dibenzofuran	1.2		210	NO
Di-n-Butyl phthalate	0.91		5500	NO
Di-n-octyl phthalate	0.45		1100	NO
Fluoranthene	1.1		2000	NO
Indeno(1,2,3)pyrene	0.15		0.56	NO
4-Nitrophenol	0.058		3400	NO
Pentachlorophenol	0.063		2.5	NO
Phenanthrene*	0.8		55	NO
Pyrene	0.9		1500	NO
TRPH	10000		NA	NA
TPG-GRO	11		NA	NA
PESTICIDES				
Chlordane (total)	0.0178		1.6	NO
4,4-DDE	0.014		1.7	NO
4,4-DDT	0.03		1.7	NO
Endrin Ketone*	0.12		16	NO
METALS				
Aluminum	12,500		75,000	NO
Barium	2840		5200	NO
Cadmium	3		37	NO
Chromium	25.4		30	NO
Copper	14.5		2900	NO
METALS, cont.				
Iron	10,800		22,000	NO

TABLE 6-9

COMPARISON OF SWMU 77 MAXIMUM SOIL CONCENTRATIONS TO MSSLs
CANNON AFB, NEW MEXICO

Chemical	Maximum Detected Concentration (mg/kg)	Qual	Residential Soil MSSL Concentration[1] (mg/kg)	Exceeds MSSL?
Lead	48.5		400	NO
Manganese	440		3100	NO
Silver	2		370	NO
Zinc	73.8		22000	NO

(1) EPA Region VI Media-Specific Screening Levels for Residential Soil (EPA 1998)
* The MSSL for naphthalene was used as a surrogate for these PAHs. See text.
** The MSSL for Endrin was used as a surrogate Endrin Ketone. See text.
*** The MSSL for thallic oxide was used as a surrogate for thallium. See text.
mg/kg = milligrams per kilogram

TABLE 6-10

CALCULATION OF INITIAL LEACHATE CONCENTRATIONS
CANNON AFB SWMU 77

Chemical	C_s (mg/kg)	f_{oc}	K_{oc} (mL/g)	K_d (mL/g)	θ_w	θ_a	H'	ρ_b (g/cm^3)	C_w (mg/L)
Benzo(a)anthracene	0.35	0.0004	3.98E+05	1.59E+02	0.24	0.16	1.37E-04	1.6	0.0022
Benzo(a)pyrene	0.63	0.0004	1.02E+06	4.08E+02	0.24	0.16	4.63E-05	1.6	0.00154
Benzo(b)fluoranthene	0.073	0.0004	1.23E+06	4.92E+02	0.24	0.16	4.55E-03	1.6	0.000148

$$Cs = Cw \cdot \left[Kd + \frac{\theta w + \theta a \cdot H'}{\rho b} \right]$$

C_s = soil concentration, mg/kg
C_w = initial leachate concentration, mg/L
f_{oc} = fraction organic carbon content
K_{oc} = organic carbon distribution coefficient, mL/g (USEPA 1996)
K_d = distribution coefficient, mL/g (=K_{oc}*f_{oc}) (USEPA 1996)
θ_w = water-filled soil porosity
θ_a = air-filled soil porosity
H' = dimensionless Henry's Law constant (USEPA 1996)
ρ_b = dry bulk density, g/cm^3

TABLE 6-11

MODEL-PREDICTED CONCENTRATIONS
CANNON AFB SWMU 77

Chemical	Source Conditions			Active Transport Processes			C_s (mg/kg)	C_w (mg/L)	Unsaturated Zone		Saturated Zone		Screening Levels	
	Steady-State	Pulse*	Decay**	Dispersion	Adsorption	Biodegradation			AF	$(C_w)_u$ (mg/L)	DAF	$(C_w)_s$ (mg/L)	Region VI Tap Water MSSL (mg/L)	MCL (mg/L)
Benzo(a)anthracene	✓			✓			0.35	0.0022	1.0	0.0022	6.0	0.00037	9.2E-05	-
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				2,003	1.1E-06	14607.1	1.50E-07		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				14,543	1.51E-07	-	-		
			✓	✓	✓	✓			-	0	-	0		
Benzo(a)pyrene	✓			✓			0.63	0.00154	1.0	0.00154	6.0	0.00026	9.2E-06	0.0002
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				5,131	3.0E-07	37,439	4.1E-08		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				37,258	4.1E-08	-	-		
			✓	✓	✓	✓			-	0	-	0		
Benzo(b)fluoranthene	✓			✓			0.073	0.000148	1.0	0.000148	6.0	2.5E-05	9.2E-05	-
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				6,188	2.4E-08	45,147	3.3E-09		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				44,944	3.3E-09	-	-		
			✓	✓	✓	✓			-	0	-	0		

* Pulse duration = 100 years.

** Decay half-life = 10 years for SVOCs.

C_s = maximum detected soil concentration

Cw = initial leachate concentration based on equilibrium partitioning

AF = attenuation factor for unsaturated zone calculated from MULTIMED results

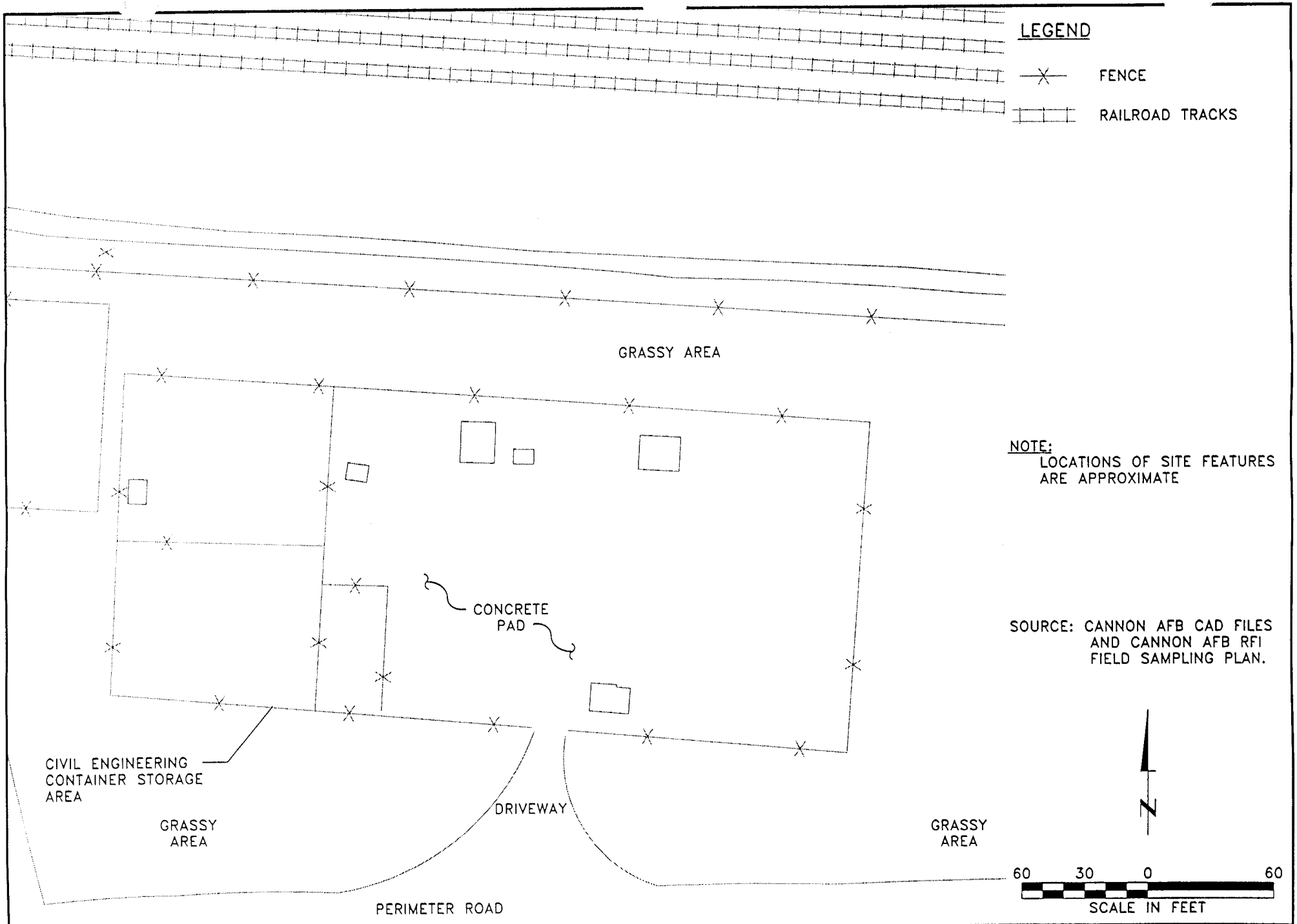
$(C_w)_u$ = soil water concentration at bottom of unsaturated zone (= C_w / AF)

DAF = dilution-attenuation factor for initial groundwater mixing zone calculated from MULTIMED results

$(C_w)_s$ = groundwater concentration at water table after initial mixing (= C_w / DAF)

"-" indicates factor is not applicable or factor/concentration could not be calculated based on model results

[illegible]dicates predicted concentration exceeds highlighted screening level



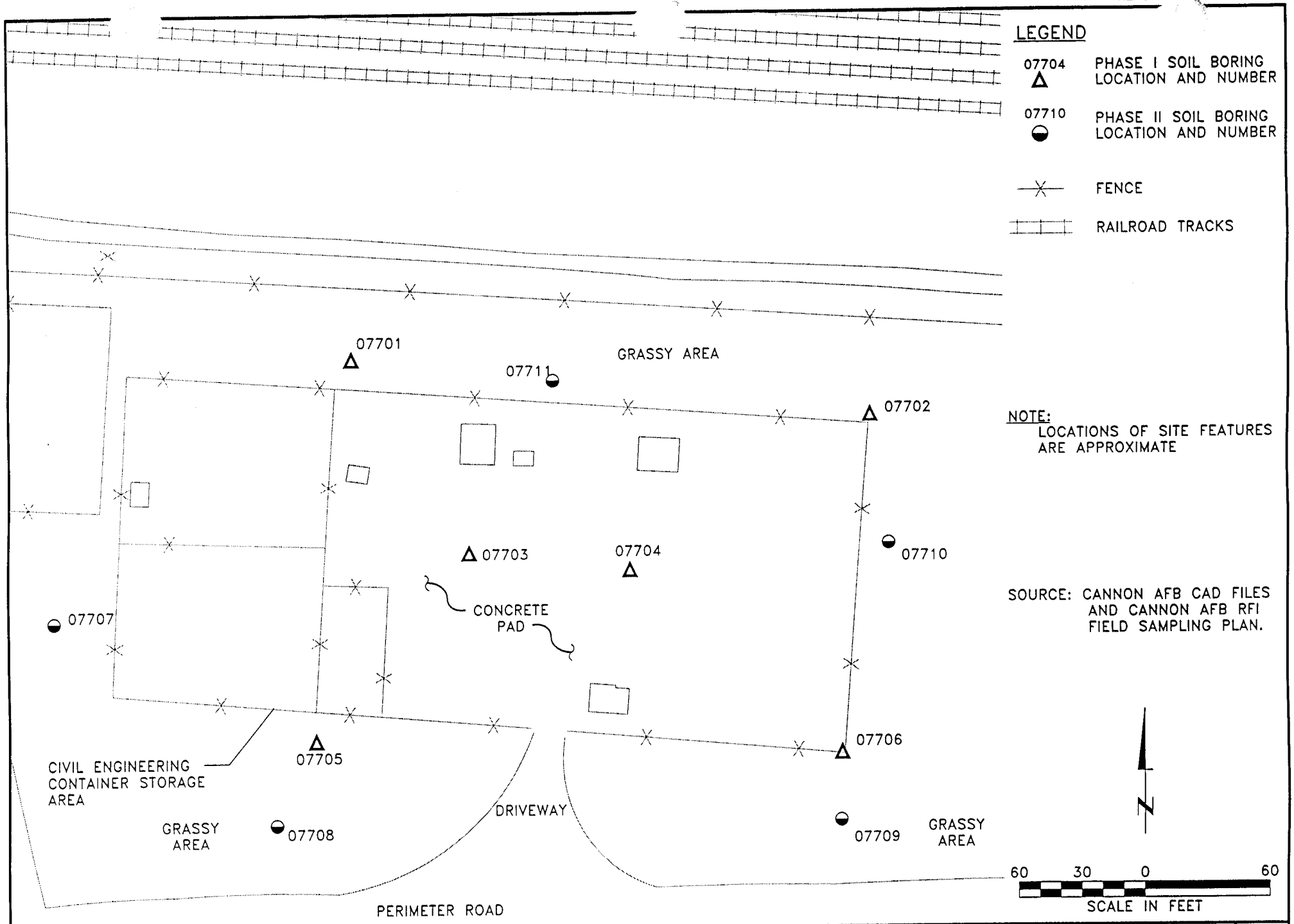
NOTE:
LOCATIONS OF SITE FEATURES ARE APPROXIMATE

SOURCE: CANNON AFB CAD FILES AND CANNON AFB RFI FIELD SAMPLING PLAN.

July 22, 1999 3:38:24 p.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG6-1.DWG (TSM)
Xrefs: CAN-BASE.DWG

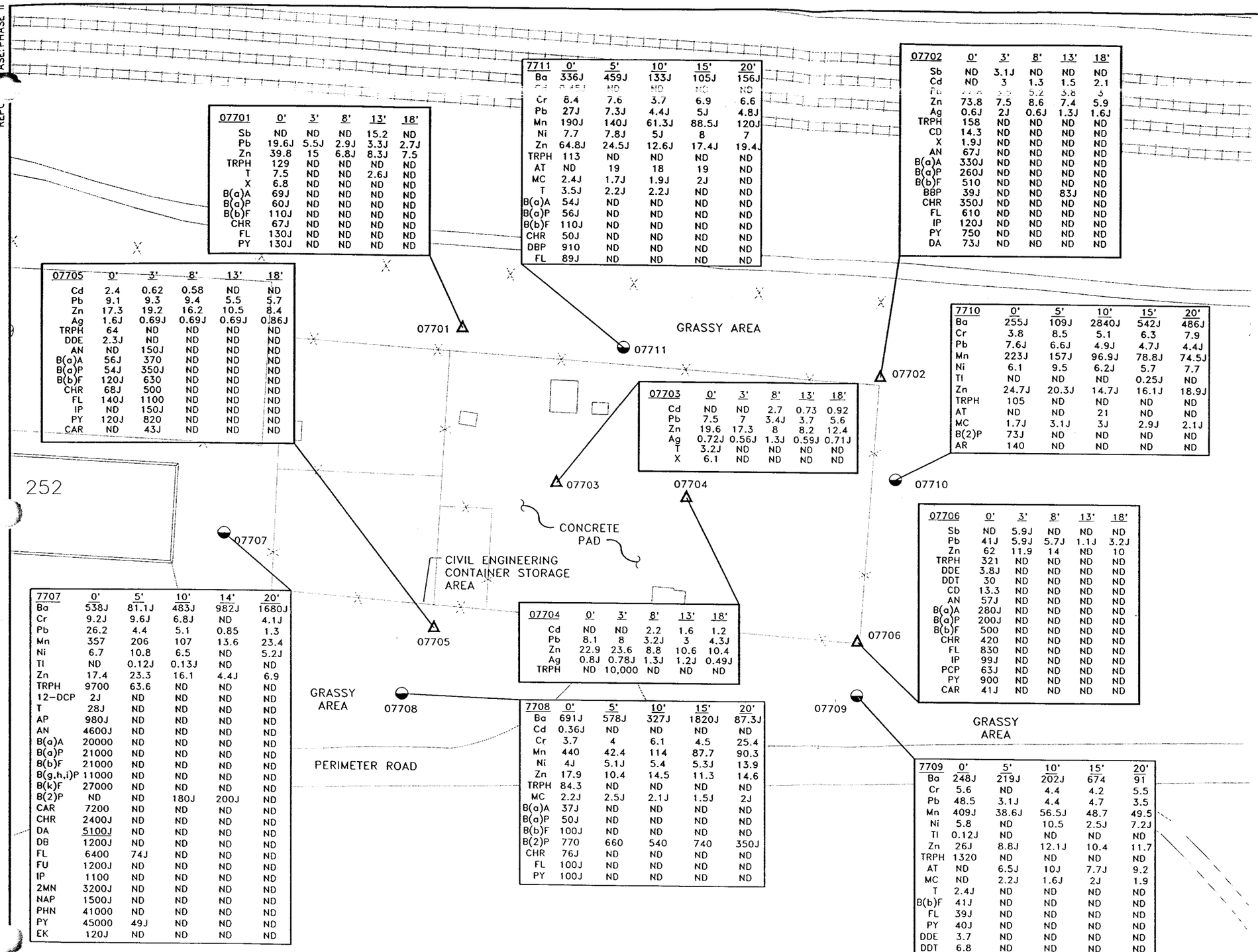
DRN BY: TSSM	DATE: 07/22/99	CIVIL ENGINEERING CONTAINER STORAGE AREA - SWMU 77 SITE PLAN CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 6-1
CHK'D BY: .	REVISION: 0			

REPORT PHASE: PHASE II



April 07, 1999 12:05:39 p.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG6-2.DWG (TSM)
Xrefs: CAN-BASE.DWG

DRN BY: TSSM	DATE: 04/07/99	CIVIL ENGINEERING CONTAINER STORAGE AREA – SWMU 77 SITE PLAN WITH BORING LOCATIONS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 6-2
CHK'D BY: .	REVISION: 0			



07701	0'	3'	8'	13'	18'
Sb	ND	ND	ND	15.2	ND
Pb	19.6J	5.5J	2.9J	3.3J	2.7J
Zn	39.8	15	6.8J	8.3J	7.5
TRPH	129	ND	ND	ND	ND
T	7.5	ND	ND	2.6J	ND
X	6.8	ND	ND	ND	ND
B(a)A	69J	ND	ND	ND	ND
B(a)P	60J	ND	ND	ND	ND
B(b)F	110J	ND	ND	ND	ND
CHR	67J	ND	ND	ND	ND
FL	130J	ND	ND	ND	ND
PY	130J	ND	ND	ND	ND

7711	0'	5'	10'	15'	20'
Ba	336J	459J	133J	105J	156J
Cd	0.45J	ND	ND	ND	ND
Cr	8.4	7.6	3.7	6.9	6.6
Pb	27J	7.3J	4.4J	5J	4.8J
Mn	190J	140J	61.3J	88.5J	120J
Ni	7.7	7.8J	5J	8	7
Zn	64.8J	24.5J	12.6J	17.4J	19.4J
TRPH	113	ND	ND	ND	ND
AT	ND	19	18	19	ND
MC	2.4J	1.7J	1.9J	2J	ND
T	3.5J	2.2J	2.2J	ND	ND
B(a)A	54J	ND	ND	ND	ND
B(a)P	56J	ND	ND	ND	ND
B(b)F	110J	ND	ND	ND	ND
CHR	50J	ND	ND	ND	ND
DBP	910	ND	ND	ND	ND
FL	89J	ND	ND	ND	ND

07702	0'	3'	8'	13'	18'
Sb	ND	3.1J	ND	ND	ND
Cd	ND	3	1.3	1.5	2.1
Pb	22.4	3.5	5.2	3.8	3
Zn	73.8	7.5	8.6	7.4	5.9
Ag	0.6J	2J	0.6J	1.3J	1.6J
TRPH	158	ND	ND	ND	ND
CD	14.3	ND	ND	ND	ND
X	1.9J	ND	ND	ND	ND
AN	67J	ND	ND	ND	ND
B(a)A	330J	ND	ND	ND	ND
B(a)P	260J	ND	ND	ND	ND
B(b)F	510	ND	ND	ND	ND
BBP	39J	ND	ND	83J	ND
CHR	350J	ND	ND	ND	ND
FL	610	ND	ND	ND	ND
IP	120J	ND	ND	ND	ND
PY	750	ND	ND	ND	ND
DA	73J	ND	ND	ND	ND

07705	0'	3'	8'	13'	18'
Cd	2.4	0.62	0.58	ND	ND
Pb	9.1	9.3	9.4	5.5	5.7
Zn	17.3	19.2	16.2	10.5	8.4
Ag	1.6J	0.69J	0.69J	0.69J	0.86J
TRPH	64	ND	ND	ND	ND
DDE	2.3J	ND	ND	ND	ND
AN	ND	150J	ND	ND	ND
B(a)A	56J	370	ND	ND	ND
B(a)P	54J	350J	ND	ND	ND
B(b)F	120J	630	ND	ND	ND
CHR	68J	500	ND	ND	ND
FL	140J	1100	ND	ND	ND
IP	ND	150J	ND	ND	ND
PY	120J	820	ND	ND	ND
CAR	ND	43J	ND	ND	ND

7710	0'	5'	10'	15'	20'
Ba	255J	109J	2840J	542J	486J
Cr	3.8	8.5	5.1	6.3	7.9
Pb	7.6J	6.6J	4.9J	4.7J	4.4J
Mn	223J	157J	96.9J	78.8J	74.5J
Ni	6.1	9.5	6.2J	5.7	7.7
Tl	ND	ND	ND	0.25J	ND
Zn	24.7J	20.3J	14.7J	16.1J	18.9J
TRPH	105	ND	ND	ND	ND
AT	ND	ND	21	ND	ND
MC	1.7J	3.1J	3J	2.9J	2.1J
B(2)P	73J	ND	ND	ND	ND
AR	140	ND	ND	ND	ND

07703	0'	3'	8'	13'	18'
Cd	ND	ND	2.7	0.73	0.92
Pb	7.5	7	3.4J	3.7	5.6
Zn	19.6	17.3	8	8.2	12.4
Ag	0.72J	0.56J	1.3J	0.59J	0.71J
T	3.2J	ND	ND	ND	ND
X	6.1	ND	ND	ND	ND

07706	0'	3'	8'	13'	18'
Sb	ND	5.9J	ND	ND	ND
Pb	41J	5.9J	5.7J	1.1J	3.2J
Zn	62	11.9	14	ND	10
TRPH	321	ND	ND	ND	ND
DDE	3.8J	ND	ND	ND	ND
DDT	30	ND	ND	ND	ND
CD	13.3	ND	ND	ND	ND
AN	57J	ND	ND	ND	ND
B(a)A	280J	ND	ND	ND	ND
B(a)P	200J	ND	ND	ND	ND
B(b)F	500	ND	ND	ND	ND
CHR	420	ND	ND	ND	ND
FL	830	ND	ND	ND	ND
IP	99J	ND	ND	ND	ND
PCP	63J	ND	ND	ND	ND
PY	900	ND	ND	ND	ND
CAR	41J	ND	ND	ND	ND

07704	0'	3'	8'	13'	18'
Cd	ND	ND	2.2	1.6	1.2
Pb	8.1	8	3.2J	3	4.3J
Zn	22.9	23.6	8.8	10.6	10.4
Ag	0.8J	0.78J	1.3J	1.2J	0.49J
TRPH	ND	10,000	ND	ND	ND

7707	0'	5'	10'	14'	20'
Ba	538J	81.1J	483J	982J	1680J
Cr	9.2J	9.6J	6.8J	ND	4.1J
Pb	26.2	4.4	5.1	0.85	1.3
Mn	357	206	107	13.6	23.4
Ni	6.7	10.8	6.5	ND	5.2J
Tl	ND	0.12J	0.13J	ND	ND
Zn	17.4	23.3	16.1	4.4J	6.9
TRPH	9700	63.6	ND	ND	ND
12-DCP	2J	ND	ND	ND	ND
T	28J	ND	ND	ND	ND
AP	980J	ND	ND	ND	ND
AN	4600J	ND	ND	ND	ND
B(a)A	20000	ND	ND	ND	ND
B(a)P	21000	ND	ND	ND	ND
B(b)F	21000	ND	ND	ND	ND
B(g,h,i)P	11000	ND	ND	ND	ND
B(k)F	27000	ND	ND	ND	ND
B(2)P	ND	ND	180J	200J	ND
CAR	7200	ND	ND	ND	ND
CHR	2400J	ND	ND	ND	ND
DA	5100J	ND	ND	ND	ND
DB	1200J	ND	ND	ND	ND
FL	6400	74J	ND	ND	ND
FU	1200J	ND	ND	ND	ND
IP	1100	ND	ND	ND	ND
2MN	3200J	ND	ND	ND	ND
NAP	1500J	ND	ND	ND	ND
PHN	41000	ND	ND	ND	ND
PY	45000	49J	ND	ND	ND
EK	120J	ND	ND	ND	ND

7708	0'	5'	10'	15'	20'
Ba	691J	578J	327J	1820J	87.3J
Cd	0.36J	ND	ND	ND	ND
Cr	3.7	4	6.1	4.5	25.4
Mn	440	42.4	114	87.7	90.3
Ni	4J	5.1J	5.4	5.3J	13.9
Zn	17.9	10.4	14.5	11.3	14.6
TRPH	84.3	ND	ND	ND	ND
MC	2.2J	2.5J	2.1J	1.5J	2J
B(a)A	37J	ND	ND	ND	ND
B(a)P	50J	ND	ND	ND	ND
B(b)F	100J	ND	ND	ND	ND
B(2)P	770	660	540	740	350J
CHR	76J	ND	ND	ND	ND
FL	100J	ND	ND	ND	ND
PY	100J	ND	ND	ND	ND

7709	0'	5'	10'	15'	20'
Ba	248J	219J	202J	674	91
Cr	5.6	ND	4.4	4.2	5.5
Pb	48.5	3.1J	4.4	4.7	3.5
Mn	409J	38.6J	56.5J	48.7	49.5
Ni	5.8	ND	10.5	2.5J	7.2J
Tl	0.12J	ND	ND	ND	ND
Zn	26J	8.8J	12.1J	10.4	11.7
TRPH	1320	ND	ND	ND	ND
AT	ND	6.5J	10J	7.7J	9.2
MC	ND	2.2J	1.6J	2J	1.9
T	2.4J	ND	ND	ND	ND
B(b)F	41J	ND	ND	ND	ND
FL	39J	ND	ND	ND	ND
PY	40J	ND	ND	ND	ND
DDE	3.7	ND	ND	ND	ND
DDT	6.8	ND	ND	ND	ND

LEGEND

07702 △ PHASE I BORING LOCATION WITH NUMBER

07710 ⊖ PHASE II BORING LOCATION WITH NUMBER

FENCE

RAILROAD TRACKS

Sb = ANTIMONY (mg/kg)
Cd = CADMIUM (mg/kg)
Pb = LEAD (mg/kg)
Zn = ZINC (mg/kg)
Ba = BARIUM (mg/kg)
Cr = CHROMIUM (mg/kg)
Mn = MANGANESE (mg/kg)
Ni = NICKEL (mg/kg)
Tl = THALLIUM (mg/kg)
AP = ACENAPTHENE
AN = ANTHRACENE
AT = ACETONE
AR = AROCLOR-1260
DA = DIBENZ(a,h)ANTHRACENE
DB = DIBENZOFURAN
FU = FLUORENE
MC = METHYLENE CHLORIDE
EK = ENDRIN KETONE
Ag = SILVER (mg/kg)
TRPH = TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/kg)
CD = CHLORDANE
FL = FLUORANTHENE
IP = INDENO(1,2,3-CD)PYRENE
PY = PYRENE
B(a)A = BENZO(A)ANTHRACENE
B(a)P = BENZO(A)PYRENE
B(b)F = BENZO(B)FLURANTHENE
DBP = DI-N-BUTYL PHTHALATE
CHR = CHRYSENE
DDE = 4,4'-DDE
DDT = 4,4'-DDT
DDD = 4,4'-DDD
12-DCP = 1,2-DICHLOROPROPANE
2MN = 2-METHYLNAPHTHALENE
NAP = NAPHTHALENE
PHN = PHENANTHRENE
B(g,h,i)P = BENZO(g,h,i)PERYLE
B(k)F = BENZO(k)FLUORANTHENE
B(2)P = BIS(2-Ethylhexyl)PHTHA
CAR = CARBAZOLE
BBP = BUTYL BENZYLPHTHALATE
PCP = PENTACHLOROPHENOL
CAR = CARBAZOLE
X = XYLENES
T = TOLUENE

CONCENTRATIONS ARE µg/kg EXCEPT WHERE NOTED

ND= CHEMICALS ANALYZED FOR WERE NOT DETECTED

* = ANALYSIS FOR THIS CHEMICAL WAS NOT PERFORMED

NOTE:
LOCATIONS OF SITE FEATURES ARE APPROXIMATE

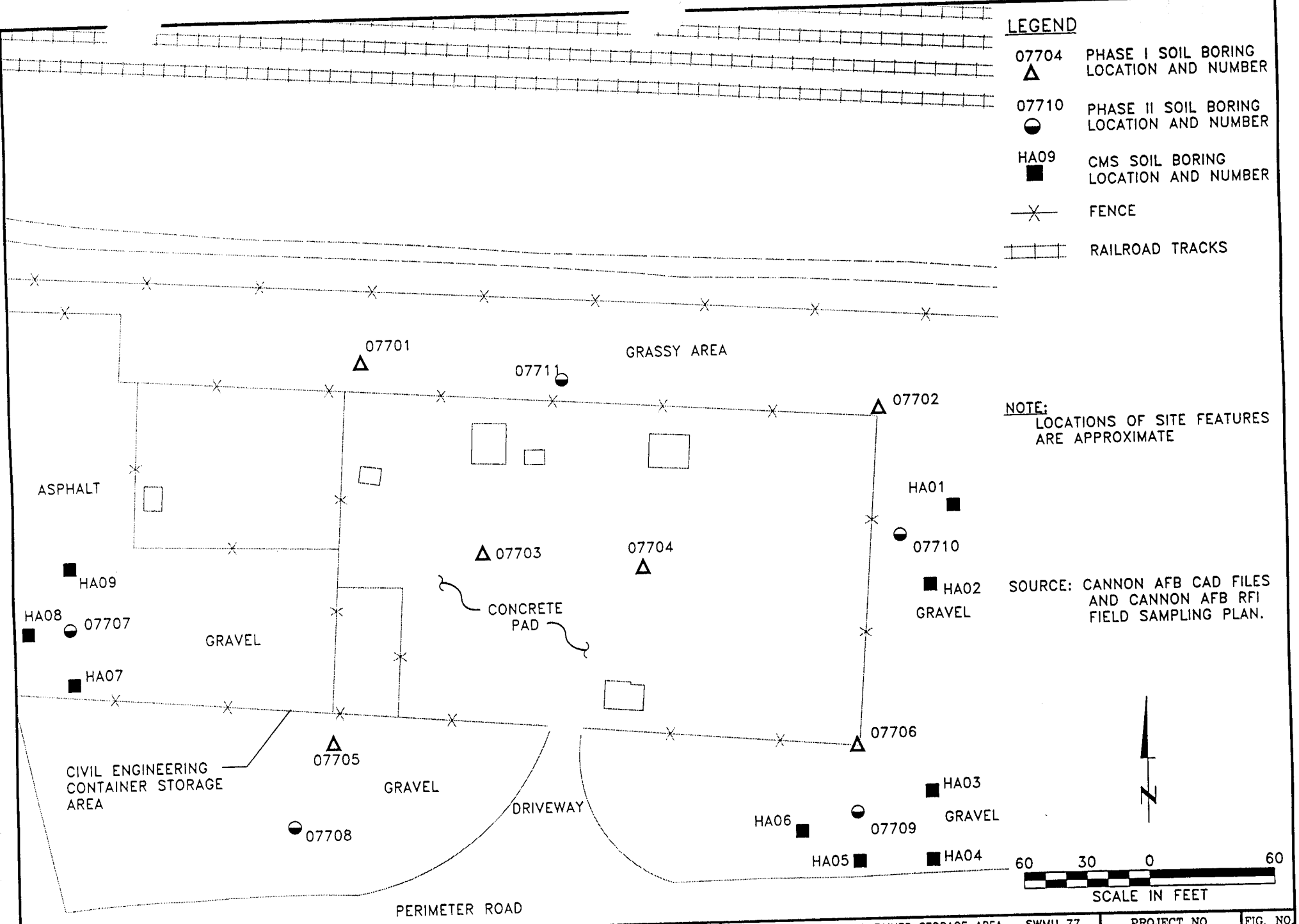
60 30 0 60
SCALE IN FEET

N

April 07, 1999 12:07:25 p.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG6-3.DWG (TSM)
Xrefs: CAN-BASE.DWG

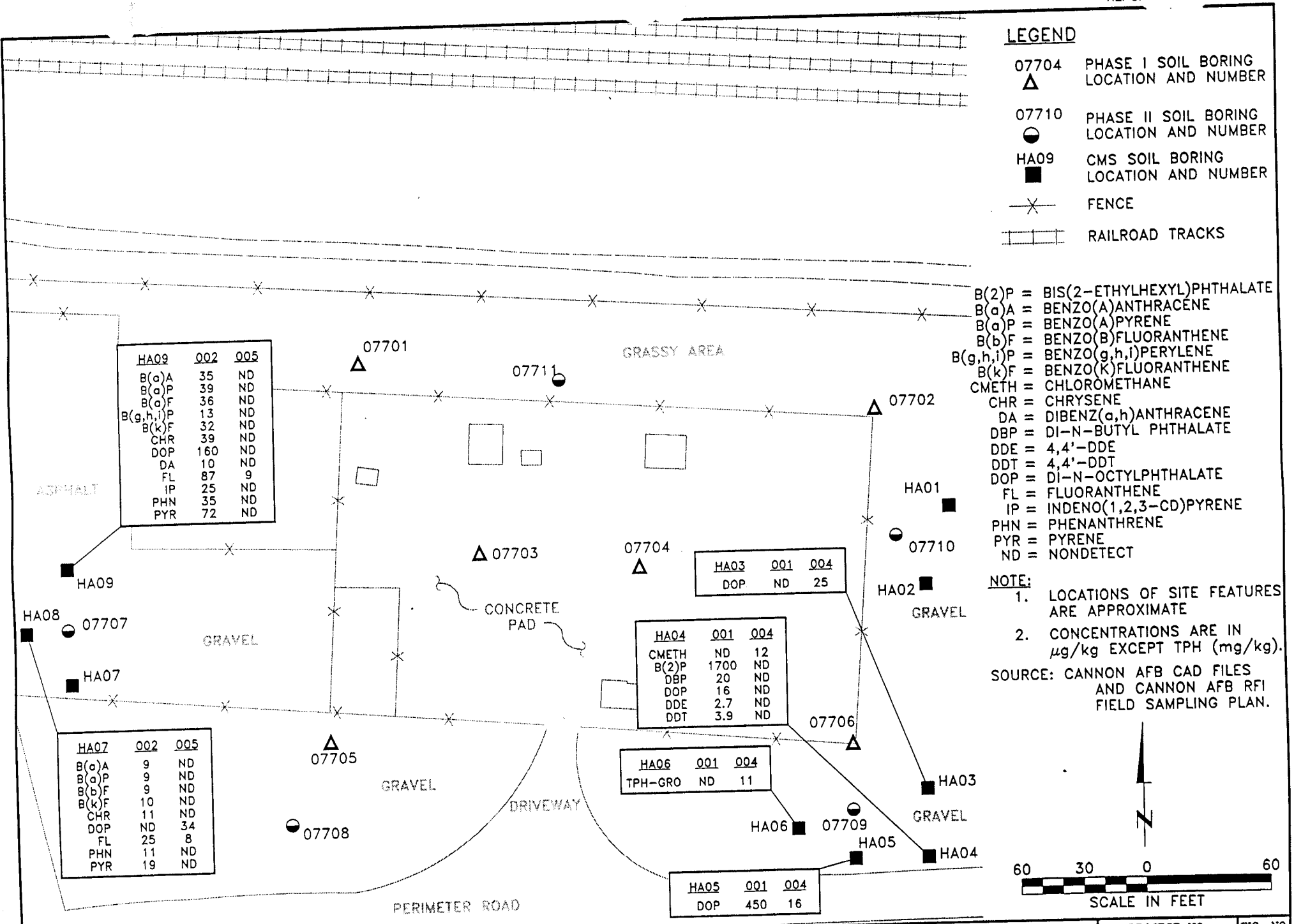
SOURCE: CANNON AFB CAD FILES AND CANNON AFB RFI FIELD SAMPLING PLAN.

DRN BY TSSM	DATE 04/07/99	CIVIL ENGINEERING CONTAINER STORAGE AREA – SWMU 77 CONCENTRATION OF CHEMICALS DETECTED IN SOIL CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 6-3
CHK'D BY	REVISION 0			



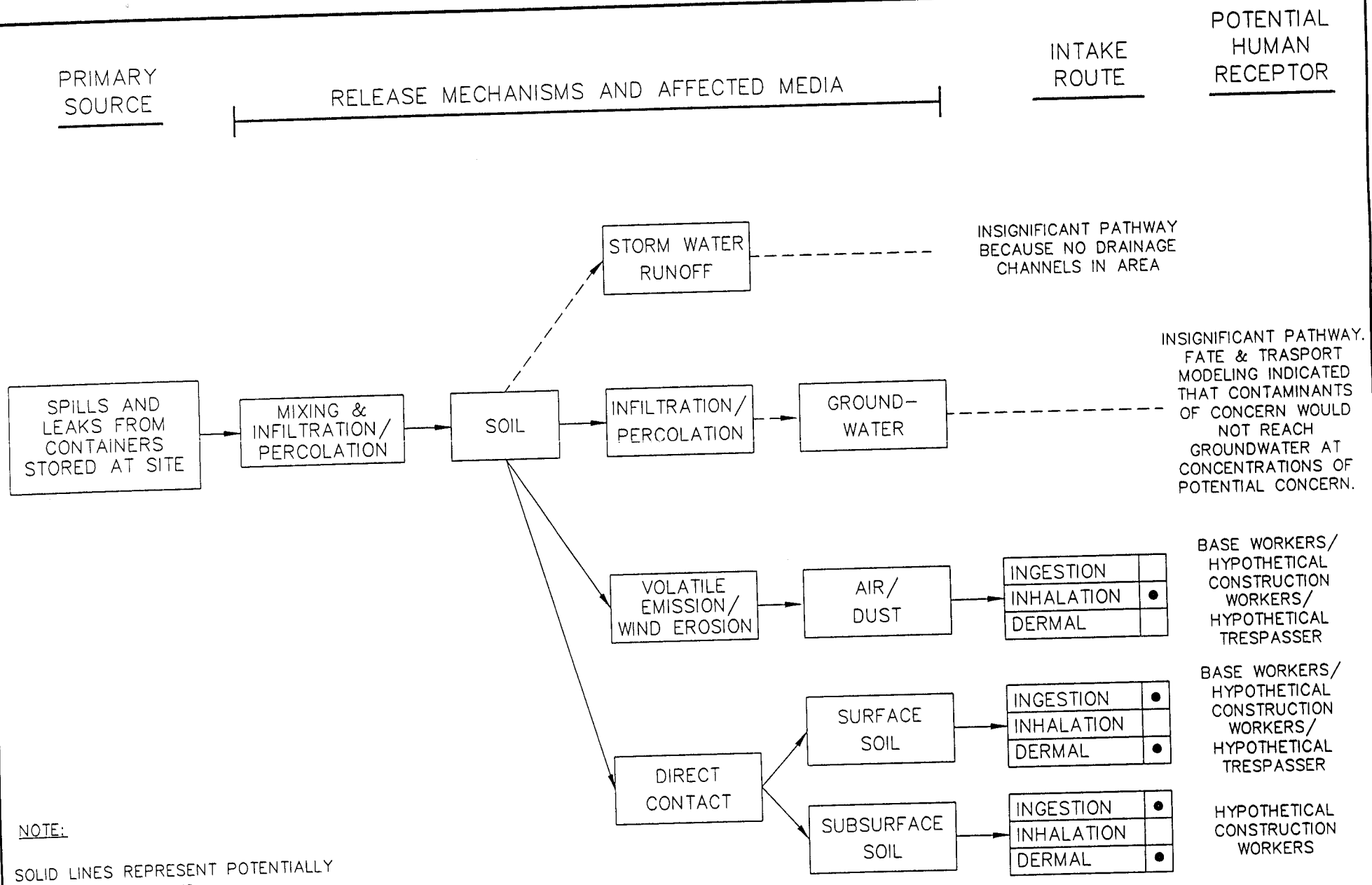
April 07, 1999 12:32:52 p.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG6-4.DWG (TSM)
Xrefs: CAN-BASE.DWG

DRN BY: TSSM	DATE: 04/07/99	CIVIL ENGINEERING CONTAINER STORAGE AREA – SWMU 77 SITE PLAN WITH CMS BORING LOCATIONS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 6-4
CHK'D BY: .	REVISION: 0			



DRN BY: TSSM	DATE: 07/26/99	CIVIL ENGINEERING CONTAINER STORAGE AREA - SWMU 77 CONCENTRATIONS OF DETECTED CHEMICALS FROM CMS BORINGS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 6-5
CHK'D BY: .	REVISION: 0			

July 26, 1999 11:30:59 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG6-5.DWG (TSM)
Xrefs: CAN-BASE.DWG



NOTE:

SOLID LINES REPRESENT POTENTIALLY COMPLETE PATHWAYS

DASHED LINES REPRESENT INCOMPLETE OR INSIGNIFICANT PATHWAYS

ONLY FUTURE USE EXPOSURES WILL BE CONSIDERED FOR SOILS PRESENTLY COVERED BY PAVEMENT

July 26, 1999 11:32:18 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG6-6.DWG (TSM)

DRN BY TSSM	DATE 07/26/99	SITE CONCEPTUAL EXPOSURE MODEL CIVIL ENGINEERING CONTAINER STORAGE AREA SWMU – 77 CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45-FM9602CC.00
CHK'D BY .	REVISIONS: 0		FIG. NO. 6-6

7.1 SITE DESCRIPTION

This SWMU is a 135-gallon concrete sand trap and leach field that receives wash water from the POL refueling truck wash rack at Facility 4095 (Figure 7-1). The sand trap measure is 2.5 feet by 4.5 feet in plan and extends about 3.5 feet below the pavement. This unit was active in 1977.

7.2 SITE HISTORY

The sand trap reportedly received washdown wastewater from fuel truck cleaning operations. This wastewater historically was discharged to a leach field located approximately 60 feet northeast of the wash rack. The leach field reportedly ceased to function in the late 1980s; a new leach field was installed approximately 20 feet northeast of the original in May 1991. A new OWS enclosed in a concrete vault was also installed at this time to recover jet fuel which may be released during wash rack operations. The original leach field remains in place, but has been bypassed and is no longer used. The OWS vault was inspected during the initial site visit (1993). The unit consists of a three-compartment steel tank with clean-out access for each compartment. There was no evidence of any leakage or spillage, and this OWS was not a part of SWMU 127 investigation sampling.

7.3 CURRENT USE

The wash rack sand trap is still present, but is not currently being used. The wastewater from the OWS discharges to a new leach field located northeast of the former leach field, and oils recovered are temporarily stored in the separator for future recycling.

7.4 PREVIOUS INVESTIGATIONS

Phase I RFI

The objective of soil sampling at the wash rack sand trap and the associated leach fields during the Phase I RFI (W-C 1994a) was to evaluate whether or not a release of SWMU-related chemicals had occurred from the sand trap or seepage from the two leach fields.

Two 10-foot borings were drilled through holes cut in the concrete wash rack to sample the soil below the pad. Soil samples were collected at the 0.5- to 2-foot, 2- to 4-foot, 4- to 6-foot, and 8- to 10-foot depth intervals to characterize the vertical distribution of possible contaminants. Minor visual and olfactory indications of contamination, probably attributable to spillage of JP-4 jet fuel on the wash rack, was found in soils directly below the concrete pad. The locations of the Phase I soil borings are shown on Figure 7-2.

One 60-foot boring was drilled adjacent to the OWS and five 60-foot borings were drilled within the new and abandoned leach fields. Samples were collected at the surface and at the 1.5- to 3.5-foot, 4- to 6-foot, 8- to 10-foot, 18- to 20-foot, 28- to 30-foot, 38- to 40-foot, 48- to 50-foot, and

58- to 60-foot depth intervals to characterize the vertical distribution of possible leachate contaminants percolating into the soil. Only soils from Boring 12708, located in the new leach field, had indications (olfactory) of subsurface contamination beyond the wash rack.

Target analytes for all borings included VOCs, SVOCs, metals, and TRPH. SVOCs were analyzed only for a limited number of samples to allow for risk assessment. These samples typically included surface samples and one selected sample at depth from each boring. Surficial samples were collected directly under the concrete wash rack and at approximately the 0.2- to 0.5-foot depth interval in areas of plant cover to provide a worst-case situation for risk assessment purposes in the event that VOC contamination was discovered during this investigation. Figure 7-3 and Tables 7-1a and 7-1b provide a summary of the analytical results for the Phase I investigation.

1,2-Dichloroethane was detected in Boring No. 12706 at the surface. 1,2-Dichloropropane was detected in Boring No. 12705 at the surface, Boring No. 12705 at 38 feet, and Boring No. 12704 at 50 and 60 feet. Toluene was detected in surface samples and/or subsurface samples to 60 feet in Boring Nos. 12703 through 12707. Xylene was detected in Boring Nos. 12703, 12704, 12706, and 12707 at the surface; in Boring No. 12707 at 3.5; and in Boring No. 12705 at 20 feet. Carbazole was detected in Boring Nos. 12703 and 12705 at the surface. Anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, phenanthrene, and/or pyrene were detected in one or more samples from the surface and 3.5 feet in Boring Nos. 12703 through 12708. Butyl benzyl phthalate was detected in Boring No. 12701 at 4 feet. Petroleum hydrocarbons were detected in Boring Nos. 12702 through 12707 at the surface, in Boring No. 12702 at 4 and 6 feet, in Boring No. 12701 at 6 and 10 feet, and in Boring No. 12708 at 10 to 20 feet. Aluminum, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc were detected above background in surface samples and subsurface samples to 60 feet in one or more of the borings.

Results from the baseline risk assessment associated with the Phase I RFI indicated that risk to human health met USEPA-acceptable levels.

Phase II RFI

Eight soil borings were drilled and soil samples collected at the sand trap at the POL wash rack during the Phase II RFI (W-C 1995c). Two borings were drilled to a depth of 10 feet at the location of the POL wash rack. Three borings were drilled to a depth of 60 feet in/or near the historic leach field area, three borings were drilled to 60 feet in the new leach field area, and one boring was drilled to 60 feet between the two leach fields. The boring locations were chosen to further assess the lateral presence and extent of site-related soil contaminants to the 10-foot and 60-foot depth intervals. Phase II RFI boring locations are shown on Figure 7-2.

Surface soil samples from all borings were collected from 0 to 0.5 feet. All borings were also sampled at intervals of 3 to 5 feet and 8 to 10 feet. Other samples collected from the 60-foot

borings included depths of 13 to 15 feet, 18 to 20 feet, 23 to 25 feet, 28 to 30 feet, 33 to 35 feet, 38 to 40 feet, 48 to 50 feet, and 58 to 60 feet. Target analytes include VOCs, SVOCs, TAL metals, and TRPH. Figure 7-3 and Tables 7-2a through 7-2d summarize analytical results for the Phase II investigation.

Except for acetone and methylene chloride, which were both qualified as nondetect after they were determined to be laboratory contaminants, the only VOCs detected in near-surface soil samples were ethylbenzene, toluene, and total xylenes. Ethylbenzene was reported in samples at concentrations of 3,900 μg/kg (estimated) and 54,000 μg/kg. Toluene was reported in samples at concentrations of 14,000 μg/kg, 82,000 μg/kg, and 1.3 μg/kg (estimated). Total xylenes were reported in samples at concentrations of 33,000 μg/kg and 260,000 μg/kg. Several SVOCs, mainly in the form of PAHs, were reported in many of the surface samples. Total PAH concentrations in surface samples ranged from 1,445 μg/kg to 21,000 μg/kg (estimated). Other non-PAH SVOCs were bis(2-ethylhexyl) phthalate, 2-methylnaphthalene, and benzoic acid. Petroleum hydrocarbons were detected in samples at concentrations ranging from 45.5 mg/kg to 11,600 mg/kg.

Other than acetone and methylene chloride, which were qualified nondetect after they were determined to be laboratory contaminants, the only VOCs reported in subsurface soil samples were toluene and 2-butanone. Toluene was reported in samples at concentrations ranging from 1.2 μg/kg (estimated) to 9 μg/kg. 2-Butanone was reported in samples at concentrations of 6.2 μg/kg and 1.3 μg/kg (estimated). Several SVOCs, mainly in the form of PAHs, were reported for some of the subsurface samples. Total PAHs reported for samples ranged from 128 μg/kg to 1,733 μg/kg. Other non-PAH SVOCs reported were di-n-butyl phthalate, di-n-octyl phthalate, diethyl phthalate, and bis(2-ethylhexyl) phthalate. Petroleum hydrocarbons were reported at concentrations ranging from 47.9 mg/kg to 1,700 mg/kg. TRPH was not detected in any of the 60-foot subsurface soil samples.

The maximum concentrations of barium, chromium, cobalt, copper, lead, manganese, thallium, and zinc exceeded background levels.

TRPH was also analyzed for during these previous investigations. The maximum detected concentration from Phase II (11,600 mg/kg) exceeded the NMED action level of 1,000 mg/kg. The NMED action levels of 500 mg/kg for BTEX and 10 mg/kg for benzene individually were not exceeded.

7.5 HUMAN HEALTH RISK EVALUATION

7.5.1 Site Conceptual Exposure Model

The SCEM is a schematic representation of the contaminant source areas, chemical release mechanisms, environmental transport media, potential human intake routes, and potential human receptors. A SCEM should identify complete exposure pathways that may result in human

health risks and indicate the data needed to evaluate those pathways. An exposure pathway consists of four necessary elements:

- A source and mechanism of chemical release to the environment
- An environmental transport medium for the released chemical (e.g., air, groundwater, or surface water)
- A point of potential human exposure to transported chemicals (e.g., a domestic drinking water well)
- A human intake mechanism (e.g., inhalation or ingestion) at the point of exposure

All four elements must be present for an exposure pathway to be complete and for chemical exposure to occur. In the SCEM, potentially complete exposure pathways are indicated with solid lines; minor (insignificant) pathways are indicated with dashed lines.

This SWMU includes a 135-gallon concrete sand trap, an new oil/water separator, an old leach field, and a new leach field. The SCEM for SWMU 127 is presented in Figure 7-4. The primary source at SWMU 127 is wastewater and recovered oil products that have leaked from or been spilled at the oil/water separator, sand trap, or leach fields. Chemicals from the primary source may be transported away from the primary source areas, affecting other media that may in turn act as secondary sources. Mixing and infiltration of the waste with the soil is shown as the primary chemical release mechanism. Once in the soil, the chemicals may be released to the atmosphere by volatilization or wind erosion.

Other release mechanisms, such as direct contact (soil ingestion and dermal contact), surface runoff, wind erosion, or volatilization to the atmosphere, are also depicted in the SCEM. Transport by storm runoff is not considered a significant pathway for human exposure at SWMU 127 because the SWMU is flat and there are no developed drainageways on site.

Potential receptors at SWMU 127 include occupational receptors, hypothetical future construction workers, and hypothetical trespassers. SWMU 127 is located in the industrial area of the Base; therefore, residential development is not a likely future land use. Surface soil (upper 2 feet of soil column) and air emissions (particulates) from surface soil may provide exposures to occupational receptors and hypothetical trespassers. Surface soil, subsurface soil, and air emissions (volatile and particulate) from soil may provide exposures to hypothetical future construction workers during excavation activities.

Groundwater is used for domestic purposes on and off Base. However, potential groundwater exposures were not evaluated because fate and transport modeling indicates that groundwater will not be impacted (see Section 7.7).

In summary, the potentially complete human exposure pathways at SWMU 127 are:

Occupational Receptors

- Ingestion of surface soil
- Dermal contact with surface soil
- Inhalation of airborne particulate matter from surface soil

Hypothetical Future Construction Workers

- Ingestion of subsurface and surface soil
- Dermal contact with subsurface and surface soil
- Inhalation of volatile emissions and airborne particulate matter from subsurface and surface soil

Hypothetical Trespassers

- Ingestion of surface soil
- Dermal contact with surface soil
- Inhalation of airborne particulate matter from surface soil

7.5.2 Site Classification

Site classification is a prioritization step that is used to judge the urgency of the need for initial response actions and maximizes the effectiveness of limited resources. There are four classes of sites (ASTM 1996):

Class 1: Immediate threat to human health and safety or sensitive environmental receptors

Class 2: Short-term threat to human health and safety or sensitive environmental receptors

Class 3: Long-term threat to human health and safety or sensitive environmental receptors

Class 4: No demonstrable threat to human health and safety or sensitive environmental receptors

This site presents no explosive threat and contains no free product, no surface water, and no groundwater discharges. There are no public facilities (i.e., daycares, parks, schools, dwellings) located on or near the site. The nearest potable groundwater aquifer is located more than 250 feet bgs. Additionally, access to soils is limited primarily to Base personnel. Therefore, SWMU 127 was considered to be a Class 4 site.

7.5.3 Background Comparison

Metals are natural constituents of soils and water. Metals that occur in concentrations within background levels are not considered site-related chemicals of concern and are not evaluated further. To determine if the concentrations of metals detected in surface and subsurface soil at

SWMU 127 exceeded background concentrations, the maximum detected concentrations at the site were compared to the calculated background UTLs. The UTLs used in this comparison were calculated as part of the background study for Cannon AFB (W-C 1997). Maximum detected concentrations from surface soils were compared to surface soil UTLs. Maximum detected concentrations from subsurface soils were compared to subsurface UTLs. If the maximum detected concentration exceeded the background UTL, the metal was considered to exceed background and was evaluated in the Tier 1 screen.

Surface Soil

The maximum detected surface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, antimony, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, selenium, silver, and zinc were considered to exceed background levels. All other metals were considered to be within background levels. Table 7-3 summarizes the comparison and a discussion is given below.

Seven of sixteen surface soil samples contained aluminum at concentrations (ranging from 9,240 mg/kg to 14,500 mg/kg) which exceeded the background UTL of 8,950 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

One of nine surface soil samples contained antimony at a concentration (7.8 mg/kg) which exceeded the background UTL of 3 mg/kg. Therefore, antimony was considered to exceed background levels and was evaluated further.

One of sixteen surface soil samples contained beryllium at a concentration (0.82 mg/kg) which exceeded the background UTL of 0.78 mg/kg. Therefore, beryllium was considered to exceeded background levels and was evaluated further.

Four of ten surface soil samples contained cadmium at concentrations (ranging from 0.49 mg/kg to 1.1 mg/kg) which exceeded the background UTL of 0.435 mg/kg. Therefore, cadmium was considered to exceeded background levels and was evaluated further.

Three of sixteen surface soil samples contained calcium at concentrations (ranging from 45,300 mg/kg to 56,900 mg/kg) which exceeded the background UTL of 44,800 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

Eight of sixteen surface soil samples contained chromium at concentrations (ranging from 11.3 mg/kg to 21.4 mg/kg) which exceeded the background UTL of 10.5 mg/kg. Therefore, chromium was considered to exceed background levels and was evaluated further.

One of sixteen surface soil samples contained cobalt at a concentration (8 mg/kg) which exceeded the background UTL of 6.6 mg/kg. Therefore, cobalt was considered to exceed background levels and was evaluated further.

One of sixteen surface soil samples contained copper at a concentration (25.9 mg/kg) which exceeded the background UTL of 18.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

Three of sixteen surface soil samples contained iron at concentrations (ranging from 10,400 mg/kg to 11,500 mg/kg) which exceeded the background UTL of 10,100 mg/kg. Therefore, iron was considered to exceed background levels and was evaluated further.

Eleven of sixteen surface soil samples contained lead at concentrations (ranging from 12.6 mg/kg to 83.9 mg/kg) which exceeded the background UTL of 12 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

Five of sixteen surface soil samples contained magnesium at concentrations (ranging from 1,980 mg/kg to 2,760 mg/kg) which exceeded the background UTL of 1,930 mg/kg. Therefore, magnesium was considered to exceed background levels and was evaluated further.

Two of sixteen surface soil samples contained manganese at concentrations (ranging from 332 mg/kg to 340 mg/kg) which exceeded the background UTL of 307 mg/kg. Therefore, manganese was considered to exceed background levels and was evaluated further.

One of sixteen surface soil samples contained selenium at a concentration (0.27 mg/kg) which exceeded the background UTL of 0.26 mg/kg. Therefore, selenium was considered to exceed background levels and was evaluated further.

Four of eight surface soil samples contained silver at concentrations (ranging from 0.43 mg/kg to 0.69 mg/kg) which exceeded the background UTL of 0.43 mg/kg. Therefore, silver was considered to exceed background levels and was evaluated further.

Three of sixteen surface soil samples contained zinc at concentrations (ranging from 34.7 mg/kg to 41.1 mg/kg) which exceeded the background UTL of 32.2 mg/kg. Therefore, zinc was considered to exceed background levels and was evaluated further.

Subsurface Soil

The maximum detected subsurface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, lead, potassium, and silver were considered to exceed background levels. All other metals were considered to be within background levels. Table 7-4 summarizes the comparison and a discussion is given below.

One of 118 subsurface soil samples contained aluminum at concentration (14,700 mg/kg) which exceeded the background UTL of 12,214 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

Two of 118 subsurface soil samples contained barium at concentrations (ranging from 971 mg/kg to 1,540 mg/kg) which exceeded the background UTL of 890 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

Two of 118 subsurface soil samples contained beryllium at concentrations (ranging from 0.76 mg/kg to 0.83 mg/kg) which exceeded the background UTL of 0.73 mg/kg. Therefore, beryllium was considered to exceed background levels and was evaluated further.

Ten of seventy-four subsurface soil samples contained cadmium at concentrations (ranging from 1.5 mg/kg to 4.2 mg/kg) which exceeded the background UTL of 1.3 mg/kg. Therefore, cadmium was considered to exceed background levels and was evaluated further.

Four of 118 subsurface soil samples contained calcium at concentrations (ranging from 238,000 mg/kg to 254,000 mg/kg) which exceeded the background UTL of 237,498 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

One of 118 subsurface soil samples contained chromium at a concentration (13.4 mg/kg) which exceeded the background UTL of 13.3 mg/kg. Therefore, chromium was considered to exceed background levels and was evaluated further.

Four of 118 subsurface soil samples contained cobalt at concentrations (ranging from 4.8 mg/kg to 5.2 mg/kg) which exceeded the background UTL of 4.7 mg/kg. Therefore, cobalt was considered to exceed background levels and was evaluated further.

Eight of 118 subsurface soil samples contained copper at a concentrations (ranging from 8.6 mg/kg to 54.9 mg/kg) which exceeded the background UTL of 8.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

Three of 107 subsurface soil samples contained lead at concentrations (ranging from 9.2 mg/kg to 12.5 mg/kg) which exceeded the background UTL of 8.7 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

Three of 118 subsurface soil samples contained potassium at concentrations (ranging from 2,520 mg/kg to 3,230 mg/kg) which exceeded the background UTL of 2,512 mg/kg. Therefore, potassium was considered to exceed background levels and was evaluated further.

One of fifty-four subsurface soil samples contained silver at a concentration (3.6 mg/kg) which exceeded the background UTL of 2.65 mg/kg. Therefore, silver was considered to exceed background levels and was evaluated further.

Comparison of Site Essential Nutrient Concentrations to RDAs

The maximum detected concentrations of essential nutrients which exceeded background and which do not have EPA Region VI MSSLs established for them were compared to the recommended daily allowances (RDAs) set by the National Research Council.

At SWMU 127, calcium, magnesium, and potassium were compared to the RDAs. Table 7-5 shows that the maximum detected concentrations of calcium, magnesium, and potassium did not cause estimated potential site daily intake to exceed the RDAs. Therefore, these inorganics would not pose a human health risk and were not evaluated further.

7.5.4 Tier 1 Evaluation

The Tier 1 evaluation involves the comparison of the maximum detected SWMU concentrations to conservative, nonsite-specific, risk-based screening levels to determine whether SWMU conditions satisfy the criteria for a quick regulatory closure or warrant a more site-specific evaluation.

Chemicals of Potential Concern

COPCs were identified based on the chemical analytical data (both historic and current) presented in Tables 7-1 and 7-2. Metals which exceeded background levels and RDAs and all detected organic compounds (except those considered to be laboratory contaminants) were evaluated as COPCs. TPH was not considered to be a COPC because it is a complex chemical mixture with varying constituents. Therefore, individual constituents (e.g., BTEX, PAHs, etc.) were used to evaluate potential impacts from TPH at SWMU 127.

Tier 1 Comparison

Maximum detected concentrations of COPCs were compared to the EPA Region VI Residential MSSLs. The comparison is shown in Table 7-6. The table shows that benzene, xylenes, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene exceeded the Tier 1 values. Therefore, these compounds were considered to be chemicals of concern (COCs) at SWMU 127.

7.5.5 Tier 2 Evaluation

The Tier 2 evaluation provides an option to determine the target levels for the COCs identified in the Tier 1 comparison. This step uses site-specific information related to exposure parameters and soil properties to develop site-specific target levels (SSTLs).

At SWMU 127, the SSTLs were calculated using the RBCA Tool Kit for Chemical Releases developed by Groundwater Services, Inc. (GSI 1999). The site-specific information used to develop the SSTLs included the assumption of commercial and construction worker exposure scenarios. Tier 1 values assumed residential exposure which is highly conservative for SWMU 127. SWMU 127 is located in an industrial area of the Base and is still receives wastewater from the vehicle washrack. Therefore, industrial exposures are more appropriate for this SWMU. The following exposure assumptions were used to calculate the SSTLs for COCs at SWMU 127.

An exposure frequency of 60 days per year was assumed for the commercial worker scenario. Although the SWMU is still active, no one works routinely (8 hours/day, 250 days/year) at the O/WS, the leach field, nor the vehicle washrack. Additionally, the SWMU does not require significant ground maintenance/landscaping because of limited rainfall in the area. Therefore, regular exposure of Base workers to soils at SWMU 127 is unlikely and the assumption of 60 days per year (5 days per month) is conservative and provides protection for Base workers. All other exposure parameter were considered to be the standard default values. Appendix C shows all the input parameters and assumptions used to calculate the SSTLs for COCs at SWMU 127.

The SSTLs for COCs at SWMU 127 and their maximum detected concentrations are shown below.

COCs	SSTLs	Maximum Concentrations
Benzo(a)anthracene	4.3 mg/kg	8 mg/kg
Benzo(a)pyrene	0.43 mg/kg	8.6 mg/kg
Benzo(b)fluoranthene	1.3 mg/kg	17 mg/kg
Dibenzo(a,h)anthracene	3.7 mg/kg	0.28 mg/kg
Indeno (1,2,3-cd) pyrene	5.1 mg/kg	0.56 mg/kg
Benzene	4.6 mg/kg	3.8 mg/kg
Xylenes	23,000 mg/kg	260 mg/kg

The maximum detected concentrations for benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene exceeded their SSTLs. All other COCs were below their SSTLs.

Detections that exceeded SSTLs included benzo(a)anthracene in one surface soil sample, benzo(a)pyrene in five surface soil samples, and benzo(b)fluoranthene in two surface soil samples. Concentrations of these three COCs decreased with depth to nondetect in all soil borings (see Figure 7-3). The maximum concentrations of these COCs occurred during the Phase I RFI (W-C 1994a). The concentrations were used for comparisons to SSTLs and the Baseline Risk Assessment (W-C 1994b). The Baseline Risk Assessment (BRA) included both human health and ecological risk evaluations and concluded that the risk was within USEPA acceptable levels. The BRA is included with Appendix C.

7.6 ECOLOGICAL RISK EVALUATION

Certain nondomesticated plants and animals will occur, at least at times, in almost any area that is outdoors, regardless of the absence of "natural" habitat and/or the omnipresence of human activity and artificial structures (buildings, pavement). Thus, strictly speaking, virtually any area outside of a building might include "habitat for ecological receptors." Such essentially artificial habitats are not, however, considered *directly* ecologically relevant because they exist and are

configured to support human (industrial) functions. Understanding the concept of "direct ecological relevance" is very important in assessing ecological risk at an active military site.

The initial step in ecological evaluation of a site is determining whether the unit has an *ecological component*. This determination is based on the availability, within the subject unit, of *habitat*. Simply defined, the term habitat means the "place where a plant or animal lives" (USACE 1996; USEPA 1997a), but a more functional definition can be paraphrased as the *type of environment* where an organism (or community of similarly adapted organisms) *normally* lives. If no ecological components are identified, it is concluded that the unit is not of potential ecological concern and no further ecological evaluation is warranted. It is not believed that individual organisms that are occasionally present constitute an ecological component because individuals (unless accorded official protection as endangered or threatened) are not appropriate as assessment endpoints for an ecological risk assessment. As stated by USEPA (1997a), "Ecological effects of most concern are those that can impact populations (or higher levels of biological organization)." By definition, an occasional individual does not constitute a population nor would any effects on an occasional individual be expected to translate into an effect on a population.

SWMU 127 encompasses a fenced area of mowed grass. It is maintained as a near monoculture of grass and there is limited forage and biomass production. Therefore, it is not expected to be ecologically significant – nor would any such forage be considered attractive to native (relevant) New Mexico species. Based on this, SWMU 127 does not contain any significant ecological component such that a formal ecological risk assessment is warranted.

7.7 VADOSE ZONE CONTAMINANT FATE AND TRANSPORT MODELING

Because chemicals were detected in soil above MSSLs at SWMU 127, the fate and transport of contaminants in the vadose, or unsaturated, zone was modeled to evaluate the potential for contaminants in soil to be transported to underlying groundwater. The following provides a brief description of the modeling effort and presents model-predicted concentrations for SWMU 127.

7.7.1 Description of Modeling Effort

The mathematical models HELP and MULTIMED were applied to a conceptual vadose zone model developed for SWMUs 31, 77, and 127, all of which had chemicals detected above MSSLs and which have similar geology and site conditions. The HELP model was used to estimate a net infiltration rate for input into MULTIMED. MULTIMED was then used to model contaminant migration through the vadose zone to the water table.

MULTIMED was run for each chemical detected above MSSLs under steady-state, pulse source, and source decay conditions while considering both sorption and sorption/biodegradation as attenuation mechanisms. Results were used to calculate attenuation factors (AFs) and dilution-attenuation factors (DAFs) which can then be used to predict concentrations, respectively, at the bottom of the unsaturated zone and at the water table after initial mixing in groundwater.

Appendix D provides a detailed description of the modeling approach, model documentation, input parameters, and model output for SWMUs 31, 77, and 127.

7.7.2 Model-Predicted Concentrations

Initial leachate concentrations were calculated for each chemical detected in soil above MSSLs at SWMU 127 using the following equilibrium partitioning equation from the Soil Screening Technical Background Document (USEPA 1996):

$$Cs = Cw \cdot \left[Kd + \frac{\theta w + \theta a \cdot H'}{\rho b} \right]$$

In the above equation, *Cw* is the initial leachate concentration (mg/L) and *Cs* is the maximum detected soil concentration (mg/kg) at the SWMU. *Kd* is the distribution coefficient (L/kg or mL/g), θw is the water-filled soil porosity, θa is the air-filled soil porosity, *H'* is the dimensionless Henry's law constant, and ρb is the dry bulk density (kg/L, g/mL, or g/cm^3). For organic compounds, *Kd* is the product of the normalized organic carbon distribution coefficient, *Koc*, and fraction organic carbon content, *foc*. Porosity and bulk density are taken from the HELP layer 1 (sandy clay loam) at field capacity. Values for *Koc*, *Kd*, and *H'* are taken from USEPA 1996. Other values are the same as used in the MULTIMED model. Calculations for each chemical are shown in Table 7-7.

AFs and DAFs for each chemical and type of model run were then applied to these initial leachate concentrations. The results of this analysis are shown in Table 7-8. Predicted concentrations that exceed USEPA Region VI tap water MSSLs or MCLs are shaded.

For all modeled chemicals (VOCs and SVOCs), predicted concentrations for steady-state, non-transport decay analyses, are above tap water MSSLs and/or MCLs. However, in general, both organic and inorganic contaminant source mass is expected to decrease over time due to such processes as sorption, volatilization, and biodegradation. Therefore, the assumption of a constant, infinite source (i.e., steady-state) is believed to be unrealistic and overly-conservative. The results for other analyses are discussed further.

As shown in Table 7-8 for SVOCs (PAHs), predicted concentrations for sorption-only analyses (plus dispersion) are usually at least one order of magnitude, or ten times, below the tap water MSSL. When biodegradation is also considered, predicted concentrations are zero.

For VOCs, predicted concentrations for all sorption-only analyses (plus dispersion) exceed tap water MSSLs and MCLs, except that the MCL for xylenes is not exceeded for the decaying source condition. When biodegradation is also considered, all predicted concentrations are zero. This is due to the fact that although VOCs are less sorptive than SVOCs, they typically biodegrade at a faster rate.

7.7.3 Assumptions and Limitations

The results of the vadose zone contaminant fate and transport modeling at SWMUs 31, 77, and 127 and predicted concentrations at each SWMU are based on a conservative, analytical approach with many simplifying assumptions. These assumptions and limitations are described in Appendix D. However, to summarize, the implementation of a more complex, numerical model (e.g., typical for RBCA Tier 3) would most likely produce results that are more representative of actual flow and transport processes that presumably occur at SWMUs 31, 77, and 127 due to its semiarid climate. These processes include the effects of capillary forces and soil hysteresis. The use of a numerical model might even result in lower predicted concentrations at the water table for similar assumed source conditions.

7.7.4 Summary of Results

The results of the vadose zone fate and transport modeling for SWMU 127, assuming sorption, dispersion, and biodegradation occurs, indicate that chemicals of concern will not reach groundwater above tap water screening levels.

7.8 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVE

Results of the human health and ecological risk evaluations indicate that there is no acceptable risk to human health and the environment based on the maximum detected concentrations of chemicals of concern in soil at SWMU 127. Furthermore, results of vadose zone fate and transport modeling show that chemicals of concern will not reach groundwater above allowable concentrations for tap water. Therefore, the "No Further Action' alternative was evaluated based on the criteria listed in Section 2.3 and as outlined in the CMS Work Plan (W-C 1998).

1. Technical
   - Performance - the No Further Action alternative is effective at being protective of human health and the environment over extended periods of time. This has been demonstrated through Tier I and Tier II human health and ecological risk evaluations, a baseline risk assessment, and fate and transport modeling.
   - Reliability - the No Further Action alternative does not require any operation or maintenance activities and has been proven to be effective before for similar sites and conditions.
   - Implementability - the No Further Action alternative is easy to implement and will meet or exceed applicable standards.
   - Safety - the No Action Alternative poses no threat to the safety of nearby workers.
2. Human Health

- The No Further Action alternative was determined following the Risk-Based Corrective Action (RBCA) process as outlined in ASTM E1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.
- Maximum concentrations of most chemicals of concern left in place are less than conservative Tier I EPA Region VI Media Specific Screening Levels (MSSLs) and calculated Tier II Site-Specific Target Levels (SSTLs).
- Those chemicals of concern that exceeded SSTLs were only in surface soil samples. The maximum concentrations of these chemicals were used in a baseline risk assessment that concluded there was no unacceptable risk.

3. Environmental
   - No valued ecological resources are present.
4. Cost
   - The No Further Action alternative is protective of human health and the environment and at the lowest cost.

TABLE 7-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR SURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1271-0000			CAN127-1271-0002			CAN127-1272-0000			CAN127-1272-0002			CAN127-1273-0000			CAN127-1273-0002		
LAB SAMPLE NUMBER	0313740003SA			0313740004SA			0313740007SA			0313740008SA			0312160001SA			0312160002SA		
COLLECT DATE	09/23/93			09/23/93			09/23/93			09/23/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
1,2-Dichloroethane	<	5.8	U	<	5.8	U	<	5.8	U	<	6	U	<	5.2	U	<	5.5	U
1,2-Dichloropropane	<	5.8	U	<	5.8	U	<	5.8	U	<	6	U	<	5.2	U	<	5.5	U
Toluene	<	5.8	U	<	5.8	U	<	5.8	U	<	6	U	12	5.2		<	5.5	U
Xylenes (total)	<	5.8	U	<	5.8	U	<	5.8	U	<	6	U	3.4	5.2	J	<	5.5	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	380	U				<	380	U	<	400	U	<	350	U			
Anthracene	<	380	U				<	380	U	<	400	U	48	350	J			
Benzo(a)anthracene	<	380	U				<	380	U	<	400	U	510	350				
Benzo(a)pyrene	<	380	U				<	380	U	<	400	U	550	350				
Benzo(b)fluoranthene	<	380	U				<	380	U	<	400	U	960	350				
Benzo(g,h,i)perylene	<	380	U				<	380	U	<	400	U	470	350				
Carbazole	<	380	U				<	380	U	<	400	U	46	350	J			
Chrysene	<	380	U				<	380	U	<	400	U	720	350				
Fluoranthene	<	380	U				<	380	U	<	400	U	1500	350				
Fluorene	<	380	U				<	380	U	<	400	U	<	350	U			
Indeno(1,2,3-cd)pyrene	<	380	U				<	380	U	<	400	U	390	350				
2-Methylnaphthalene	<	380	U				<	380	U	<	400	U	<	350	U			
Phenanthrene	<	380	U				<	380	U	<	400	U	570	350				
Pyrene	<	380	U				<	380	U	<	400	U	1400	350				
Metals (mg/kg)																		
Aluminum	9270	11.5		3830	23.1		7220	11.6		3110	60.5		7650	10.5		11600	10.9	
Antimony	<	6.9	U	<	13.8	U	<	6.9	U	<	36.3	U	<	6.3	U	<	6.5	U
Arsenic	2	0.58		2.1	0.58		1.9	0.58		1.6	0.6		2.2	0.52		2.4	0.55	
Barium	91.7	1.2		971	2.3		91.9	1.2		206	6		115	1		99	1.1	
Beryllium	0.67	0.23		0.33	0.46	J	0.53	0.23		<	1.2	U	0.46	0.21		0.7	0.22	
Cadmium	<	0.58	UJ	3	1.2		1.1	0.58		4.2	3		<	0.52	U	<	0.55	U
Calcium	19200	23.1	J	191000	46.1		56900	23.1		247000	121		10300	20.9		14000	21.8	
Chromium	9.9	1.2		4.5	2.3		7.3	1.2		7	6		16.9	1		10.3	1.1	
Cobalt	4.5	1.2		2.5	2.3		3.7	1.2		<	6	U	3.4	1		4.8	1.1	
Copper	8.9	2.3		2.8	4.6	J	7.3	2.3		2.6	12.1	J	6.8	2.1		7.9	2.2	

TABLE 7-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR SURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1271-0000			CAN127-1271-0002			CAN127-1272-0000			CAN127-1272-0002			CAN127-1273-0000			CAN127-1273-0002		
LAB SAMPLE NUMBER	0313740003SA			0313740004SA			0313740007SA			0313740008SA			0312160001SA			0312160002SA		
COLLECT DATE	09/23/93			09/23/93			09/23/93			09/23/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.																		
Iron	8610	11.5		3350	23.1		6380	11.6		2760	60.5		7770	10.5		10500	10.9	
Lead	7.3	0.58		2.7	2.9	J	4.4	2.9		1.6	6	J	30.8	10.5		8	1.1	
Magnesium	2030	23.1		2690	46.1		1890	23.1		2930	121		1570	20.9		2360	21.8	
Manganese	179	1.2		46.9	2.3		138	1.2		37.4	6		166	1		206	1.1	
Mercury	<	0.12	U	<	0.12	U	<	0.12	U	<	0.12	U	<	0.1	U	<	0.11	U
Nickel	10.4	4.6		5.8	9.2	J	8	4.6		5.1	24.2	J	7	4.2		11.4	4.4	
Potassium	1680	577		744	1150	J	1410	579		468	3020	J	1910	523		2400	545	
Selenium	<	1.2	UJ	<	1.2	UJ	<	1.2	UJ	<	1.2	UJ	<	0.52	UJ	<	1.1	UJ
Silver	0.69	1.2	J	1.1	2.3	J	0.68	1.2	J	3.6	6	J	<	1	U	<	1.1	U
Thallium	<	2.3	U	<	1.2	UJ	<	1.2	UJ	<	1.2	UJ	<	0.52	U	0.13	0.55	J
Vanadium	17.9	1.2		14.8	2.3		14.2	1.2		12.4	6		17.6	1		21.4	1.1	
Zinc	21.9	2.3		12.3	4.6		17.4	2.3		6.3	12.1	J	25.4	2.1		24.4	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	46.1	U	<	46.1	U	93.2	46.3		48.7	48.4		66.8	41.9		<	43.6	U
Water Quality (percent)																		
Water	13	0.1		13	0.1		14	0.1		17	0.1		4.5	0.1		8.3	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria
R = Rejected value Qual = Qualification
U = Not detected RL = Reporting Limit

TABLE 7-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR SURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1274-0000			CAN127-1274-0002			CAN127-1275-0000			CAN127-1275-0002			CAN127-1276-0000			CAN127-1276-0002		
LAB SAMPLE NUMBER	0312770001SA			0312770002SA			0312770011SA			0312770012SA			0312160012SA			0312160013SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
1,2-Dichloroethane	<	5.5	U	<	5.5	U	<	5.2	U	<	5.8	U	1.9	5.2	J	<	5.4	U
1,2-Dichloropropane	<	5.5	U	<	5.5	U	4.6	5.2	J	<	5.8	U	<	5.2	U	<	5.4	U
Toluene	2.3	5.5	J	2.8	5.5	J	5.2	5.2		<	5.8	U	15	5.2		<	5.4	U
Xylenes (total)	1.5	5.5	J	<	5.5	U	<	5.2	U	<	5.8	U	12	5.2		<	5.4	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	370	U				150	1400	J	<	380	U	<	340	U			
Anthracene	<	370	U				<	1400	U	<	380	U	<	340	U			
Benzo(a)anthracene	83	370	J				8000	1400		<	380	U	160	340	J			
Benzo(a)pyrene	120	370	J				8600	1400		<	380	U	230	340	J			
Benzo(b)fluoranthene	270	370	J				17000	1400		<	380	U	410	340				
Benzo(g,h,i)perylene	72	370	J				5100	1400		<	380	U	190	340	J			
Carbazole	<	370	U				1500	1400		<	380	U	<	340	U			
Chrysene	210	370	J				14000	1400		<	380	U	300	340	J			
Fluoranthene	300	370	J				17000	1400		<	380	U	570	340				
Fluorene	<	370	U				290	1400	J	<	380	U	<	340	U			
Indeno(1,2,3-cd)pyrene	68	370	J				5100	1400		<	380	U	160	340	J			
2-Methylnaphthalene	<	370	U				<	1400	U	<	380	U	<	340	U			
Phenanthrene	120	370	J				8100	1400		<	380	U	210	340	J			
Pyrene	230	370	J				17000	1400		<	380	U	550	340				
Metals (mg/kg)																		
Aluminum	7490	11.1		9560	11		6530	10.5		8570	23		7170	10.4		11400	10.8	
Antimony	<	6.6	U	<	6.6	U	7.8	6.3		<	13.8	U	<	6.2	U	<	6.5	U
Arsenic	2.9	0.55		2.3	0.55		2.1	0.52		2.1	0.58		2	0.52		2.4	0.54	
Barium	125	1.1	J	75.7	1.1	J	245	1	J	104	2.3	J	74.3	1		105	1.1	
Beryllium	0.82	0.22		0.83	0.22		0.45	0.21		0.65	0.46		0.43	0.21		0.7	0.22	
Cadmium	0.49	0.55	J	<	0.55	U	0.53	0.52		<	1.2	U	<	0.52	U	<	0.54	U
Calcium	7210	22.2		4820	22		45300	21		106000	46.1		6630	20.8		4740	21.6	
Chromium	9.4	1.1		10	1.1		15.3	1		5.8	2.3		9.9	1		9.3	1.1	
Cobalt	5.3	1.1		5.2	1.1		2.8	1		4.3	2.3		2.9	1		4.9	1.1	
Copper	8.5	2.2		8	2.2		25.9	2.1		5.9	4.6		6.3	2.1		8.4	2.2	

TABLE 7-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR SURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1274-0000			CAN127-1274-0002			CAN127-1275-0000			CAN127-1275-0002			CAN127-1276-0000			CAN127-1276-0002		
LAB SAMPLE NUMBER	0312770001SA			0312770002SA			0312770011SA			0312770012SA			0312160012SA			0312160013SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.																		
Iron	8420	11.1		9250	11		7650	10.5		7920	23		5990	10.4		8990	10.8	
Lead	12.6	2.8		8.4	0.55		29.2	5.2		6.7	0.58		48.2	10.4		9.2	1.1	
Magnesium	1800	22.2		2180	22		1850	21		2640	46.1		1300	20.8		2510	21.6	
Manganese	246	1.1		213	1.1		332	1		127	2.3		141	1		218	1.1	
Mercury	<	0.11	U	<	0.11	U	<	0.1	U	<	0.12	U	<	0.1	U	<	0.11	U
Nickel	9.5	4.4		12.4	4.4		6.8	4.2		10.1	9.2		6.2	4.2		10.5	4.3	
Potassium	1390	554		1760	550		1180	524		1550	1150		2060	519		2520	540	
Selenium	0.27	0.55	J	<	0.55	UJ	<	0.52	UJ	<	1.2	UJ	<	0.52	UJ	<	0.54	UJ
Silver	<	1.1	U	<	1.1	U	<	1	U	<	2.3	U	<	1	U	<	1.1	U
Thallium	<	0.55	U	<	0.55	U	<	0.52	U	<	0.58	UJ	<	0.52	U	0.14	0.54	J
Vanadium	23	1.1		19.2	1.1		16.5	1		15.8	2.3		12.9	1		17.7	1.1	
Zinc	20.4	2.2		21.7	2.2		38.5	2.1		18	4.6		25.3	2.1		24	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	253	44.3	J	<	44	U	344	83.9		<	46.1	U	80.5	41.6		<	43.2	U
Water Quality (percent)																		
Water	9.7	0.1		9.1	0.1		4.6	0.1		13	0.1		3.8	0.1		7.4	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria
R = Rejected value Qual = Qualification
U = Not detected RL = Reporting Limit

TABLE 7-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR SURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1277-0000			CAN127-1277-0002			CAN127-1278-0000			CAN127-1278-0002		
LAB SAMPLE NUMBER	0311840009SA			0311840010SA			0311840001SA			0311840002SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
1,2-Dichloroethane	<	5.3	U	<	5.4	U	<	5.3	U	<	5.4	U
1,2-Dichloropropane	<	5.3	U	<	5.4	U	<	5.3	U	<	5.4	U
Toluene	5.5	5.3	J	3.8	5.4	J	<	5.3	U	<	5.4	U
Xylenes (total)	5.9	5.3		1.5	5.4	J	<	5.3	U	<	5.4	U
Semivolatile Organics (µg/kg)												
Acenaphthene	<	350	U				<	1400	U			
Anthracene	<	350	U				<	1400	U			
Benzo(a)anthracene	190	350	J				150	1400	J			
Benzo(a)pyrene	180	350	J				180	1400	J			
Benzo(b)fluoranthene	390	350					380	1400	J			
Benzo(g,h,i)perylene	91	350	J				<	1400	U			
Carbazole	<	350	U				<	1400	U			
Chrysene	240	350	J				260	1400	J			
Fluoranthene	470	350					440	1400	J			
Fluorene	<	350	U				<	1400	U			
Indeno(1,2,3-cd)pyrene	93	350	J				<	1400	U			
2-Methylnaphthalene	250	350	J				<	1400	U			
Phenanthrene	190	350	J				190	1400	J			
Pyrene	440	350					360	1400	J			
Metals (mg/kg)												
Aluminum	5640	10.5		8800	10.8		6790	10.5		8050	10.9	
Antimony	<	6.3	U	<	6.5	U	<	6.3	U	<	6.5	U
Arsenic	2.2	0.53		2.8	0.54		2.3	0.53		2.6	1.1	
Barium	84.1	1.1		102	1.1		83.8	1.1		79.4	1.1	
Beryllium	0.49	0.21		0.72	0.22		0.45	0.21		0.68	0.22	
Cadmium	<	0.53	U	<	0.54	U	<	0.53	U	<	0.54	U
Calcium	18200	21		16700	21.6		5730	21.1		43500	21.8	
Chromium	9.9	1.1		9.5	1.1		11.3	1.1		8.8	1.1	
Cobalt	3.4	1.1		4.8	1.1		3.3	1.1		4.4	1.1	
Copper	7.1	2.1		9.9	2.2		7.3	2.1		9.1	2.2	

TABLE 7-1a

SUMMARY OF COMPOUNDS DETECTED IN PHASE I NEAR SURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1277-0000			CAN127-1277-0002			CAN127-1278-0000			CAN127-1278-0002		
LAB SAMPLE NUMBER	0311840009SA			0311840010SA			0311840001SA			0311840002SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.												
Iron	6260	10.5		8960	10.8		7060	10.5		7800	10.9	
Lead	43.2	5.3		9.2	1.1		42.4	5.3		7.5	0.54	
Magnesium	1340	21		2270	21.6		1220	21.1		2300	21.8	
Manganese	154	1.1		189	1.1		151	1.1		168	1.1	
Mercury	<	0.11	U	<	0.11	U	0.11	0.11		<	0.11	U
Nickel	6.6	4.2		10.4	4.3		6.9	4.2		9.8	4.4	
Potassium	1540	526		1760	539		1630	527		1650	545	
Selenium	<	0.53	UJ	<	1.1	UJ	<	0.53	U	<	1.1	UJ
Silver	0.43	1.1	J	0.47	1.1	J	0.53	1.1	J	0.45	1.1	J
Thallium	<	0.53	U	<	0.54	U	<	0.53	U	<	0.54	U
Vanadium	14.6	1.1		18.6	1.1		14.6	1.1		16.9	1.1	
Zinc	24.1	2.1		21	2.2		22.1	2.1		19.4	2.2	
TPH (mg/kg)												
Total Petroleum Hydrocarbons	44.1	42.1		<	43.1	U	<	42.2	U	<	43.6	U
Water Quality (percent)												
Water	4.9	0.1		7.2	0.1		5.2	0.1		8.2	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review. A complete summary of chemical results is presented in Appendix A.

J = Estimated value below reporting limit or estimated based on data quality criteria

R = Rejected value Qual = Qualification

U = Not detected RL = Reporting Limit

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1271-0004			CAN127-1271-0008			CAN127-1272-0004			CAN127-1272-0008			CAN127-1273-0004			CAN127-1273-0008		
LAB SAMPLE NUMBER	0313740005SA			0313740006SA			0313740009SA			0313740010SA			0312160004SA			0312160003SA		
COLLECT DATE	09/23/93			09/23/93			09/23/93			09/23/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
2-Butanone (MEK)	<	12	U	<	11	U	<	12	U	<	12	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Chlorobenzene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
1,1-Dichloroethene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
1,2-Dichloroethene (total)	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
1,2-Dichloropropane	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Ethylbenzene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Tetrachloroethene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Toluene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
1,1,1-Trichloroethane	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Trichloroethene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Xylenes (total)	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate	110	380	J													<	360	U
Metals (mg/kg)																		
Aluminum	5370	23.1	J	4000	22.8		4240	58.8		4180	23.8		7780	21.8		4420	11	
Arsenic	2.2	0.58	J	1.1	0.57		1.3	0.59		1.1	0.59		2.3	0.55		1.5	0.55	
Barium	285	2.3		163	2.3		435	5.9		98.4	2.4		255	2.2		93.9	1.1	
Beryllium	0.46	0.46		0.28	0.46	J	<	1.2	U	0.34	0.48	J	0.35	0.44	J	0.3	0.22	
Cadmium	2.1	1.2		2	1.1		2.9	2.9		1.8	1.2		<	1.1	U	<	0.55	U
Calcium	137000	46.2		132000	45.7		248000	118		148000	47.5		135000	43.7		85200	22	
Chromium	6	2.3	J	3.5	2.3		<	5.9	U	3.9	2.4		4	2.2		3.4	1.1	
Cobalt	2.9	2.3	J	1.8	2.3	J	<	5.9	U	1.3	2.4	J	3.6	2.2		2	1.1	
Copper	5	4.6	J	2.2	4.6	J	1.9	11.8	J	2.2	4.8	J	5.2	4.4		2.6	2.2	
Iron	4940	23.1	J	3360	22.8		3180	58.8		3210	23.8		6370	21.8		3360	11	
Lead	3.2	1.2		2.5	2.9	J	2.4	2.9	J	2.4	3	J	4.2	0.55		3.2	0.55	
Magnesium	2830	46.2		3330	45.7		4110	118		3370	47.5		3270	43.7		2570	22	
Manganese	69.6	2.3	J	41.4	2.3		43.9	5.9		42.5	2.4		93	2.2		55.8	1.1	
Nickel	7.4	9.2	J	5.2	9.1	J	<	23.5	U	5.2	9.5	J	8.3	8.7	J	4.5	4.4	

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1271-0004			CAN127-1271-0008			CAN127-1272-0004			CAN127-1272-0008			CAN127-1273-0004			CAN127-1273-0008		
LAB SAMPLE NUMBER	0313740005SA			0313740006SA			0313740009SA			0313740010SA			0312160004SA			0312160003SA		
COLLECT DATE	09/23/93			09/23/93			09/23/93			09/23/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Potassium	1010	1160	J	999	1140	J	695	2940	J	1060	1190	J	1740	1090		1270	549	
Silver	1.2	2.3	J	0.84	2.3	J	2.6	5.9	J	1.4	2.4	J	<	2.2	U	<	1.1	U
Vanadium	19.8	2.3	J	11.8	2.3		11.3	5.9		11.2	2.4		17.9	2.2		12.4	1.1	
Zinc	11.8	4.6	J	10	4.6		11.2	11.8	J	9.9	4.8		15.8	4.4		9	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	46.6	46.2		48.6	45.7		50.1	47.1		<	47.5	U	<	43.7	U	<	43.9	U
Water Quality (percent)																		
Water	14	0.1		12	0.1		15	0.1		16	0.1		8.5	0.1		8.9	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria
R = Rejected value Qual = Qualification
U = Not detected RL = Reporting Limit

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1273-0018			CAN127-1273-0028			CAN127-1273-0038			CAN127-1273-0048			CAN127-1273-0058			CAN127-1274-0004		
LAB SAMPLE NUMBER	0312160005SA			0312160006SA			0312160007SA			0312160008SA			0312160009SA			0312770003SA		
COLLECT DATE	09/13/93			09/13/93			09/13/93			09/13/93			09/13/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Chlorobenzene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
1,1-Dichloroethene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
1,2-Dichloroethene (total)	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
1,2-Dichloropropane	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Ethylbenzene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Tetrachloroethene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Toluene	3.5	5.6	J	<	5.5	U	<	5.5	U	<	5.5	U	1.2	5.4	J	<	5.5	U
1,1,1-Trichloroethane	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Trichloroethene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Xylenes (total)	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate																		
Metals (mg/kg)																		
Aluminum	5740	22.4		6020	11.1		6610	11.1		5830	11		3840	10.7		3650	22.1	
Arsenic	1.2	0.56		1.3	0.55		1.7	0.55		1.3	0.55		1.1	0.54		2.5	0.55	
Barium	110	2.2		137	1.1		61.9	1.1		106	1.1		12.9	1.1		517	2.2	
Beryllium	0.24	0.45	J	0.23	0.22		0.29	0.22		0.17	0.22	J	0.16	0.21	J	0.4	0.44	J
Cadmium	<	1.1	U	<	0.55	U	<	0.55	U	<	0.55	U	<	0.54	U	<	1.1	U
Calcium	135000	44.8		77500	22.1		50100	22.1		45000	21.9		6730	21.4		149000	44.1	
Chromium	2.8	2.2		2.9	1.1		6.3	1.1		6.2	1.1		3.3	1.1		2.3	2.2	
Cobalt	2.4	2.2		1.2	1.1		1.9	1.1		1.4	1.1		1.4	1.1		2.7	2.2	
Copper	2.3	4.5	J	2	2.2	J	2.2	2.2		1.5	2.2	J	1.3	2.1	J	2.5	4.4	J
Iron	4290	22.4		3310	11.1		4680	11.1		4100	11		3020	10.7		3780	22.1	
Lead	4	0.56		3.1	2.8		2.9	0.55		2.3	0.55		1.6	0.54		4.6	0.55	
Magnesium	5250	44.8		6820	22.1		6550	22.1		4660	21.9		2630	21.4		2630	44.1	
Manganese	60.9	2.2		30.5	1.1		58.6	1.1		45.9	1.1		28.7	1.1		62	2.2	
Nickel	5.2	9	J	3.6	4.4	J	4.3	4.4	J	3.7	4.4	J	2.8	4.3	J	6	8.8	J

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1273-0018			CAN127-1273-0028			CAN127-1273-0038			CAN127-1273-0048			CAN127-1273-0058			CAN127-1274-0004		
LAB SAMPLE NUMBER	0312160005SA			0312160006SA			0312160007SA			0312160008SA			0312160009SA			0312770003SA		
COLLECT DATE	09/13/93			09/13/93			09/13/93			09/13/93			09/13/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Potassium	1910	1120		1530	553		1730	553		1470	548		957	535		741	1100	J
Silver	<	2.2	U	<	1.1	U	<	1.1	U	<	1.1	U	<	1.1	U	<	2.2	U
Vanadium	11.2	2.2		13.7	1.1		17.8	1.1		14.6	1.1		13	1.1		15.8	2.2	
Zinc	11.2	4.5		9.8	2.2		11.3	2.2		9.3	2.2		6.8	2.1		8.7	4.4	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	44.8	U	<	44.2	U	<	44.2	U	<	43.9	U	<	42.8	U	<	44.1	U
Water Quality (percent)																		
Water	11	0.1		9.6	0.1		9.6	0.1		8.8	0.1		6.6	0.1		9.3	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria
R = Rejected value Qual = Qualification
U = Not detected RL = Reporting Limit

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1274-0008			CAN127-1274-0018			CAN127-1274-0028			CAN127-1274-0038			CAN127-1274-0048			CAN127-1274-0058		
LAB SAMPLE NUMBER	0312770004SA			0312770005SA			0312770007SA			0312770008SA			0312770009SA			0312770010SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/14/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Chlorobenzene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
1,1-Dichloroethene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
1,2-Dichloroethene (total)	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
1,2-Dichloropropane	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	5.7	5.5		13	5.4	
Ethylbenzene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Tetrachloroethene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Toluene	<	5.7	U	<	5.5	U	<	5.6	U	2	5.6	J	3.3	5.5	J	1.6	5.4	J
1,1,1-Trichloroethane	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Trichloroethene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Xylenes (total)	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate													<	360	U			
Metals (mg/kg)																		
Aluminum	3730	22.7		6270	11		4710	22.3		4730	11.2		4870	11		3310	10.8	
Arsenic	1.1	0.57		2.1	0.55		1.3	0.56		1.1	0.56		1.3	0.55		1	0.54	
Barium	100	2.3	J	68.2	1.1	J	74.4	2.2	J	42.6	1.1	J	56.1	1.1	J	17.1	1.1	J
Beryllium	0.35	0.45	J	0.39	0.22		0.26	0.45	J	0.29	0.22		0.22	0.22		0.18	0.22	J
Cadmium	<	1.1	U	<	0.55	U	<	1.1	U	<	0.56	U	<	0.55	U	<	0.54	U
Calcium	154000	45.3		71700	22		102000	44.7		61000	22.4		38100	22		16100	21.6	
Chromium	<	2.3	U	5	1.1		1.9	2.2	J	4.8	1.1		4.8	1.1		3.3	1.1	
Cobalt	2	2.3	J	2.6	1.1		2	2.2	J	1.3	1.1		1.5	1.1		1.5	1.1	
Copper	1.1	4.5	J	3	2.2		1.3	4.5	J	1.3	2.2	J	1.2	2.2	J	1.1	2.2	J
Iron	3260	22.7		5510	11		3450	22.3		3820	11.2		4150	11		3750	10.8	
Lead	3.2	0.57		4.4	1.1		2.9	0.56		2.4	0.56		2.3	0.55		2	0.54	
Magnesium	3390	45.3		3810	22		4490	44.7		5530	22.4		4410	22		3450	21.6	
Manganese	47.8	2.3		78.7	1.1		39.4	2.2		37.9	1.1		56.9	1.1		48.6	1.1	
Nickel	5.3	9.1	J	5.7	4.4		5.6	8.9	J	4	4.5	J	3.7	4.4	J	3.5	4.3	J

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1274-0008			CAN127-1274-0018			CAN127-1274-0028			CAN127-1274-0038			CAN127-1274-0048			CAN127-1274-0058		
LAB SAMPLE NUMBER	0312770004SA			0312770005SA			0312770007SA			0312770008SA			0312770009SA			0312770010SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/14/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Potassium	874	1130	J	1740	550		910	1120	J	856	561		951	549		562	539	
Silver	<	2.3	U	<	1.1	U	<	2.2	U	<	1.1	U	<	1.1	U	<	1.1	U
Vanadium	10.4	2.3		20.1	1.1		15.8	2.2		18.3	1.1		17.3	1.1		16.2	1.1	
Zinc	7.2	4.5		11.1	2.2		7.1	4.5		8.6	2.2		9.2	2.2		6.1	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	45.3	U	<	44	U	<	44.7	U	<	44.9	U	<	43.9	U	<	43.1	U
Water Quality (percent)																		
Water	12	0.1		9.1	0.1		10	0.1		11	0.1		9	0.1		7.3	0.1	

(i) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria
R = Rejected value Qual = Qualification
U = Not detected RL = Reporting Limit

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1275-0004			CAN127-1275-0008			CAN127-1275-0018			CAN127-1275-0028			CAN127-1275-0038			CAN127-1275-0048		
LAB SAMPLE NUMBER	0312770013SA			0312770014SA			0312770015SA			0312770016SA			0312770017SA			0312770018SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/14/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.7	U	<	5.8	U	1.2	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
2-Butanone (MEK)	<	11	U	<	12	U	<	12	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.7	U	<	5.8	U	2.7	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Chlorobenzene	<	5.7	U	<	5.8	U	1.3	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
1,1-Dichloroethene	<	5.7	U	<	5.8	U	1.9	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
1,2-Dichloroethene (total)	<	5.7	U	<	5.8	U	1.3	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
1,2-Dichloropropane	<	5.7	U	<	5.8	U	<	5.8	U	<	5.6	U	7.7	5.5		<	5.6	U
Ethylbenzene	<	5.7	U	<	5.8	U	1.3	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Tetrachloroethene	<	5.7	U	<	5.8	U	2.9	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Toluene	5.4	5.7	J	18	5.8		6.2	5.8		<	5.6	U	7.2	5.5		12	5.6	
1,1,1-Trichloroethane	<	5.7	U	<	5.8	U	1.8	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Trichloroethene	<	5.7	U	<	5.8	U	2.3	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Xylenes (total)	<	5.7	U	<	5.8	U	2.4	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate																		
Metals (mg/kg)																		
Aluminum	5030	57.2		3630	23.3		10100	57.7		4470	22.5		4860	11.1		4570	11.1	
Arsenic	1.5	0.57		1.3	0.58		1.7	0.58		1	0.56		1	0.55		1.1	0.56	
Barium	435	5.7	J	167	2.3	J	445	5.8	J	65.4	2.2	J	148	1.1	J	36.6	1.1	J
Beryllium	<	1.1	U	0.28	0.47	J	<	1.2	U	0.27	0.45	J	0.33	0.22		0.29	0.22	
Cadmium	<	2.9	U	<	1.2	U	<	2.9	U	<	1.1	U	<	0.55	U	<	0.56	U
Calcium	238000	114		181000	46.6		238000	115		150000	44.9		58900	22.1		76300	22.3	
Chromium	<	5.7	U	<	2.3	U	<	5.8	U	2.1	2.2	J	4.3	1.1		3.4	1.1	
Cobalt	<	5.7	U	2.4	2.3		<	5.8	U	1.5	2.2	J	1.6	1.1		1.5	1.1	
Copper	<	11.4	U	1.8	4.7	J	3.2	11.5	J	1.7	4.5	J	2.7	2.2		1.9	2.2	J
Iron	4210	57.2		3300	23.3		5960	57.7		3200	22.5		3900	11.1		3770	11.1	
Lead	3	0.57		2.7	0.58		3.1	0.58		1.7	0.56		1.9	0.55		2.2	0.56	
Magnesium	3940	114		3590	46.6		11900	115		4840	44.9		5590	22.1		5470	22.3	
Manganese	51.4	5.7		34	2.3		46.4	5.8		28	2.2		42.1	1.1		43.1	1.1	
Nickel	<	22.9	U	6.1	9.3	J	7.9	23.1	J	3.5	9	J	4.7	4.4		3.3	4.5	J

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1275-0004			CAN127-1275-0008			CAN127-1275-0018			CAN127-1275-0028			CAN127-1275-0038			CAN127-1275-0048		
LAB SAMPLE NUMBER	0312770013SA			0312770014SA			0312770015SA			0312770016SA			0312770017SA			0312770018SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/14/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Potassium	612	2860	J	854	1160	J	2080	2880	J	700	1120	J	916	554		810	556	
Silver	<	5.7	U	<	2.3	U	<	5.8	U	<	2.2	U	<	1.1	U	<	1.1	U
Vanadium	11.2	5.7		11.1	2.3		18.2	5.8		14.4	2.2		17.2	1.1		19	1.1	
Zinc	5.2	11.4	J	7.3	4.7		<	11.5	U	6.4	4.5		8.2	2.2		8.5	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	45.8	U	<	46.6	U	<	46.1	U	<	44.9	U	<	44.3	U	<	44.5	U
Water Quality (percent)																		
Water	13	0.1		14	0.1		13	0.1		11	0.1		9.7	0.1		10	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria
R = Rejected value Qual = Qualification
U = Not detected RL = Reporting Limit

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1275-0058			CAN127-1276-0004			CAN127-1276-0008			CAN127-1276-0018			CAN127-1276-0028			CAN127-1276-0038		
LAB SAMPLE NUMBER	0312770019SA			0312150009SA			0312150010SA			0312150011SA			0312150012SA			0312150013SA		
COLLECT DATE	09/14/93			09/13/93			09/13/93			09/13/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Chlorobenzene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
1,1-Dichloroethene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
1,2-Dichloroethene (total)	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
1,2-Dichloropropane	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Ethylbenzene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Tetrachloroethene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Toluene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
1,1,1-Trichloroethane	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Trichloroethene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Xylenes (total)	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate										<	360	U						
Metals (mg/kg)																		
Aluminum	4270	11.2		6670	21.6		3640	22.1		4530	11		4370	10.9		4500	11	
Arsenic	1.2	0.56		2.5	0.54		1.1	0.55		1.8	0.55		1.9	0.55		1.3	0.55	
Barium	545	1.1	J	107	2.2		95.7	2.2		302	1.1		96.4	1.1		23.7	1.1	
Beryllium	0.3	0.22		0.29	0.43	J	<	0.44	U	0.47	0.22		0.3	0.22		0.23	0.22	
Cadmium	<	0.56	U	<	1.1	U	<	1.1	U	<	0.55	U	<	0.55	U	<	0.55	U
Calcium	73800	22.3		113000	43.3		152000	44.1		68500	21.9		76500	21.8		39300	22.1	
Chromium	2.6	1.1		3.9	2.2		<	2.2	U	2.9	1.1		3	1.1		3.4	1.1	
Cobalt	1.1	1.1		3.3	2.2		2.1	2.2	J	1.9	1.1		1.7	1.1		1.2	1.1	
Copper	1.5	2.2	J	4.8	4.3		1.5	4.4	J	2.7	2.2		2.8	2.2		1.8	2.2	J
Iron	3020	11.2		6140	21.6		3050	22.1		3620	11		3250	10.9		3280	11	
Lead	2.5	0.56		5.8	1.1		3.1	1.1		4.5	1.1		3.1	0.55		2.5	1.1	
Magnesium	4490	22.3		3020	43.3		2710	44.1		3320	21.9		5100	21.8		6940	22.1	
Manganese	43.2	1.1		98.5	2.2		31.1	2.2		47.2	1.1		42.5	1.1		32.6	1.1	
Nickel	2.9	4.5	J	9.7	8.7		5.8	8.8	J	4.4	4.4		3.9	4.4	J	3.9	4.4	J

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1275-0058			CAN127-1276-0004			CAN127-1276-0008			CAN127-1276-0018			CAN127-1276-0028			CAN127-1276-0038		
LAB SAMPLE NUMBER	0312770019SA			0312150009SA			0312150010SA			0312150011SA			0312150012SA			0312150013SA		
COLLECT DATE	09/14/93			09/13/93			09/13/93			09/13/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Potassium	787	559		1540	1080		1150	1100		1510	549		1130	546		967	552	
Silver	<	1.1	U	<	2.2	U	<	2.2	U	<	1.1	U	<	1.1	U	<	1.1	U
Vanadium	17.5	1.1		16.4	2.2		10	2.2		12.6	1.1		12.8	1.1		16	1.1	
Zinc	7.9	2.2		14.5	4.3		6.8	4.4		7.8	2.2		7.1	2.2		8.3	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	44.7	U	<	43.3	U	<	44.1	U	<	43.9	U	<	43.7	U	<	44.1	U
Water Quality (percent)																		
Water	10	0.1		7.6	0.1		9.3	0.1		8.8	0.1		8.4	0.1		9.4	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria
R = Rejected value Qual = Qualification
U = Not detected RL = Reporting Limit

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1276-0048			CAN127-1276-0058			CAN127-1277-0004			CAN127-1277-0008			CAN127-1277-0018			CAN127-1277-0028		
LAB SAMPLE NUMBER	0312150014SA			0312150015SA			0311840011SA			0311840012SA			0311840013SA			0311840014SA		
COLLECT DATE	09/13/93			09/13/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Chlorobenzene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
1,1-Dichloroethene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
1,2-Dichloroethene (total)	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
1,2-Dichloropropane	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Ethylbenzene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Tetrachloroethene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Toluene	<	5.5	U	2.5	5.4	J	2.1	5.5	J	<	5.5	U	<	5.7	U	<	5.6	U
1,1,1-Trichloroethane	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Trichloroethene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Xylenes (total)	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate										<	360	U						
Metals (mg/kg)																		
Aluminum	4660	11		3630	10.8		6130	10.9		3780	11		6250	11.3		5360	11.1	
Arsenic	1.5	0.55		1.1	0.54		2.8	0.55		1.5	0.55		2.4	0.57		1.4	0.56	
Barium	27.8	1.1		20.6	1.1		72.9	1.1		98.4	1.1		101	1.1		157	1.1	
Beryllium	0.22	0.22		0.16	0.22	J	0.49	0.22		0.37	0.22		0.71	0.23		0.38	0.22	
Cadmium	<	0.55	U	<	0.54	U	1.5	0.55		0.92	0.55		1.1	0.57		1.2	0.56	
Calcium	37000	22		8970	21.6		103000	21.8		104000	22.1		91000	22.7		76300	22.3	
Chromium	3.1	1.1		3.6	1.1		6.1	1.1		4.2	1.1	U	5.2	1.1	U	5.6	1.1	
Cobalt	2.9	1.1		1.4	1.1		3.2	1.1		2.3	1.1		3.2	1.1		1.4	1.1	
Copper	2	2.2	J	2.7	2.2		5.4	2.2		2.8	2.2		5.5	2.3		2.4	2.2	
Iron	3760	11		3430	10.8		5800	10.9		3540	11		5200	11.3		3780	11.1	
Lead	2.6	1.1		2.6	1.1		6.1	2.7		4.6	0.55		7.4	1.1		3.1	0.56	
Magnesium	5240	22		3760	21.6		2630	21.8		2370	22.1		3970	22.7		6170	22.3	
Manganese	111	1.1		30.6	1.1		78.5	1.1		58.3	1.1		93	1.1		35	1.1	
Nickel	4.6	4.4		3.8	4.3	J	7.8	4.4		5.2	4.4		6.7	4.5		4.6	4.5	

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1276-0048			CAN127-1276-0058			CAN127-1277-0004			CAN127-1277-0008			CAN127-1277-0018			CAN127-1277-0028		
LAB SAMPLE NUMBER	0312150014SA			0312150015SA			0311840011SA			0311840012SA			0311840013SA			0311840014SA		
COLLECT DATE	09/13/93			09/13/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Potassium	1010	549		816	540	J	1310	545		1050	552		2010	567		1050	557	
Silver	<	1.1	U	<	1.1	U	0.47	1.1	J	0.54	1.1	J	<	1.1	U	0.43	1.1	J
Vanadium	18.2	1.1		16.3	1.1		18.7	1.1		12.1	1.1		16.2	1.1		15	1.1	
Zinc	8.8	2.2		6.4	2.2		14.4	2.2		9.4	2.2		12.8	2.3		9	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	43.9	U	<	43.2	U	<	43.6	U	<	44.2	U	<	45.4	U	<	44.6	U
Water Quality (percent)																		
Water	8.9	0.1		7.4	0.1		8.3	0.1		9.4	0.1		12	0.1		10	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria
R = Rejected value Qual = Qualification
U = Not detected RL = Reporting Limit

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1277-0038			CAN127-1277-0048			CAN127-1277-0058			CAN127-1278-0004			CAN127-1278-0008			CAN127-1278-0018		
LAB SAMPLE NUMBER	0311840015SA			0311840016SA			0311840017SA			0311840004SA			0311840005SA			0311840006SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	6.6	11	J	<	11	U
Carbon tetrachloride	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Chlorobenzene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	J	<	5.7	U
1,1-Dichloroethene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
1,2-Dichloroethene (total)	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
1,2-Dichloropropane	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Ethylbenzene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	J	<	5.7	U
Tetrachloroethene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	J	<	5.7	U
Toluene	1.7	5.5	J	2	5.5	J	2.6	5.5	J	<	5.5	U	<	5.6	J	<	5.7	U
1,1,1-Trichloroethane	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Trichloroethene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Xylenes (total)	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate													<	370	U			
Metals (mg/kg)																		
Aluminum	4470	11		4580	11		4370	11.1		4270	21.8		4500	11.1		5730	22.9	
Arsenic	1.3	0.55		1.1	0.55		1.2	0.55		2	0.55		1.7	0.56		2.2	0.57	
Barium	158	1.1		41.7	1.1		84.6	1.1		227	2.2		204	1.1		242	2.3	
Beryllium	0.31	0.22		0.28	0.22		0.27	0.22		0.42	0.44	J	0.46	0.22		0.44	0.46	J
Cadmium	0.86	0.55		<	0.55	U	1.1	0.55		2.6	1.1		1.2	0.56		2.4	1.1	
Calcium	77800	22		58200	22		68400	22.1		166000	43.6		83100	22.2		154000	45.7	
Chromium	6.1	1.1		4.9	1.1	U	6.3	1.1		4	2.2	U	4.9	1.1	U	6.7	2.3	U
Cobalt	1.5	1.1		1.2	1.1		1.7	1.1		2.6	2.2		2.2	1.1	J	2.7	2.3	
Copper	2.2	2.2		2.1	2.2	J	54.9	2.2		4.1	4.4	J	4	2.2		3.7	4.6	J
Iron	3430	11		3570	11		3370	11.1		4170	21.8		4570	11.1		4780	22.9	
Lead	3.4	0.55		3	0.55		3.9	0.55		4.9	0.55		5.8	0.56		5.1	0.57	
Magnesium	4870	22		5890	22		5920	22.1		2460	43.6		2500	22.2		4940	45.7	
Manganese	40.3	1.1		47.5	1.1		41.3	1.1		57.1	2.2		71.6	1.1		71.1	2.3	
Nickel	4.3	4.4	J	4	4.4	J	4.6	4.4		6.4	8.7	J	6	4.4		7.6	9.1	J

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1277-0038			CAN127-1277-0048			CAN127-1277-0058			CAN127-1278-0004			CAN127-1278-0008			CAN127-1278-0018		
LAB SAMPLE NUMBER	0311840015SA			0311840016SA			0311840017SA			0311840004SA			0311840005SA			0311840006SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Potassium	891	551		917	550		812	553		850	1090	J	1130	555		1540	1140	
Silver	0.51	1.1	J	0.48	1.1	J	0.35	1.1	J	1.2	2.2	J	0.8	1.1	J	1.6	2.3	J
Vanadium	14.9	1.1		18.2	1.1		20.9	1.1		15.4	2.2		15.2	1.1		17	2.3	
Zinc	7.9	2.2		8.8	2.2		11	2.2		11.1	4.4		11.1	2.2		10.4	4.6	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	44.1	U	<	44	U	<	44.2	U	<	43.6	U	170	44.4		55.9	45.7	
Water Quality (percent)																		
Water	9.2	0.1		9.2	0.1		9.5	0.1		8.3	0.1		10	0.1		13	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A.

J = Estimated value below reporting limit or estimated based on data quality criteria

R = Rejected value Qual = Qualification

U = Not detected RL = Reporting Limit

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1278-0028			CAN127-1278-0038			CAN127-1278-0048			CAN127-1278-0058		
LAB SAMPLE NUMBER	0311840007SA			0311840008SA			0312160010SA			0312160011SA		
COLLECT DATE	09/12/93			09/12/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Benzene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	7.1	11	J
Carbon tetrachloride	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Chlorobenzene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
1,1-Dichloroethene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
1,2-Dichloroethene (total)	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
1,2-Dichloropropane	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Ethylbenzene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Tetrachloroethene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Toluene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
1,1,1-Trichloroethane	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Trichloroethene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Xylenes (total)	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Semivolatile Organics (µg/kg)												
Butyl benzyl phthalate												
Metals (mg/kg)												
Aluminum	7380	11.2		4530	11.1		4490	11.1		4430	11.3	
Arsenic	1.9	0.56		1.3	0.55		1.1	0.56		1.2	0.56	
Barium	189	1.1		74.4	1.1		113	1.1		31.6	1.1	
Beryllium	0.46	0.22		0.31	0.22		<	0.22	U	0.17	0.23	J
Cadmium	0.71	0.56		0.88	0.55		<	0.56	U	<	0.56	U
Calcium	89600	22.5		64200	22.1		58900	22.2		30800	22.6	
Chromium	5.6	1.1		4.7	1.1	U	3.2	1.1		2.7	1.1	
Cobalt	2.4	1.1		1.6	1.1		1.5	1.1		1.4	1.1	
Copper	3.1	2.2		2	2.2	J	1.6	2.2	J	1.8	2.3	J
Iron	5230	11.2		3430	11.1		2990	11.1		2840	11.3	
Lead	4	0.56		4.2	0.55		2.1	0.56		2.3	0.56	
Magnesium	4850	22.5		3730	22.1		4960	22.2		4400	22.6	
Manganese	68.5	1.1		37.4	1.1		37	1.1		39.5	1.1	
Nickel	6.6	4.5		4.5	4.4		3.7	4.4	J	3.6	4.5	J

TABLE 7-1b

SUMMARY OF COMPOUNDS DETECTED IN PHASE I SUBSURFACE SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-1278-0028			CAN127-1278-0038			CAN127-1278-0048			CAN127-1278-0058		
LAB SAMPLE NUMBER	0311840007SA			0311840008SA			0312160010SA			0312160011SA		
COLLECT DATE	09/12/93			09/12/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)												
Potassium	1580	561		925	553		987	555		1000	564	
Silver	0.48	1.1	J	0.62	1.1	J	<	1.1	U	<	1.1	U
Vanadium	19.8	1.1		14.5	1.1		16.3	1.1		15.7	1.1	
Zinc	11.7	2.2		7.3	2.2		7.2	2.2		7.3	2.3	
TPH (mg/kg)												
Total Petroleum Hydrocarbons	<	44.9	U	<	44.2	U	<	44.4	U	<	45.1	U
Water Quality (percent)												
Water	11	0.1		9.6	0.1		10	0.1		11	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review. A complete summary of chemical results is presented in Appendix A.

J = Estimated value below reporting limit or estimated based on data quality criteria

R = Rejected value Qual = Qualification

U = Not detected RL = Reporting Limit

TABLE 7-2a

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2709-0000			CAN127-2709-0005			CAN127-2709-0010			CAN127-2710-0000			CAN127-2710-0005			CAN127-2710-0010		
LAB SAMPLE NUMBER	0398710011SA			0398710009SA			0398710008SA			0398710005SA			0398710003SA			0398710007SA		
COLLECT DATE	12/13/94			12/13/94			12/13/94			12/13/94			12/13/94			12/13/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	5000	14000	J	7.3	12	J	11	11		7500	14000	J	12	12		11	11	
Benzene	<	7000	U	<	5.8	U	<	5.7	U	3800	7200	J	<	5.9	U	<	5.5	U
Ethylbenzene	3900	7000	J	<	5.8	U	<	5.7	U	54000	7200		<	5.9	U	<	5.5	U
Methylene chloride	<	7000	U	<	5.8	U	<	5.7	U	<	7200	U	<	5.9	U	<	5.5	U
Toluene	14000	7000		<	5.8	U	<	5.7	U	82000	7200		<	5.9	U	<	5.5	U
Xylenes (total)	33000	7000		<	5.8	U	<	5.7	U	260000	7200		<	5.9	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Anthracene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Benzo(a)anthracene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Benzo(a)pyrene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Benzo(b)fluoranthene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Benzo(g,h,i)perylene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Benzo(k)fluoranthene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Carbazole	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Chrysene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Dibenz(a,h)anthracene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Fluoranthene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Fluorene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Indeno(1,2,3-cd)pyrene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
2-Methylnaphthalene	4900	37000	J	<	380	U	<	380	U	40000	38000		<	390	U	<	360	U
Naphthalene	<	37000	U	<	380	U	<	380	U	21000	38000	J	<	390	U	<	360	U
Phenanthrene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Pyrene	<	37000	U	<	380	U	<	380	U	<	38000	U	<	390	U	<	360	U
Metals (mg/kg)																		
Aluminum	9240	11.2		7350	23.1		6950	22.8		11100	11.5		4530	58.8		4900	11	
Arsenic	3	0.56		2.3	0.58		1.3	0.57		2.4	0.58		1.6	0.59		0.88	0.55	
Barium	638	1.1	J	866	2.3	J	1540	2.3	J	205	1.2	J	329	5.9	J	128	1.1	J
Beryllium	0.43	0.22		0.43	0.46	J	0.4	0.46	J	0.55	0.23		<	1.2	U	0.34	0.22	

TABLE 7-2a

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2709-0000			CAN127-2709-0005			CAN127-2709-0010			CAN127-2710-0000			CAN127-2710-0005			CAN127-2710-0010		
LAB SAMPLE NUMBER	0398710011SA			0398710009SA			0398710008SA			0398710005SA			0398710003SA			0398710007SA		
COLLECT DATE	12/13/94			12/13/94			12/13/94			12/13/94			12/13/94			12/13/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.																		
Cadmium	0.64	0.56		<	1.2	U	<	1.1	U	<	0.58	U	<	2.9	U	<	0.55	U
Calcium	53500	22.4		204000	46.2		135000	45.5		20500	23		254000	118		75700	22	
Chromium	11.3	1.1		4.4	2.3		4.6	2.3		10.5	1.2		<	5.9	U	3.9	1.1	
Cobalt	8	1.1		3.2	2.3		<	2.3	U	5.3	1.2		3	5.9	J	2.5	1.1	
Copper	8.5	2.2		4.5	4.6	J	3	4.6	J	8.8	2.3		<	11.8	U	2.1	2.2	J
Iron	10800	11.2		5780	23.1		5300	22.8		10400	11.5		3560	58.8		4120	11	
Lead	6.4	0.56	J	3.9	0.58	J	3.5	0.57	J	7.6	0.58	J	3.1	0.59	J	3.3	0.55	J
Magnesium	2220	22.4		3480	46.2		3490	45.5		2000	23		3600	118		2520	22	
Manganese	340	1.1		80.1	2.3		47	2.3		174	1.2		36.5	5.9		60.8	1.1	
Nickel	10.5	4.5		6.9	9.2	J	4.9	9.1	J	9	4.6		6.5	23.5	J	5.5	4.4	
Potassium	1330	560		1330	1150		1730	1140		1920	576		735	2940	J	1300	550	
Sodium	<	560	U	<	1150	U	<	1140	U	<	576	U	<	2940	U	<	550	U
Thallium	<	1.1	UJ	<	1.2	UJ	<	2.3	UJ	<	1.2	UJ	<	2.4	UJ	<	1.1	UJ
Vanadium	18.5	1.1		15.3	2.3		12.9	2.3		19.8	1.2		11.1	5.9		11.7	1.1	
Zinc	25.2	2.2		14.2	4.6		12	4.6		25.4	2.3		9.8	11.8	J	10	2.2	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons	<	44.8	U	<	46.2	U	<	45.5	U	11600	1150		<	47	U	<	44	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A-2a.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit
(1) Duplicate for preceding sample number.

TABLE 7-2a

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2711-0000			CAN127-2711-0005			CAN127-2711-0010			CAN127-2711-0015			CAN127-2711-0020		
LAB SAMPLE NUMBER	0397370007SA			0397370008SA			0397370009SA			0397370010SA			0397370011SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)															
Acetone	<	11	U	4.6	11	J	5.3	11	J	7	11	J	5	11	J
Benzene	<	5.4	U	<	5.3	U	<	5.7	U	<	5.5	U	<	5.6	U
Ethylbenzene	<	5.4	U	<	5.3	U	<	5.7	U	<	5.5	U	<	5.6	U
Methylene chloride	<	5.4	U	<	5.3	U	1.3	5.7	J	<	5.5	U	1.2	5.6	J
Toluene	<	5.4	U	<	5.3	U	<	5.7	U	<	5.5	U	<	5.6	U
Xylenes (total)	<	5.4	U	<	5.3	U	<	5.7	U	<	5.5	U	<	5.6	U
Semivolatile Organics (µg/kg)															
Acenaphthene	<	360	U	<	350	U	<	370	U	<	370	U	<	370	U
Anthracene	68	360	J	<	350	U	<	370	U	<	370	U	<	370	U
Benzo(a)anthracene	910	360		<	350	U	<	370	U	<	370	U	<	370	U
Benzo(a)pyrene	1100	360		<	350	U	<	370	U	<	370	U	<	370	U
Benzo(b)fluoranthene	1100	360	J	<	350	UJ	<	370	UJ	<	370	UJ	<	370	UJ
Benzo(g,h,i)perylene	700	360		<	350	U	<	370	U	<	370	U	<	370	U
Benzo(k)fluoranthene	1600	360		<	350	U	<	370	U	<	370	U	<	370	U
Carbazole	170	360	J	<	350	U	<	370	U	<	370	U	<	370	U
Chrysene	1500	360		<	350	U	<	370	U	<	370	U	<	370	U
Dibenz(a,h)anthracene	280	360	J	<	350	U	<	370	U	<	370	U	<	370	U
Fluoranthene	2800	360		<	350	U	<	370	U	<	370	U	<	370	U
Fluorene	<	360	U	<	350	U	<	370	U	<	370	U	<	370	U
Indeno(1,2,3-cd)pyrene	700	360		<	350	U	<	370	U	<	370	U	<	370	U
2-Methylnaphthalene	<	360	U	<	350	U	<	370	U	<	370	U	<	370	U
Naphthalene	<	360	U	<	350	U	<	370	U	<	370	U	<	370	U
Phenanthrene	1100	360		<	350	U	<	370	U	<	370	U	<	370	U
Pyrene	2300	360		<	350	U	<	370	U	<	370	U	<	370	U
Metals (mg/kg)															
Aluminum	11000	10.8	J	7000	10.6	J	6940	22.7	J	10200	11.1	J	6390	11.2	J
Arsenic	2.4	0.54		1.6	0.53		1.5	0.57		2	0.55		1.9	0.56	
Barium	105	1.1	J	86.2	1.1	J	232	2.3	J	241	1.1	J	54.9	1.1	J
Beryllium	0.5	0.22		0.3	0.21		0.47	0.45		0.5	0.22		0.58	0.22	

TABLE 7-2a

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2711-0000			CAN127-2711-0005			CAN127-2711-0010			CAN127-2711-0015			CAN127-2711-0020		
LAB SAMPLE NUMBER	0397370007SA			0397370008SA			0397370009SA			0397370010SA			0397370011SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)															
Cadmium	<	0.54	U	<	0.53	U	<	1.1	U	<	0.55	U	<	0.56	U
Calcium	19300	21.6		63300	21.1		161000	45.3		63500	22.2		57400	22.4	
Chromium	15.5	1.1		6.4	1.1		4.7	2.3		7.4	1.1		5.3	1.1	
Cobalt	3.4	1.1		2.1	1.1		2.5	2.3		3	1.1		3.3	1.1	
Copper	7.5	2.2		4.5	2.1		2.6	4.5	J	4.8	2.2		4.7	2.2	
Iron	9760	10.8	J	6140	10.6	J	5560	22.7	J	7640	11.1	J	5610	11.2	J
Lead	83.9	5.4		4.5	0.53		4.1	0.57		6.9	0.55		6.2	0.56	
Magnesium	1980	21.6		2070	21.1		4690	45.3		4600	22.2		3890	22.4	
Manganese	183	1.1	J	83.9	1.1	J	55.9	2.3	J	111	1.1	J	111	1.1	J
Nickel	8.1	4.3		6.3	4.2		8.5	9.1	J	8	4.4		7.2	4.5	
Potassium	2030	541		1310	528		1600	1130		2620	554		2040	559	
Sodium	<	541	U	<	528	U	<	1130	U	248	554	J	<	559	U
Thallium	<	0.54	U	<	0.53	U	<	1.1	UJ	<	1.1	UJ	<	0.56	U
Vanadium	17.8	1.1		12.5	1.1		13.5	2.3		15.4	1.1		15.6	1.1	
Zinc	34.7	2.2		15.1	2.1		13.3	4.5		20.8	2.2		13.7	2.2	
TRPH (mg/kg)															
Total Recoverable Petroleum Hydrocarbon	130	43.3		<	42.2	U	<	45.3	U	<	44.3	U	<	44.7	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A-2a.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit
(1) Duplicate for preceding sample number.

TABLE 7-2a

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2711-0025			CAN127-2711-0030			CAN127-2711-0035			CAN127-2711-0040			CAN127-2711-0050			CAN127-2711-0060		
LAB SAMPLE NUMBER	0397370012SA			0397370013SA			0397740013SA			0397740014SA			0397740015SA			0397740016SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	8.6	11	J	<	11	U	1.3	11	J	<	11	U	<	11	U	<	11	U
Benzene	<	5.6	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Ethylbenzene	<	5.6	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Methylene chloride	<	5.6	U	<	5.6	U	1.6	5.6	UJ	1.2	5.5	UJ	1.5	5.6	UJ	1.6	5.6	UJ
Toluene	<	5.6	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Xylenes (total)	<	5.6	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Anthracene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Benzo(a)anthracene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Benzo(a)pyrene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Benzo(b)fluoranthene	<	370	UJ	<	370	UJ	<	370	U	<	360	U	<	370	U	<	370	U
Benzo(g,h,i)perylene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Benzo(k)fluoranthene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Carbazole	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Chrysene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Dibenz(a,h)anthracene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Fluoranthene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Fluorene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Indeno(1,2,3-cd)pyrene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
2-Methylnaphthalene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Naphthalene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Phenanthrene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Pyrene	<	370	U	<	370	U	<	370	U	<	360	U	<	370	U	<	370	U
Metals (mg/kg)																		
Aluminum	2880	22.3	J	7120	11.3	J	7040	11.2		5410	10.9		4770	11.1		3590	11.1	
Arsenic	1.7	0.56		1.4	0.56		1.3	0.56		2.2	0.55		1.6	0.56		1.8	0.56	
Barium	109	2.2	J	144	1.1	J	27	1.1		22.5	1.1		42.7	1.1		24.5	1.1	
Beryllium	0.29	0.45	J	0.21	0.23	J	0.27	0.22		0.27	0.22		0.24	0.22		0.19	0.22	J

TABLE 7-2a

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2711-0025			CAN127-2711-0030			CAN127-2711-0035			CAN127-2711-0040			CAN127-2711-0050			CAN127-2711-0060		
LAB SAMPLE NUMBER	0397370012SA			0397370013SA			0397740013SA			0397740014SA			0397740015SA			0397740016SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Cadmium	<	1.1	U	<	0.56	U	<	0.56	U	<	0.55	U	<	0.56	U	<	0.56	U
Calcium	190000	44.6		81300	22.6		30700	22.3		30400	21.9		64400	22.3		32400	22.2	
Chromium	2.7	2.2		5.4	1.1		6.4	1.1		4.5	1.1		5.5	1.1		3.2	1.1	
Cobalt	<	2.2	U	1.1	1.1		1.3	1.1		1.7	1.1		2.3	1.1		1.4	1.1	
Copper	1.6	4.5	J	1.8	2.3	J	2.1	2.2	J	2.1	2.2	J	2.2	2.2		2.1	2.2	J
Iron	2190	22.3	J	4590	11.3	J	5200	11.2		4690	10.9		3930	11.1		3450	11.1	
Lead	3	0.56		3.3	0.56		2.8	0.56	J	3.5	0.55	J	2.3	0.56	J	1.9	0.56	J
Magnesium	5440	44.6		6760	22.6		6810	22.3	J	3670	21.9		5350	22.3	J	3520	22.2	J
Manganese	15.7	2.2	J	36.5	1.1	J	40.7	1.1		50.9	1.1		46.3	1.1		35.8	1.1	
Nickel	3.3	8.9	J	5.7	4.5		4.6	4.5		4	4.4	J	4.2	4.5	J	2	4.4	J
Potassium	842	1120	J	1250	564		1310	558		1180	547		936	557		665	556	
Sodium	<	1120	U	<	564	U	<	558	U	<	547	U	<	557	U	<	556	U
Thallium	<	1.1	UJ	0.16	0.56	J	<	1.1	UJ	<	1.1	UJ	<	0.56	UJ	<	0.56	UJ
Vanadium	11.8	2.2		17.1	1.1		23.2	1.1		17	1.1		19.8	1.1		15.1	1.1	
Zinc	5.6	4.5		10.7	2.3		10.8	2.2		10.6	2.2		8.8	2.2		7.8	2.2	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbo	<	44.6	U	<	45.1	U	<	44.7	UJ	<	43.8	UJ	<	44.6	UJ	<	44.4	UJ

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Appendix A-2a.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit
(1) Duplicate for preceding sample number.

TABLE 7-2b

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2712-0000			CAN127-2712-0005			CAN127-2712-0010			CAN127-2712-0015			CAN127-2712-0020		
LAB SAMPLE NUMBER	0397130001SA			0397130002SA			0397130003SA			0397130004SA			0397130005SA		
COLLECT DATE	12/08/94			12/08/94			12/08/94			12/08/94			12/08/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)															
Acetone	<	11	U	<	11	U	14	11		<	11	U	<	11	U
4-Methyl-2-pentanone (MIBK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Methylene chloride	<	6	U	<	6.1	U	<	5.7	U	<	5.5	U	<	6.9	U
Toluene	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U	<	5.6	U
Semivolatile Organics (µg/kg)															
Anthracene	56	360	J	<	370	U	<	360	U	<	360	U	<	370	U
Benzo(a)anthracene	660	360		<	370	U	<	360	U	<	360	U	<	370	U
Benzo(a)pyrene	800	360		<	370	U	<	360	U	<	360	U	<	370	U
Benzo(b)fluoranthene	1600	360		<	370	U	<	360	U	<	360	U	<	370	U
Benzo(g,h,i)perylene	640	360		<	370	U	<	360	U	<	360	U	<	370	U
bis(2-Ethylhexyl)phthalate	68	360	J	<	370	U	<	360	U	<	360	U	<	370	U
Carbazole	120	360	J	<	370	U	<	360	U	<	360	U	<	370	U
Chrysene	1000	360		<	370	U	<	360	U	<	360	U	<	370	U
Dibenz(a,h)anthracene	120	360	J	<	370	U	<	360	U	<	360	U	<	370	U
Fluoranthene	1800	360		<	370	U	<	360	U	<	360	U	<	370	U
Indeno(1,2,3-cd)pyrene	570	360		<	370	U	<	360	U	<	360	U	<	370	U
Phenanthrene	880	360		<	370	U	<	360	U	<	360	U	<	370	U
Pyrene	1900	360		<	370	U	<	360	U	<	360	U	<	370	U
Metals (mg/kg)															
Aluminum	11800	11	J	6970	22.1	J	4560	10.9	J	4270	11	J	9520	22.6	J
Arsenic	2.4	0.55		2.3	0.55		1.5	0.54		1.7	0.55		1.8	0.56	
Barium	108	1.1		197	2.2		169	1.1		360	1.1		337	2.3	
Beryllium	0.43	0.22		0.57	0.44		0.27	0.22		0.29	0.22		0.64	0.45	
Calcium	12200	21.9	J	173000	44.3	J	96200	21.7	J	80500	22	J	195000	45.1	J
Chromium	21.4	1.1	J	6	2.2	J	3.8	1.1	J	4	1.1	J	7	2.3	J
Cobalt	3.7	1.1		3.4	2.2		2.1	1.1		2.4	1.1		<	2.3	U
Copper	7.4	2.2		5.7	4.4		2.5	2.2		2.1	2.2	J	3.9	4.5	J
Iron	9550	11	J	6380	22.1	J	3870	10.9	J	3700	11	J	6720	22.6	J

TABLE 7-2b

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2712-0000			CAN127-2712-0005			CAN127-2712-0010			CAN127-2712-0015			CAN127-2712-0020		
LAB SAMPLE NUMBER	0397130001SA			0397130002SA			0397130003SA			0397130004SA			0397130005SA		
COLLECT DATE	12/08/94			12/08/94			12/08/94			12/08/94			12/08/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.															
Lead	60.9	5.5	J	6.4	1.1	J	3.9	0.54	J	4.2	0.55	J	3.8	0.56	J
Magnesium	1880	21.9		3290	44.3		2640	21.7		2690	22		7850	45.1	
Manganese	167	1.1	J	99.2	2.2	J	62.9	1.1	J	65.8	1.1	J	61.5	2.3	J
Nickel	7.5	4.4		8.8	8.9	J	5.3	4.3		5.3	4.4		4.8	9	J
Potassium	2090	548		1410	1110		1200	543		1230	551		2470	1130	
Thallium	0.16	0.55	J	0.12	1.1	J	0.12	1.1	J	0.11	1.1	J	0.11	1.1	J
Vanadium	17.5	1.1	J	17	2.2	J	12.5	1.1	J	10.9	1.1	J	15.7	2.3	J
Zinc	41.1	2.2		18.3	4.4		9.6	2.2		9.9	2.2		16.4	4.5	
TRPH (mg/kg)															
Total Recoverable Petroleum Hydrocarbon	168	43.9		<	44.3	U	<	43.4	U	48	44.1		293	45.1	

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Table A-2b.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit

TABLE 7-2b

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2712-0025			CAN127-2712-0030			CAN127-2712-0035			CAN127-2712-0040			CAN127-2712-0050			CAN127-2712-0060		
LAB SAMPLE NUMBER	0397130006SA			0397130007SA			0397130008SA			0397130009SA			0397130010SA			0397130011SA		
COLLECT DATE	12/08/94			12/08/94			12/08/94			12/08/94			12/08/94			12/08/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	11	U	<	11	U	<	12	U	<	11	U	<	11	U	<	11	U
4-Methyl-2-pentanone (MIBK)	<	11	U	<	11	U	<	12	U	<	11	U	<	11	U	<	11	U
Methylene chloride	<	6	U	<	6.7	U	<	5.8	U	<	6	U	<	6	U	<	5.6	U
Toluene	<	5.6	U	<	5.6	U	<	5.8	U	<	5.6	U	<	5.6	U	<	5.6	U
Semivolatile Organics (µg/kg)																		
Anthracene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Benzo(a)anthracene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Benzo(a)pyrene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Benzo(b)fluoranthene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Benzo(g,h,i)perylene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
bis(2-Ethylhexyl)phthalate	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Carbazole	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Chrysene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Dibenz(a,h)anthracene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Fluoranthene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Indeno(1,2,3-cd)pyrene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Phenanthrene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Pyrene	<	370	U	<	370	U	<	380	U	<	370	U	<	370	U	<	370	U
Metals (mg/kg)																		
Aluminum	6100	11.1	J	6870	11.3	J	5210	11.5	J	5330	11.1	J	5480	11.3	J	4600	11.2	J
Arsenic	2	0.56		1.8	0.56		1.3	0.58		1.1	0.56		1.4	0.56		1.8	0.56	
Barium	108	1.1		91.4	1.1		28.6	1.2		24	1.1		59.9	1.1		28.4	1.1	
Beryllium	0.21	0.22	J	0.32	0.23		0.15	0.23	J	0.17	0.22	J	0.19	0.23	J	0.15	0.22	J
Calcium	88400	22.2	J	66000	22.6	J	66700	23	J	35500	22.2	J	51100	22.5	J	26900	22.3	J
Chromium	4.8	1.1	J	5.4	1.1	J	4.2	1.2	J	5.8	1.1	J	6.1	1.1	J	5.2	1.1	J
Cobalt	2	1.1		2.2	1.1		1.5	1.2		1.5	1.1		2.7	1.1		1.2	1.1	
Copper	2.8	2.2		2.7	2.3		1.8	2.3	J	3.6	2.2		2.7	2.3		2.3	2.2	
Iron	4350	11.1	J	5080	11.3	J	3520	11.5	J	3690	11.1	J	4050	11.3	J	3700	11.2	J

TABLE 7-2b

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2712-0025			CAN127-2712-0030			CAN127-2712-0035			CAN127-2712-0040			CAN127-2712-0050			CAN127-2712-0060		
LAB SAMPLE NUMBER	0397130006SA			0397130007SA			0397130008SA			0397130009SA			0397130010SA			0397130011SA		
COLLECT DATE	12/08/94			12/08/94			12/08/94			12/08/94			12/08/94			12/08/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Lead	3.8	0.56	J	3.3	0.56	J	2.3	0.58	J	1.9	0.56	J	2.5	0.56	J	2	2.8	J
Magnesium	6090	22.2		5900	22.6		6920	23		9070	22.2		15000	22.5		10000	22.3	
Manganese	56.5	1.1	J	57.8	1.1	J	34.2	1.2	J	48.4	1.1	J	80.8	1.1	J	37.1	1.1	J
Nickel	5.7	4.4		5.9	4.5		3.9	4.6	J	4.5	4.4		4.3	4.5	J	3.8	4.5	J
Potassium	1640	556		1630	565		1040	576		1040	555		1070	563		936	558	
Thallium	<	0.56	U	<	0.56	U	0.12	0.58	J	<	0.56	U	<	0.56	U	<	0.56	U
Vanadium	13.3	1.1	J	20.5	1.1	J	16.1	1.2	J	18.6	1.1	J	21.5	1.1	J	16	1.1	J
Zinc	10.5	2.2		12	2.3		8.1	2.3		9.8	2.2		9.5	2.3		14	2.2	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbo	<	44.5	U	<	45.2	U	<	46	U	67.4	44.4		<	45.1	U	<	44.6	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.

A complete summary of chemical results is presented in Table A-2b.

J = Estimated value

R = Rejected value D = Sample was diluted for analysis

U = Nondetected value RL = Reporting Limit

TABLE 7-2b

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2713-0000			CAN127-2713-0000			CAN127-2713-0005			CAN127-2713-0010			CAN127-2713-0010			CAN127-2713-0015		
LAB SAMPLE NUMBER	0397380001SA			0397380013SA			0397380002SA			0397380003RA			0397380003SA			0397380004RA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	11	U				<	11	U				<	11	U			
4-Methyl-2-pentanone (MIBK)	<	11	U				<	11	U				<	11	U			
Methylene chloride	6.7	6.7					<	6.5	U				<	7	U			
Toluene	1.3	5.5	J				<	5.5	U				1.2	5.6	J			
Semivolatile Organics (µg/kg)																		
Anthracene	<	360	U	<	360	UJ	<	360	UJ	<	370	UJ	<	370	U	<	380	UJ
Benzo(a)anthracene	95	360	J	89	360	J	91	360	J	<	370	UJ	<	370	U	<	380	UJ
Benzo(a)pyrene	130	360	J	110	360	J	100	360	J	<	370	UJ	<	370	U	<	380	UJ
Benzo(b)fluoranthene	310	360	J	230	360	J	250	360	J	<	370	UJ	<	370	U	<	380	UJ
Benzo(g,h,i)perylene	100	360	J	<	360	UJ	<	360	UJ	<	370	UJ	<	370	U	<	380	UJ
bis(2-Ethylhexyl)phthalate	<	780	U	<	360	UJ	<	360	UJ	<	370	UJ	<	410	U	<	380	UJ
Carbazole	<	360	U	<	360	UJ	<	360	UJ	<	370	UJ	<	370	U	<	380	UJ
Chrysene	190	360	J	160	360	J	150	360	J	<	370	UJ	<	370	U	<	380	UJ
Dibenz(a,h)anthracene	43	360	J	<	360	UJ	<	360	UJ	<	370	UJ	<	370	U	<	380	UJ
Fluoranthene	310	360	J	310	360	J	310	360	J	<	370	UJ	<	370	U	<	380	UJ
Indeno(1,2,3-cd)pyrene	88	360	J	<	360	UJ	<	360	UJ	<	370	UJ	<	370	U	<	380	UJ
Phenanthrene	110	360	J	100	360	J	100	360	J	<	370	UJ	<	370	U	<	380	UJ
Pyrene	260	360	J	260	360	J	250	360	J	<	370	UJ	<	370	U	<	380	UJ
Metals (mg/kg)																		
Aluminum	14500	11	J				11700	10.9	J				6930	22.4	J			
Arsenic	2.6	0.55					2.6	0.55					2.5	0.56				
Barium	170	1.1	J				176	1.1	J				253	2.2	J			
Beryllium	0.71	0.22	J				0.76	0.22	J				<	0.45	UJ			
Calcium	41400	21.9	J				40100	21.9	J				135000	44.8	J			
Chromium	12.9	1.1	J				11.6	1.1	J				11.7	2.2	J			
Cobalt	4.6	1.1	J				4.7	1.1	J				3	2.2	J			
Copper	8.5	2.2	J				8.6	2.2	J				5.6	4.5	J			
Iron	11500	11	J				10900	10.9	J				6410	22.4	J			

TABLE 7-2b

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2713-0000			CAN127-2713-0000			CAN127-2713-0005			CAN127-2713-0010			CAN127-2713-0010			CAN127-2713-0015		
LAB SAMPLE NUMBER	0397380001SA			0397380013SA			0397380002SA			0397380003RA			0397380003SA			0397380004RA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Lead	13.4	2.7	J				12.5	2.7	J				4.9	0.56	J			
Magnesium	2760	21.9					2560	21.9					2960	44.8				
Manganese	187	1.1	J				200	1.1	J				84.6	2.2	J			
Nickel	10.4	4.4					9.4	4.4					7	9	J			
Potassium	2390	548	J				2080	547	J				1360	1120	J			
Thallium	0.12	0.55	J				<	0.55	U				<	0.56	U			
Vanadium	20.8	1.1					22	1.1					16.1	2.2				
Zinc	30.3	2.2	J				26.4	2.2	J				15.8	4.5	J			
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons	66.5	43.9					52.3	43.8					<	44.8	U			

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Table A-2b.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit

TABLE 7-2b

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2713-0015			CAN127-2713-0020			CAN127-2713-0020			CAN127-2713-0025			CAN127-2713-0025		
LAB SAMPLE NUMBER	0397380004SA			0397380005RA			0397380005SA			0397380006RA			0397380006SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)															
Acetone	<	11	U				<	11	U				<	12	U
4-Methyl-2-pentanone (MIBK)	<	11	U				<	11	U				<	12	U
Methylene chloride	<	6.3	U				<	5.5	U				<	6.3	U
Toluene	<	5.7	U				<	5.5	U				<	5.8	U
Semivolatile Organics (µg/kg)															
Anthracene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Benzo(a)anthracene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Benzo(a)pyrene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Benzo(b)fluoranthene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Benzo(g,h,i)perylene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
bis(2-Ethylhexyl)phthalate	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Carbazole	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Chrysene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Dibenz(a,h)anthracene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Fluoranthene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Indeno(1,2,3-cd)pyrene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Phenanthrene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Pyrene	<	380	U	<	360	UJ	<	360	U	<	380	UJ	<	380	U
Metals (mg/kg)															
Aluminum	4600	22.8	J				7190	22.1	J				14700	23.3	J
Arsenic	1.8	0.57					1.7	0.55					2.3	0.58	
Barium	404	2.3	J				238	2.2	J				241	2.3	J
Beryllium	0.39	0.46	J				0.56	0.44	J				0.51	0.47	J
Calcium	218000	45.6	J				121000	44.2	J				180000	46.5	J
Chromium	3.2	2.3	J				6.7	2.2	J				7.1	2.3	J
Cobalt	2.1	2.3	J				3.1	2.2	J				2.1	2.3	J
Copper	2.3	4.6	J				4.1	4.4	J				3.5	4.7	J
Iron	3720	22.8	J				6340	22.1	J				8010	23.3	J

TABLE 7-2b

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2713-0015			CAN127-2713-0020			CAN127-2713-0020			CAN127-2713-0025			CAN127-2713-0025		
LAB SAMPLE NUMBER	0397380004SA			0397380005RA			0397380005SA			0397380006RA			0397380006SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)															
Lead	3.8	0.57	J				4.9	0.55	J				4.4	0.58	J
Magnesium	4300	45.6					4560	44.2					12600	46.5	
Manganese	46.5	2.3	J				89.2	2.2	J				49.7	2.3	J
Nickel	6.5	9.1	J				5.4	8.8	J				9.2	9.3	J
Potassium	1230	1140	J				1990	1110	J				3230	1160	J
Thallium	<	1.1	UJ				<	0.55	U				<	1.2	UJ
Vanadium	12.5	2.3					16.3	2.2					22.2	2.3	
Zinc	10	4.6	J				16.2	4.4	J				19.4	4.7	J
TRPH (mg/kg)															
Total Recoverable Petroleum Hydrocarb	<	45.6	U				<	44.2	U				<	46.5	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Table A-2b.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit

TABLE 7-2c

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2713-0030			CAN127-2713-0030			CAN127-2713-0035			CAN127-2713-0035			CAN127-2713-0040			CAN127-2713-0040		
LAB SAMPLE NUMBER	0397380007RA			0397380007SA			0397380008RA			0397380008SA			0397380009RA			0397380009SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone				<	11	U				<	11	U				5.6	11	J
2-Butanone (MEK)				<	11	U				<	11	U				<	11	U
Methylene chloride				<	5.7	U				<	5.7	U				<	5.6	U
Toluene				1.6	5.6	J				9	5.7					<	5.6	U
Semivolatile Organics (µg/kg)																		
Anthracene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Benzo(a)anthracene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Benzo(a)pyrene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Benzo(b)fluoranthene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Benzo(g,h,i)perylene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Benzo(k)fluoranthene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
bis(2-Ethylhexyl)phthalate	<	370	UJ	<	950	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Carbazole	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Chrysene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Di-n-butyl phthalate	<	370	UJ	77	370	J	<	380	UJ	58	380	J	<	370	UJ	<	370	U
Dibenz(a,h)anthracene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Fluoranthene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Indeno(1,2,3-cd)pyrene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Phenanthrene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Pyrene	<	370	UJ	<	370	U	<	380	UJ	<	380	U	<	370	UJ	<	370	U
Metals (mg/kg)																		
Aluminum				8550	22.4	J				7010	23	J				6710	11.1	J
Antimony				<	13.4	UJ				<	13.8	UJ				<	6.7	UJ
Arsenic				1.9	0.56					1.4	0.57					1.4	0.56	
Barium				290	2.2	J				445	2.3	J				62.3	1.1	J
Beryllium				0.5	0.45	J				0.25	0.46	J				0.32	0.22	J

TABLE 7-2c

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2713-0030			CAN127-2713-0030			CAN127-2713-0035			CAN127-2713-0035			CAN127-2713-0040			CAN127-2713-0040		
LAB SAMPLE NUMBER	0397380007RA			0397380007SA			0397380008RA			0397380008SA			0397380009RA			0397380009SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.																		
Calcium				186000	44.8	J				149000	45.9	J				30900	22.2	J
Chromium				8.8	2.2	J				4.4	2.3	J				7.2	1.1	J
Cobalt				2.2	2.2	J				1.2	2.3	J				1.9	1.1	J
Copper				4.6	4.5	J				2	4.6	J				2.1	2.2	J
Iron				5670	22.4	J				4510	23	J				5290	11.1	J
Lead				3	0.56	J				3	0.57	J				2.9	0.56	J
Magnesium				6630	44.8					6520	45.9					4540	22.2	
Manganese				38.7	2.2	J				36.3	2.3	J				47.2	1.1	J
Nickel				6.9	9	J				3.7	9.2	J				4.3	4.4	J
Potassium				1730	1120	J				1250	1150	J				1270	556	J
Sodium				521	1120	J				<	1150	U				<	556	U
Thallium				<	1.1	UJ				<	0.57	U				<	0.56	U
Vanadium				19.3	2.2					18	2.3					18.9	1.1	
Zinc				13.1	4.5	J				10.1	4.6	J				11.1	2.2	J
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbons				47.1	44.8					<	45.9	U				<	44.5	

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Table A-2c.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit

TABLE 7-2c

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2713-0050			CAN127-2713-0050			CAN127-2713-0060			CAN127-2713-0060		
LAB SAMPLE NUMBER	0397380010RA			0397380010SA			0397380011RA			0397380011SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Acetone				3.1	11	J				25	11	
2-Butanone (MEK)				<	11	U				6.2	11	J
Methylene chloride				<	5.7	U				<	5.6	U
Toluene				<	5.7	U				<	5.6	U
Semivolatile Organics (µg/kg)												
Anthracene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Benzo(a)anthracene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Benzo(a)pyrene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Benzo(b)fluoranthene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Benzo(g,h,i)perylene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Benzo(k)fluoranthene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
bis(2-Ethylhexyl)phthalate	<	370	UJ	<	600	U	<	370	UJ	<	590	U
Carbazole	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Chrysene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Di-n-butyl phthalate	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Dibenz(a,h)anthracene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Fluoranthene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Indeno(1,2,3-cd)pyrene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Phenanthrene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Pyrene	<	370	UJ	<	370	U	<	370	UJ	<	370	U
Metals (mg/kg)												
Aluminum				5550	11.3	J				5450	11.1	J
Antimony				<	6.8	UJ				<	6.7	UJ
Arsenic				1.9	0.57					1.8	0.56	
Barium				23.8	1.1	J				132	1.1	J
Beryllium				0.29	0.23	J				0.28	0.22	J

TABLE 7-2c

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2713-0050			CAN127-2713-0050			CAN127-2713-0060			CAN127-2713-0060		
LAB SAMPLE NUMBER	0397380010RA			0397380010SA			0397380011RA			0397380011SA		
COLLECT DATE	12/09/94			12/09/94			12/09/94			12/09/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)												
Calcium				39800	22.7	J				53600	22.2	J
Chromium				6.1	1.1	J				13.4	1.1	J
Cobalt				1.4	1.1	J				2.2	1.1	J
Copper				2.7	2.3	J				9.3	2.2	J
Iron				4390	11.3	J				6110	11.1	J
Lead				3.2	0.57	J				3.1	0.56	J
Magnesium				6500	22.7					4910	22.2	
Manganese				48.2	1.1	J				75.4	1.1	J
Nickel				4.2	4.5	J				6.1	4.4	
Potassium				1110	566	J				1110	555	J
Sodium				<	566	U				<	555	U
Thallium				<	0.57	U				<	0.56	U
Vanadium				21.6	1.1					20.2	1.1	
Zinc				9.9	2.3	J				9.6	2.2	J
TRPH (mg/kg)												
Total Recoverable Petroleum Hydrocarbons				47.9	45.3					<	44.4	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review. A complete summary of chemical results is presented in Table A-2c.

J = Estimated value

R = Rejected value D = Sample was diluted for analysis

U = Nondetected value RL = Reporting Limit

TABLE 7-2c

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2714-0000			CAN127-2714-0005			CAN127-2714-0010			CAN127-2714-0015			CAN127-2714-0020			CAN127-2714-0025		
LAB SAMPLE NUMBER	0396880006SA			0396880008SA			0396880009SA			0396880010SA			0396880011SA			0396880012SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<		U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	1.3	11	J
Methylene chloride	<	5.6	U	4.4	5.4		<	8	U	4.2	5.4	J	<	5.5	U	<	5.5	J
Toluene	<	5.6	U	<	5.4	U	<	5.4	U	<	5.4	U	<	5.5	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Anthracene	52	370	J	<	360	U	<	360	U	<	360	U	<	360	U	<	360	U
Benzo(a)anthracene	450	370		96	360	J	<	360	U	<	360	U	<	360	U	<	360	U
Benzo(a)pyrene	640	370		140	360	J	<	360	U	<	360	U	<	360	U	<	360	U
Benzo(b)fluoranthene	750	370		150	360	J	37	360	J	<	360	U	<	360	U	<	360	U
Benzo(g,h,i)perylene	340	370	J	90	360	J	<	360	U	<	360	U	<	360	U	<	360	U
Benzo(k)fluoranthene	800	370		170	360	J	<	360	U	<	360	U	<	360	U	<	360	U
bis(2-Ethylhexyl)phthalate	450	370		300	360	J	290	360	J	290	360	J	310	360	J	550	360	
Carbazole	100	370	J	<	360	U	<	360	U	<	360	U	<	360	U	<	360	U
Chrysene	820	370		170	360	J	<	360	U	<	360	U	<	360	U	<	360	U
Di-n-butyl phthalate	<	370	U	<	360	U	<	360	U	<	360	U	<	360	U	<	360	U
Dibenz(a,h)anthracene	150	370	J	43	360	J	<	360	U	<	360	U	<	360	U	<	360	U
Fluoranthene	1400	370		330	360	J	50	360	J	<	360	U	<	360	U	<	360	U
Indeno(1,2,3-cd)pyrene	360	370	J	94	360	J	<	360	U	<	360	U	<	360	U	<	360	U
Phenanthrene	570	370		160	360	J	<	360	U	<	360	U	<	360	U	<	360	U
Pyrene	1300	370		290	360	J	41	360	J	<	360	U	<	360	U	<	360	U
Metals (mg/kg)																		
Aluminum	7050	11.2		9210	10.9		6200	21.8		6230	10.8		7840	11		4610	22.1	
Antimony	<	6.7	UJ	<	6.5	UJ	<	13.1	UJ	<	6.5	UJ	4.6	6.6	UJ	<	13.3	UJ
Arsenic	1.9	0.56		2	0.54	J	1.3	0.54		1.3	0.54	J	1.4	0.55	J	0.84	0.55	J
Barium	92.4	1.1	J	96.1	1.1	J	161	2.2	J	115	1.1	J	78.5	1.1	J	119	2.2	J
Beryllium	0.39	0.22		0.51	0.22		0.35	0.44	J	0.35	0.22		0.5	0.22		<	0.44	U

TABLE 7-2c

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2714-0000			CAN127-2714-0005			CAN127-2714-0010			CAN127-2714-0015			CAN127-2714-0020			CAN127-2714-0025		
LAB SAMPLE NUMBER	0396880006SA			0396880008SA			0396880009SA			0396880010SA			0396880011SA			0396880012SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Calcium	18100	22.4		23600	21.7		135000	43.6		52600	21.6		69200	22.1		206000	44.2	
Chromium	9.2	1.1		11.9	1.1		3.7	2.2		5.5	1.1		6.4	1.1		5.8	2.2	
Cobalt	2.9	1.1		3.6	1.1		<	2.2	U	2.2	1.1		3.1	1.1		<	2.2	U
Copper	6.8	2.2		8.3	2.2		3.7	4.4	J	2.8	2.2		5	2.2		8.8	4.4	
Iron	7130	11.2		8550	10.9		4450	21.8		5640	10.8		6510	11		4210	22.1	
Lead	<		R	<		R	<		R	<		R	<		R	<		R
Magnesium	1470	22.4		1950	21.7		2780	43.6		2790	21.6		3840	22.1		5030	44.2	
Manganese	160	1.1		172	1.1		61.7	2.2		94.3	1.1		117	1.1		30.8	2.2	
Nickel	6.7	4.5		8.6	4.3		4.7	8.7	J	5.7	4.3		7	4.4		3.9	8.8	J
Potassium	1790	560		1830	543		1140	1090		1630	540		2040	552		959	1110	J
Sodium	<	560	U	<	543	U	<	1090	U	<	540	U	<	552	U	<	1110	U
Thallium	<	0.56	U	0.11	0.54	J	<	0.54	U	<	0.54	U	<	0.55	U	0.38	0.55	J
Vanadium	13.4	1.1		15.1	1.1		9.4	2.2		14.5	1.1		14.4	1.1		9.3	2.2	
Zinc	31.5	2.2		25.5	2.2		11.9	4.4		13.5	2.2		16.7	2.2		10.3	4.4	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocar	<	44.8	U	69.4	43.4		<	43.6	U	<	43.2	U	<	44.2	U	<	44.2	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Table A-2c.
J = Estimated value.
R = Rejected value. D = Sample was diluted for analysis.
U = Nondetected value. RL = Reporting Limit.

TABLE 7-2c

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2714-0030			CAN127-2714-0035			CAN127-2714-0040			CAN127-2714-0050			CAN127-2714-0060		
LAB SAMPLE NUMBER	0396880013SA			0396880014SA			0396880015SA			0396880016SA			0396880017SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)															
Acetone	<	11	U	<	13	U	<	11	U	<	11	U	<	11	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Methylene chloride	<	5.5	U	<	5.5	U	<	5.4		<	5.4	U	<	5.4	U
Toluene	<	5.5	U	<	5.5	U	<	5.4	U	<	5.4	U	<	5.4	U
Semivolatile Organics (µg/kg)															
Anthracene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Benzo(a)anthracene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Benzo(a)pyrene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Benzo(b)fluoranthene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Benzo(g,h,i)perylene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Benzo(k)fluoranthene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
bis(2-Ethylhexyl)phthalate	270	360	J	710	360		550	360		830	360		640	350	
Carbazole	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Chrysene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Di-n-butyl phthalate	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Dibenz(a,h)anthracene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Fluoranthene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Indeno(1,2,3-cd)pyrene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Phenanthrene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Pyrene	<	360	U	<	360	U	<	360	U	<	360	U	<	350	U
Metals (mg/kg)															
Aluminum	6230	11		6000	11		5460	10.9		4980	10.9		4500	10.7	
Antimony	<	6.6	UJ	<	6.6	UJ	<	6.5	U	<	6.5	UJ	<	6.4	UJ
Arsenic	1.1	0.55	J	0.77	0.55	J	0.98	0.54	J	0.9	0.54	J	1.3	0.54	J
Barium	92.2	1.1	J	90.3	1.1	J	26.7	1.1		97.8	1.1	J	23.8	1.1	J
Beryllium	0.2	0.22	J	0.17	0.22	J	0.16	0.22	J	0.17	0.22	J	0.19	0.21	J

TABLE 7-2c

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2714-0030			CAN127-2714-0035			CAN127-2714-0040			CAN127-2714-0050			CAN127-2714-0060		
LAB SAMPLE NUMBER	0396880013SA			0396880014SA			0396880015SA			0396880016SA			0396880017SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)															
Calcium	104000	22.1		50300	22.1		49300	21.8		38400	21.8		18300	21.5	
Chromium	5.2	1.1		7.4	1.1		6.6	1.1		6.3	1.1		4.5	1.1	
Cobalt	1.3	1.1		1	1.1	J	1.3	1.1		1.6	1.1		2.2	1.1	
Copper	2.6	2.2		7.4	2.2		6.5	2.2		3.3	2.2		1.7	2.1	J
Iron	4080	11		4690	11		4500	10.9		4260	10.9		4150	10.7	
Lead	<		R	3.1	1.1	R	<		R	<		R	<		R
Magnesium	8130	22.1		7920	22.1		7530	21.8		5310	21.8		3610	21.5	
Manganese	33.7	1.1		37	1.1		49.5	1.1		50.5	1.1		58.2	1.1	
Nickel	4.4	4.4		4.8	4.4		5.1	4.4		3.1	4.4	J	3.3	4.3	J
Potassium	1110	552		1110	552		1030	545		949	545		908	537	
Sodium	<	552	U	<	552	U	<	545	U	<	545	U	<	537	U
Thallium	0.21	0.55	J	0.18	1.1	J	<	0.54	U	<	1.1	J	<	0.54	U
Vanadium	13.9	1.1		16.7	1.1		16.7	1.1		18.9	1.1		15.9	1.1	
Zinc	9.9	2.2		10.6	2.2		10.4	2.2		10.5	2.2		8.9	2.1	
TRPH (mg/kg)															
Total Recoverable Petroleum Hydrocarb	<	44.2	U	182	44.2		50.9	43.6		83.6	43.6		<	43	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Table A-2c.

J = Estimated value.
R = Rejected value. D = Sample was diluted for analysis.
U = Nondetected value. RL = Reporting Limit.

TABLE 7-2d

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

Background

LOCATOR	CAN127-2715-0000			CAN127-2715-0005			CAN127-2715-0010			CAN127-2715-2762[1]			CAN127-2715-0015		
LAB SAMPLE NUMBER	0396860001SA			0396860002SA			0396860003SA			0396860011SA			0396860004SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)															
Acetone	<	11	U	<	11	U	<	11	U	<	16	U	<	19	U
Methylene chloride	<	5.5	U	<	5.3	U	<	5.5		<	5.4	U	4.4	5.5	J
Toluene	<	5.5	U	<	5.3	U	<	5.5	U	<	5.4	U	<	5.5	U
Semivolatile Organics (µg/kg)															
Anthracene	<	360	U	<	350	U	<	360	U	<	360	U	<	360	U
Benzo(a)anthracene	260	360	J	<	350	U	<	360	U	<	360	U	<	360	U
Benzo(a)pyrene	400	360		43	350	J	<	360	U	<	360	U	<	360	U
Benzo(b)fluoranthene	420	360		74	350	J	<	360	U	<	360	U	<	360	U
Benzo(g,h,i)perylene	270	360	J	<	350	U	<	360	U	<	360	U	<	360	U
Benzo(k)fluoranthene	470	360		<	350	U	<	360	U	<	360	U	<	360	U
Benzoic acid	48	1800	J	<	1700	U	<	1700	U	<	1700	U	<	1800	U
bis(2-Ethylhexyl)phthalate	44	360	J	<	350	U	<	360	U	44	360	J	<	360	U
Carbazole	45	360	J	<	350	U	<	360	U	<	360	U	<	360	U
Chrysene	46	360	J	59	350	J	<	360	U	<	360	U	<	360	U
Di-n-butyl phthalate	<	360	U	<	350	U	<	360	U	<	360	U	<	360	U
Di-n-octyl phthalate	<	360	U	64	350	J	<	360	U	<	360	U	<	360	U
Dibenz(a,h)anthracene	<	360	U	<	350	U	<	360	U	<	360	U	<	360	U
Diethyl phthalate	<	360	U	<	350	U	<	360	U	<	360	U	<	360	U
Fluoranthene	860	360		110	350	J	<	360	U	<	360	U	<	360	U
Indeno(1,2,3-cd)pyrene	260	360	J	<	350	U	<	360	U	<	360	U	<	360	U
Phenanthrene	380	360		53	350	J	<	360	U	<	360	U	<	360	U
Pyrene	710	360		77	350	J	<	360	U	<	360	U	<	360	U
Metals (mg/kg)															
Aluminum	7730	11		7500	21.2		7090	10.9		5760	10.8		5900	11	
Arsenic	2.1	0.55	J	1.7	0.53	J	2.2	0.55	J	1.6	0.54	J	1.2	0.55	J
Barium	93	1.1	J	152	2.1	J	148	1.1	J	162	1.1	J	146	1.1	J
Beryllium	0.44	0.22		0.34	0.42	J	0.38	0.22		0.3	0.22		0.34	0.22	

TABLE 7-2d

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2715-0000			CAN127-2715-0005			CAN127-2715-0010			CAN127-2715-2762[1]			CAN127-2715-0015		
LAB SAMPLE NUMBER	0396860001SA			0396860002SA			0396860003SA			0396860011SA			0396860004SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.															
Cadmium	<	0.55	U	0.77	1.1	J	<	0.55	U	<	0.54	U	<	0.55	U
Calcium	17800	22		141000	42.5		73600	21.8		78200	21.6		100000	22.1	
Chromium	9.2	1.1	J	6.9	2.1	J	6.4	1.1	J	5	1.1	J	4.7	1.1	J
Cobalt	3	1.1		2.1	2.1		2.8	1.1		2.4	1.1		1.7	1.1	
Copper	7.1	2.2		5.1	4.2		4.1	2.2		3.4	2.2		2.5	2.2	
Iron	7840	11		6140	21.2		5720	10.9		4730	10.8		4800	11	
Lead	36.4	5.5		7.6	5.3		5.1	0.55		4.8	0.54		3.9	0.55	
Magnesium	1550	22	J	2420	42.5	J	2940	21.8	J	2580	21.6	J	3080	22.1	J
Manganese	175	1.1		77.6	2.1		85.6	1.1		70.3	1.1		68	1.1	
Nickel	7.2	4.4		5.6	8.5	J	6.2	4.4		5.1	4.3		5.5	4.4	
Potassium	1830	550		1310	1060		1540	546		1220	540		1460	552	
Selenium	0.25	1.1	J	<		R	<		R	<		R	<		R
Thallium	0.3	0.55	J	0.2	0.53	J	0.13	0.55	J	0.13	0.54	J	0.13	0.55	J
Vanadium	14.5	1.1		13.7	2.1		15.2	1.1		12.7	1.1		13.5	1.1	
Zinc	30	2.2		17	4.2		14.8	2.2		12.6	2.2		12.3	2.2	
TRPH (mg/kg)															
Total Recoverable Petroleum Hydrocarbo	80.8	44		<	42.5	U	<	43.6	U	<	43.2	U	<	44.2	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Table A-2d.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit

TABLE 7-2d

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2715-0020			CAN127-2715-0025			CAN127-2715-0030			CAN127-2715-0035			CAN127-2715-0040			CAN127-2715-0050		
LAB SAMPLE NUMBER	0396860005SA			0396860006SA			0396860007SA			0396860008SA			0396860009SA			0396860010SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	11	U	9.5	11	J	8.5	11	J	26	11		<	11	U	15	11	
Methylene chloride	<	5.6	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U
Toluene	<	5.6	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Anthracene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Benzo(a)anthracene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Benzo(a)pyrene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Benzo(b)fluoranthene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Benzo(g,h,i)perylene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Benzo(k)fluoranthene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Benzoic acid	<	1800	U	<	1800	U	<	1800	U	<	1700	U	<	1700	U	<	1700	U
bis(2-Ethylhexyl)phthalate	<	370	U	170	370	J	40	370	J	<	360	U	190	360	J	54	360	J
Carbazole	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Chrysene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Di-n-butyl phthalate	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Di-n-octyl phthalate	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Dibenz(a,h)anthracene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Diethyl phthalate	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Fluoranthene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Indeno(1,2,3-cd)pyrene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Phenanthrene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Pyrene	<	370	U	<	370	U	<	370	U	<	360	U	<	360	U	<	360	U
Metals (mg/kg)																		
Aluminum	9530	11.2		5640	22.2		5630	11.2		5480	10.9		5240	10.9		4640	10.9	
Arsenic	2.4	0.56	J	1.4	0.56	J	1.1	1.1	J	1	1.1	J	1.2	0.55	J	1.2	0.55	J
Barium	146	1.1	J	88.6	2.2	J	265	1.1	J	24.6	1.1	J	33.8	1.1	J	63.1	1.1	J
Beryllium	0.65	0.22		0.24	0.44	J	0.21	0.22	J	0.2	0.22	J	0.23	0.22		0.17	0.22	J

TABLE 7-2d

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2715-0020			CAN127-2715-0025			CAN127-2715-0030			CAN127-2715-0035			CAN127-2715-0040			CAN127-2715-0050		
LAB SAMPLE NUMBER	0396860005SA			0396860006SA			0396860007SA			0396860008SA			0396860009SA			0396860010SA		
COLLECT DATE	12/07/94			12/07/94			12/07/94			12/07/94			12/07/94			12/07/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.																		
Cadmium	<	0.56	U	<	1.1	U	<	0.56	U	<	0.55	U	<	0.55	U	<	0.55	U
Calcium	69900	22.5		156000	44.4		85300	22.3		30500	21.8		46800	21.8		40700	21.9	
Chromium	6.8	1.1	J	4.3	2.2	J	5.2	1.1	J	5.9	1.1	J	5.2	1.1	J	5.7	1.1	J
Cobalt	3	1.1		2.1	2.2	J	<	1.1	U	1.2	1.1		1.3	1.1		0.87	1.1	J
Copper	5.5	2.2		2.8	4.4	J	2.1	2.2	J	2.3	2.2		1.9	2.2	J	2	2.2	J
Iron	7710	11.2		3970	22.2		3790	11.2		4490	10.9		4250	10.9		3850	10.9	
Lead	6.4	0.56		3.3	0.56		2.1	1.1		2.2	1.1		2.2	0.55		2.1	1.1	
Magnesium	4880	22.5	J	4120	44.4	J	5290	22.3	J	4590	21.8	J	5380	21.8	J	4660	21.9	J
Manganese	139	1.1		37.9	2.2		29	1.1		38.5	1.1		56.8	1.1		50.3	1.1	
Nickel	8.3	4.5		3.8	8.9	J	3.8	4.5	J	5.1	4.4		3.6	4.4	J	2.9	4.4	J
Potassium	2510	561		1220	1110		1000	558		1020	545		1020	546		879	547	
Selenium	0.16	1.1	J	<		R	<		R	<		R	<		R	<		R
Thallium	0.11	0.56	J	<	1.1	UJ	<	1.1	UJ	<	1.1	UJ	<	0.55	U	<	0.55	U
Vanadium	17.7	1.1		12.6	2.2		15.9	1.1		17	1.1		15.7	1.1		16.8	1.1	
Zinc	19.9	2.2		11.1	4.4		8.2	2.2		10.1	2.2		9.4	2.2		8.8	2.2	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbo	<	44.9	U	<	44.4	U	<	44.7	U	171	43.6		<	43.7	U	<	43.7	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Table A-2d.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit

TABLE 7-2d

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2715-0060			CAN127-2716-0000			CAN127-2716-0005			CAN127-2716-0010			CAN127-2716-0015			CAN127-2716-0020		
LAB SAMPLE NUMBER	0397130012SA			0396550007SA			0396550008SA			0396550009SA			0396550010SA			0396550011SA		
COLLECT DATE	12/07/94			12/06/94			12/06/94			12/06/94			12/06/94			12/06/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	11	U	<	11	U	6	12	J	4.6	11	J	<	14	U	4	11	J
Methylene chloride	4.6	5.5	J	<	5.6	U	<	5.8	U	<	5.5	U	<	5.5	U	<	5.6	U
Toluene	<	5.5	U	<	5.6	U	<	5.8	U	2.8	5.5	J	<	5.5	U	<	5.6	U
Semivolatile Organics (µg/kg)																		
Anthracene	<	370	U	<	370	U	<	380	U	<	360	U	<	360	U	<	370	U
Benzo(a)anthracene	<	370	U	84	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Benzo(a)pyrene	<	370	U	110	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Benzo(b)fluoranthene	<	370	U	100	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Benzo(g,h,i)perylene	<	370	U	88	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Benzo(k)fluoranthene	<	370	U	190	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Benzoic acid	<	1800	U	<	1800	U	<	1800	U	<	1800	U	<	1800	U	<	1800	U
bis(2-Ethylhexyl)phthalate	<	370	U	41	370	J	<	380	U	<	360	U	<	360	U	4700	370	
Carbazole	<	370	U	<	370	U	<	380	U	<	360	U	<	360	U	<	370	U
Chrysene	<	370	U	140	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Di-n-butyl phthalate	<	370	U	190	370	J	170	380	J	<	360	U	170	360	J	130	370	J
Di-n-octyl phthalate	<	370	U	<	370	U	<	380	U	<	360	U	<	360	U	310	370	J
Dibenz(a,h)anthracene	<	370	U	<	370	U	<	380	U	<	360	U	<	360	U	<	370	U
Diethyl phthalate	<	370	U	<	370	U	<	380	U	<	360	U	<	360	U	<	370	U
Fluoranthene	<	370	U	270	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Indeno(1,2,3-cd)pyrene	<	370	U	83	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Phenanthrene	<	370	U	120	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Pyrene	<	370	U	260	370	J	<	380	U	<	360	U	<	360	U	<	370	U
Metals (mg/kg)																		
Aluminum	3480	11.1		10600	11.3	J	10300	23.1	J	8940	11	J	9340	11	J	7330	22.5	J
Arsenic	1.4	1.1		2.6	0.56		2.2	0.58		1.6	0.55		2	0.55		2.1	0.56	
Barium	11.8	1.1		93	1.1	J	203	2.3	J	81.2	1.1	J	396	1.1	J	306	2.2	J
Beryllium	<	0.22	U	0.57	0.23		0.43	0.46	J	0.47	0.22		0.54	0.22		0.46	0.45	

TABLE 7-2d

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2715-0060			CAN127-2716-0000			CAN127-2716-0005			CAN127-2716-0010			CAN127-2716-0015			CAN127-2716-0020		
LAB SAMPLE NUMBER	0397130012SA			0396550007SA			0396550008SA			0396550009SA			0396550010SA			0396550011SA		
COLLECT DATE	12/07/94			12/06/94			12/06/94			12/06/94			12/06/94			12/06/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.																		
Cadmium	<	0.55	U	<	0.56	U	<	1.2	U	<	0.55	U	<	0.55	U	<	1.1	U
Calcium	2490	22.1		9170	22.5		130000	46.1		79500	22		43800	22		126000	44.9	
Chromium	4.1	1.1		11.7	1.1		8.6	2.3		6.6	1.1		7.7	1.1		5.4	2.2	
Cobalt	0.84	1.1	J	4	1.1		2.6	2.3		2.6	1.1		3.2	1.1		1.9	2.2	J
Copper	1.2	2.2	J	8.3	2.3		6.3	4.6		4.4	2.2		4.9	2.2		5.6	4.5	
Iron	3320	11.1		9750	11.3		7880	23.1		6910	11		7990	11		5780	22.5	
Lead	2	0.55		20.8	5.6	J	7.4	0.58	J	4.8	0.55	J	5.4	0.55	J	4.3	1.1	J
Magnesium	3590	22.1		1820	22.5		2840	46.1		3430	22		3340	22		4180	44.9	
Manganese	22.8	1.1		207	1.1		100	2.3		99.1	1.1		144	1.1		89.9	2.2	
Nickel	2.6	4.4	J	9.6	4.5		9.9	9.2		7.5	4.4		7.6	4.4		5.9	9	J
Potassium	726	553		2350	563		1740	1150		1630	549		2040	550		1820	1120	
Selenium	<	1.1	U	<	1.1	UJ	<	2.3	UJ	<	1.1	UJ	<	1.1	UJ	<	2.2	UJ
Thallium	<	0.55	U	<	0.56	UJ	<	1.2	UJ	<	1.1	UJ	<	1.1	UJ	<	1.1	UJ
Vanadium	16.7	1.1		16.8	1.1	J	15.5	2.3	J	17.4	1.1	J	19.7	1.1	J	14.8	2.2	J
Zinc	6.9	2.2		29.2	2.3		21.3	4.6		17.7	2.2		20.4	2.2		15.5	4.5	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbo	<	44.3	U	45.7	45		<	46.1	U	<	43.9	U	<	44	U	60.7	44.9	

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Table A-2d.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit

TABLE 7-2d

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2716-0025			CAN127-2716-0030			CAN127-2716-0035			CAN127-2716-0040			CAN127-2716-0050			CAN127-2716-0060		
LAB SAMPLE NUMBER	0396550012SA			0396550013SA			0396550003SA			0396550004SA			0396550005SA			0396550006SA		
COLLECT DATE	12/06/94			12/06/94			12/06/94			12/06/94			12/06/94			12/06/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Acetone	<	13	U	3.6	11	J	6.5	11	J	<	11	U	5.3	11	J	4.8	11	J
Methylene chloride	<	6.4	U	<	5.5	U	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U
Toluene	<	6.4	U	<	5.5	U	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Anthracene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Benzo(a)anthracene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Benzo(a)pyrene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Benzo(b)fluoranthene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Benzo(g,h,i)perylene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Benzo(k)fluoranthene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Benzoic acid	<	2000	U	<	1700	U	<	1800	U	<	1700	U	<	1700	U	<	1800	U
bis(2-Ethylhexyl)phthalate	<	420	U	<	360	U	<	370	U	<	350	U	90	360	J	<	360	U
Carbazole	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Chrysene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Di-n-butyl phthalate	<	420	U	<	360	U	<	370	U	<	350	U	160	360	J	160	360	J
Di-n-octyl phthalate	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Dibenz(a,h)anthracene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Diethyl phthalate	<	420	U	<	360	U	<	370	U	<	350	U	46	360	J	<	360	U
Fluoranthene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Indeno(1,2,3-cd)pyrene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Phenanthrene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Pyrene	<	420	U	<	360	U	<	370	U	<	350	U	<	360	U	<	360	U
Metals (mg/kg)																		
Aluminum	8030	25.5	J	4940	10.9	J	6340	11.1	J	5800	10.8	J	5870	10.9	J	5800	11	J
Arsenic	1.7	0.64		2.1	0.55		2.1	0.56		1.4	0.54		1.4	0.55		1.4	0.55	
Barium	341	2.6	J	51.2	1.1	J	147	1.1	J	26.8	1.1	J	30.7	1.1	J	32.6	1.1	J
Beryllium	0.32	0.51	J	0.2	0.22	J	0.27	0.22		0.18	0.22	J	0.21	0.22	J	0.18	0.22	J

TABLE 7-2d

SUMMARY OF COMPOUNDS DETECTED IN PHASE II SOIL SAMPLES COLLECTED AT SWMU 127

LOCATOR	CAN127-2716-0025			CAN127-2716-0030			CAN127-2716-0035			CAN127-2716-0040			CAN127-2716-0050			CAN127-2716-0060		
LAB SAMPLE NUMBER	0396550012SA			0396550013SA			0396550003SA			0396550004SA			0396550005SA			0396550006SA		
COLLECT DATE	12/06/94			12/06/94			12/06/94			12/06/94			12/06/94			12/06/94		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg), cont.																		
Cadmium	<	1.3	U	<	0.55	U	<	0.56	U	<	0.54	U	<	0.55	U	<	0.55	U
Calcium	138000	51		76400	21.8		89000	22.2		14200	21.5		26500	21.8		14200	22.1	
Chromium	6	2.6		3.8	1.1		5.1	1.1		5.8	1.1		10.1	1.1		7.2	1.1	
Cobalt	<	2.6	U	1.7	1.1		0.94	1.1	J	1.4	1.1		1.6	1.1		1.7	1.1	
Copper	2.9	5.1	J	2.3	2.2		2.4	2.2		2.2	2.2		45.8	2.2		2	2.2	J
Iron	5600	25.5		4020	10.9		4460	11.1		4950	10.8		5250	10.9		5160	11	
Lead	3.2	0.64		2.6	0.55	J	3.3	0.56	J	2.5	0.54	J	3.1	0.55	J	5.5	0.55	J
Magnesium	5070	51		2460	21.8		4280	22.2		3870	21.5		4510	21.8		4660	22.1	
Manganese	42.4	2.6		46.4	1.1		43.8	1.1		48.6	1.1		60.5	1.1		54	1.1	
Nickel	5.4	10.2	J	4.1	4.4	J	3.1	4.4	J	4.7	4.3		5.7	4.4		4.6	4.4	
Potassium	1680	1280		1070	546		1240	555		1180	538		1180	546		1100	552	
Selenium	<	1.3	UJ	<	2.2	UJ	<	1.1	U	<	1.1	UJ	<	1.1	UJ	<	1.1	UJ
Thallium	<	1.3	UJ	<	1.1	UJ	<	1.1	UJ	<	0.54	UJ	<	1.1	UJ	<	0.55	U
Vanadium	14.2	2.6	J	13.6	1.1	J	16.2	1.1	J	16.5	1.1	J	17.3	1.1	J	17.9	1.1	J
Zinc	13.7	5.1		9.8	2.2		10.6	2.2		10.2	2.2		12.2	2.2		10.7	2.2	
TRPH (mg/kg)																		
Total Recoverable Petroleum Hydrocarbo	<	51	U	<	43.7	U	<	44.4	U	53.9	43		1700	436		<	44.2	U

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results is presented in Table A-2d.
J = Estimated value
R = Rejected value D = Sample was diluted for analysis
U = Nondetected value RL = Reporting Limit

TABLE 7-3

COMPARISON OF SWMU 127 METALS CONCENTRATIONS IN SURFACE SOIL WITH BACKGROUND UTLs
CANNON AFB, NEW MEXICO

Chemical	Frequency Detected	Field Sample ID for Maximum Hit	Maximum Detected Concentration (mg/kg)	Qualifiers for Maximum Hit	Background Surface Soil UTL Concentration[1] (mg/kg)	Exceeds Background UTL	Frequency of Exceedance of UTL	Frequency of Exceedance (%)	Does Metal Exceed Background?
METALS									
Aluminum	16/16	CAN127-2713-0000	14500	J	8,950	YES	7/16	44	**YES**
Antimony	1/9	CAN127-1275-0000	7.8		3	YES	1/16	11	**YES**
Arsenic	16/16	CAN127-2709-0000	3		3.6	NO			NO
Barium	16/16	CAN127-2709-0000	638	J	670	NO			NO
Beryllium	16/16	CAN127-1274-0000	0.82		0.78	YES	1/16	6	**YES**
Cadmium	4/10	CAN127-1272-0000	1.1		0.435	YES	4/16	10	**YES**
Calcium	16/16	CAN127-1272-0000	56,900		44800	YES	3/16	19	**YES**
Chromium, Total	16/16	CAN127-2712-0000	21.4		10.5	YES	8/16	50	**YES**
Cobalt	16/16	CAN127-2709-0000	8		6.6	YES	1/16	6	**YES**
Copper	16/16	CAN127-1275-0000	25.9		18.3	YES	1/16	6	**YES**
Iron	16/16	CAN127-2713-0000	11,500	J	10100	YES	3/16	19	**YES**
Lead	16/16	CAN127-2711-0000	83.9		12	YES	11/16	69	**YES**
Magnesium	16/16	CAN127-2713-0000	2760		1,930	YES	5/16	31	**YES**
Manganese	16/16	CAN127-2709-0000	340		307	YES	2/16	13	**YES**
Nickel	16/16	CAN127-2709-0000	10.5		11	NO			NO
Potassium	16/16	CAN127-2713-0000	2390	J	2691	NO			NO
Selenium	2/10	CAN127-1274-0000	0.27	J	0.26	YES	1/10	6	**YES**
Silver	4/8	CAN127-1271-0000	0.69	J	0.43	YES	4/8	50	**YES**
Thallium	3/16	CAN127-2715-0000	0.3	J	0.6	NO			NO
Vanadium	16/16	CAN127-1274-0000	23		23.3	NO			NO
Zinc	16/16	CAN127-2712-0000	41.1		32.2	YES	3/16	19	**YES**

[1] Upper Tolerance Limit of Background (90% limit of 95th percentile). See Table 6-3 of W-C 1997.
mg/kg = milligram per kilogram
J = Estimated

TABLE 7-4

COMPARISON OF SWMU 127 METALS CONCENTRATIONS IN SUBSURFACE SOIL WITH BACKGROUND UTLs
CANNON AFB, NEW MEXICO

Chemical	Frequency Detected	Field Sample ID for Maximum Hit	Maximum Detected Concentration (mg/kg)	Qualifiers for Maximum Hit	Background Subsurface Soil UTL Concentration[1] (mg/kg)	Exceeds Background UTL	Frequency of Exceedance of UTL	Frequency of Exceedance (%)	Does Metal Exceed Background?
METALS									
Aluminum	118/118	CAN127-2713-0025	14,700	J	12,214	YES	1/118	1	**YES**
Antimony	1/18	CAN127-2714-0020	4.6	J	16.0	NO			NO
Arsenic	118/118	CAN127-1277-0005	2.8		4.3	NO			NO
Barium	118/118	CAN127-2709-0010	1540		890	YES	2/118	2	**YES**
Beryllium	107/118	CAN127-1274-0002	0.83		0.73	YES	2/118	2	**YES**
Cadmium	18/74	CAN127-1272-0002	4.2		1.3	YES	10/74	14	**YES**
Calcium	118/118	CAN127-2710-0005	254,000		237,498	YES	4/118	3	**YES**
Chromium	110/118	CAN127-2713-0060	13.4		13.3	YES	1/118	1	**YES**
Cobalt	109/118	CAN127-1274-0002	5.2		4.7	YES	4/118	3	**YES**
Copper	116/118	CAN127-1277-0058	54.9		8.3	YES	8/118	7	**YES**
Iron	118/118	CAN127-2713-0005	10,900	J	13,148	NO			NO
Lead	106/107	CAN127-2713-0005	12.5	J	8.7	YES	3/107	3	**YES**
Magnesium	118/118	CAN127-2712-0050	15000		19,300	NO			NO
Manganese	118/118	CAN127-1276-0002	218		333	NO			NO
Nickel	116/118	CAN127-1274-0002	12.4		14.9	NO			NO
Potassium	118/118	CAN127-2713-0025	3230	J	2,512	YES	3/118	2.5	**YES**
Selenium	1/20	CAN127-2715-0020	0.16	J	1.1	NO			NO
Silver	19/54	CAN127-1272-0002	3.6	J	2.65	YES	1/54	2	**YES**
Sodium	1/29	CAN127-2711-0015	248	J	1,227	NO			NO
Thallium	16/72	CAN127-2714-0025	0.38	J	2.65	NO			NO
Vanadium	118/118	CAN127-2711-0035	23.2		32.8	NO			NO
Zinc	117/118	CAN127-2713-0005	26.4	J	30.6	NO			NO

[1] Upper Tolerance Limit of Background (90% limit of 95th percentile). See Table 6-3 of W-C 1997.
mg/kg = milligram per kilogram
J = Estimated

TABLE 7-5

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCs IN SOIL AT SWMU 127 CANNON AFB, NEW MEXICO

Chemical	Detected Concentration[1] (mg/kg)	Ingestion Rate[2] (mg/d)	Conversion Factor (kg/mg)	Daily Intake from the site[3] (mg/d)	Recommended Daily Allowance (RDA)[4] (mg/d)
Calcium	254,000	100	1.00E-06	25.4	1,200
Magnesium	15,000	100	1.00E-06	1.5	400
Potassium	3,230	100	1.00E-06	0.323	390-780[5]

[1] Maximum detected concentration at SWMU 127. See Table 7-3 or 7-4.

[2] Estimation of potential chemical ingestion rate for receptors at SWMU 127.

[3] Daily Intake = Detected Concentration * Ingestion Rate * Conversion Factor

[4] National Research Council

[5] Recommended potassium intake is based on body weight. For a small child weighing 10kg, the recommended intake is 390-780 mg/day.

TABLE 7-6

COMPARISON OF SWMU 127 MAXIMUM SOIL CONCENTRATIONS TO MSSLs
CANNON AFB, NEW MEXICO

Chemical	Maximum Detected Concentration (mg/kg)	Qual	Residential Soil MSSL Concentration[1] (mg/kg)	Exceeds MSSL?
VOLATILE ORGANICS				
1,1,1-Trichloroethane	0.0018		690	NO
1,1-Dichloroethene	0.0019		0.53	NO
1,2-Dichloroethane	0.0019		0.34	NO
1,2-Dichloroethene (total)**	0.0013		42	NO
1,2-Dichloropropane	0.013		0.35	NO
2-Butanone	0.0062		6900	NO
Acetone	7.5		1400	NO
Benzene	3.8		0.62	**YES**
Carbon Tetrachloride	0.0027		0.23	NO
Chlorobenzene	0.0013		54	NO
Ethylbenzene	54		230	NO
Methylene Chloride	0.0067		8.5	NO
Tetrachloroethene	0.0029		4.7	NO
Toluene	82		520	NO
Trichloroethene	0.0023		2.7	NO
Xylenes	260		210	**YES**
SEMIVOLATILE ORGANICS				
2-Methylnaphthalene*	40		55	NO
Acenaphthene	0.15		2600	NO
Anthracene	0.068		14000	NO
Benzo(a)anthracene	8.00		0.56	**YES**
Benzo(a)pyrene	8.60		0.056	**YES**
Benzo(b)fluoranthene	17.00		0.56	**YES**
Benzo(g,h,i)perylene*	5.1		55	NO
Benzo(k)fluoranthene	1.60		5.6	NO
Benzoic acid	0.048		100,000	NO
Bis(2-ethylhexyl)phthalate	4.7		32	NO
Butylbenzylphthalate	0.110		240	NO
Carbazole	1.500		22	NO
Chrysene	14.0		56	NO
Dibenzo(a,h)anthracene	0.280		0.056	**YES**
Di-n-Butyl phthalate	0.19		5500	NO
Di-n-octyl phthalate	0.31		1100	NO
Diethylphthalate	0.046		44000	NO
Fluoranthene	17		2000	NO
Fluorene	0.29		1800	NO
Indeno(1,2,3)pyrene	5.1		0.56	YES
Phenanthrene*	8.1		55	NO
Pyrene	17		1500	NO
TRPH	11600		NA	
METALS				
Antimony	7.8		30	NO
Barium	2840		5200	NO

TABLE 7-6

COMPARISON OF SWMU 127 MAXIMUM SOIL CONCENTRATIONS TO MSSLs
CANNON AFB, NEW MEXICO

Chemical	Maximum Detected Concentration (mg/kg)	Qual	Residential Soil MSSL Concentration[1] (mg/kg)	Exceeds MSSL?
Beryllium	0.83		150	NO
Cadmium	4.2		37	NO
Chromium	25.4		30	NO
Copper	14.5		2800	NO
Iron	11,500		22,000	NO
Lead	48.5		400	NO
Manganese	440		3100	NO
Selenium	0.27		370	NO
Silver	3.6		370	NO
Zinc	73.8		22000	NO

(1) EPA Region Media-Specific Screening Levels for Residential Soil (EPA 1998)

* The MSSL for naphthalene was used as a surrogate for these PAHs. See text.

** The MSSL for cis-1,2-dichloroethylene was used as a surrogate. See text.

mg/kg = milligrams per kilogram

TABLE 7-7

CALCULATION OF INITIAL LEACHATE CONCENTRATIONS
CANNON AFB SWMU 127

Chemical	C_s (mg/kg)	f_{oc}	K_{oc} (mL/g)	K_d (mL/g)	θ_w	θ_a	H'	ρ_b (g/cm^3)	C_w (mg/L)
Benzene	3.8	0.0004	5.89E+01	2.36E-02	0.24	0.16	2.28E-01	1.6	19
Xylenes	260	0.0004	3.63E+02	1.45E-01	0.24	0.16	2.13E-01	1.6	821
Benzo(a)anthracene	8	0.0004	3.98E+05	1.59E+02	0.24	0.16	1.37E-04	1.6	0
Benzo(a)pyrene	8.6	0.0004	1.02E+06	4.08E+02	0.24	0.16	4.63E-05	1.6	0.021
Benzo(b)fluoranthene	17	0.0004	1.23E+06	4.92E+02	0.24	0.16	4.55E-03	1.6	0.035
Dibenzo(a,h)anthracene	0.28	0.0004	3.80E+06	1.52E+03	0.24	0.16	6.03E-07	1.6	0.000184

$$Cs = Cw \cdot \left[Kd + \frac{\theta w + \theta a \cdot H'}{\rho b} \right]$$

C_s = soil concentration, mg/kg

C_w = initial leachate concentration, mg/L

f_{oc} = fraction organic carbon content

K_{oc} = organic carbon distribution coefficient, mL/g (USEPA 1996)

K_d = distribution coefficient, mL/g (=K_{oc}*f_{oc}) (USEPA 1996)

θ_w = water-filled soil porosity

θ_a = air-filled soil porosity

H' = dimensionless Henry's Law constant (USEPA 1996)

ρ_b = dry bulk density, g/cm^3

TABLE 7-8

MODEL-PREDICTED CONCENTRATIONS
CANNON AFB SWMU 127

Chemical	Source Conditions			Active Transport Processes			C_s (mg/kg)	C_w (mg/L)	Unsaturated Zone		Saturated Zone		Screening Levels	
	Steady-State	Pulse*	Decay**	Dispersion	Adsorption	Biodegradation			AF	$(C_w)_u$ (mg/L)	DAF	$(C_w)_s$ (mg/L)	Region VI Tap Water MSSL (mg/L)	MCL (mg/L)
Benzene	✓			✓			3.8	19	1.0	19	6.0	3.2	0.0039	0.005
	✓			✓		✓			2.0E+17	0	1.2E+28	0		
		✓		✓	✓				1.1	17	8.0	2.4		
		✓		✓	✓	✓			1.9E+17	0	-	0		
			✓	✓	✓				31	0.6	196	0.01		
			✓	✓	✓	✓			2.9E+18	0	-	0		
Xylenes	✓			✓			260	821	1.0	821	6.0	137	14	10
	✓			✓		✓			8.6E+34	0	-	0		
		✓		✓	✓				2.5	382	23	36		
		✓		✓	✓	✓			2.6E+35	0	9.1E+37	0		
			✓	✓	✓				88	9.4	561	1.5		
			✓	✓	✓	✓			-	0	-	0		
Benzo(a)anthracene	✓			✓			8.0	0.050						
	✓			✓		✓								
		✓		✓	✓									
		✓		✓	✓	✓								
			✓	✓	✓									
			✓	✓	✓	✓								
Benzo(a)pyrene	✓			✓			8.6	0.021	1.0	0.021	6.0	0.0035	9.2E-06	0.0002
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				5,131	4.1E-06	37,439	5.6E-07		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				37,258	5.7E-07	-	-		
			✓	✓	✓	✓			-	0	-	0		

TABLE 7-8

MODEL-PREDICTED CONCENTRATIONS
CANNON AFB SWMU 127

Chemical	Source Conditions			Active Transport Processes			C_s (mg/kg)	C_w (mg/L)	Unsaturated Zone		Saturated Zone		Screening Levels	
	Steady-State	Pulse*	Decay**	Dispersion	Adsorption	Biodegradation			AF	$(C_w)_u$ (mg/L)	DAF	$(C_w)_s$ (mg/L)	Region VI Tap Water MSSL (mg/L)	MCL (mg/L)
Benzo(b)fluoranthene	✓			✓			17	0.035	1.0	0.035	6.0	0.0057	9.2E-05	-
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				6,188	5.6E-06	45,147	7.7E-07		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				44,944	7.7E-07	-	-		
			✓	✓	✓	✓			-	0	-	0		
Dibenzo(a,h)anthracene	✓			✓			0.28	0.000184	1.0	1.84E-04	6.0	3.1E-05	9.2E-06	-
	✓			✓		✓			-	0	-	0		
		✓		✓	✓				19,113	9.6E-09	139,470	1.3E-09		
		✓		✓	✓	✓			-	0	-	0		
			✓	✓	✓				138,812	1.3E-09	-	-		
			✓	✓	✓	✓			-	0	-	0		

* Pulse duration = 100 years.

** Decay half-life = 2 years for VOCs and 10 years for SVOCs.

C_s = maximum detected soil concentration

C_w = initial leachate concentration based on equilibrium partitioning

AF = attenuation factor for unsaturated zone calculated from MULTIMED results

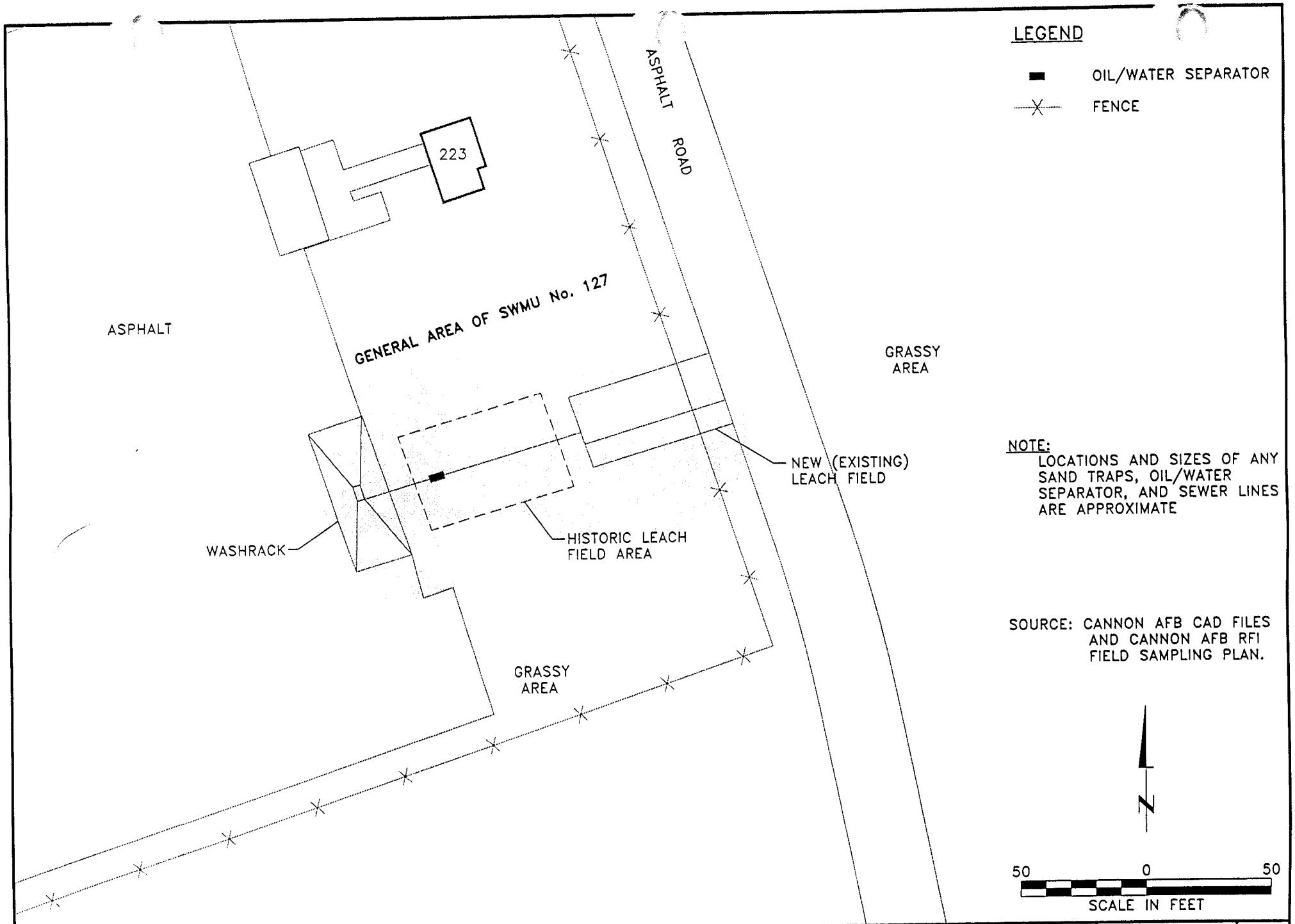
$(C_w)_u$ = soil water concentration at bottom of unsaturated zone (= C_w / AF)

DAF = dilution-attenuation factor for initial groundwater mixing zone calculated from MULTIMED results

$(C_w)_s$ = groundwater concentration at water table after initial mixing (= C_w / DAF)

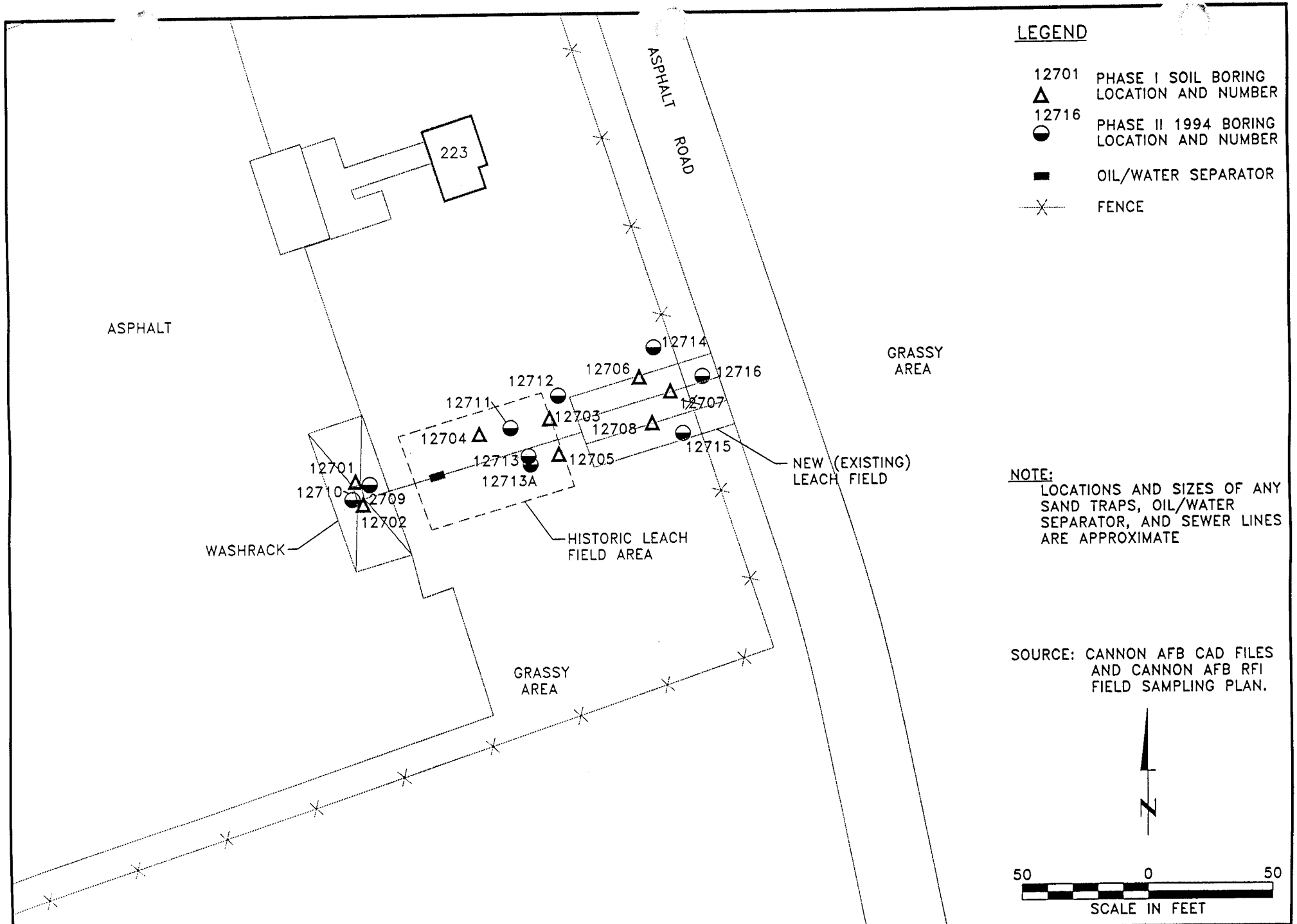
"-" indicates factor is not applicable or factor/concentration could not be calculated based on model results

indicates predicted concentration exceeds highlighted screening level



April 07, 1999 12:59:57 p.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG7-1.DWG (TSM)
Xrefs: CAN-BASE.DWG

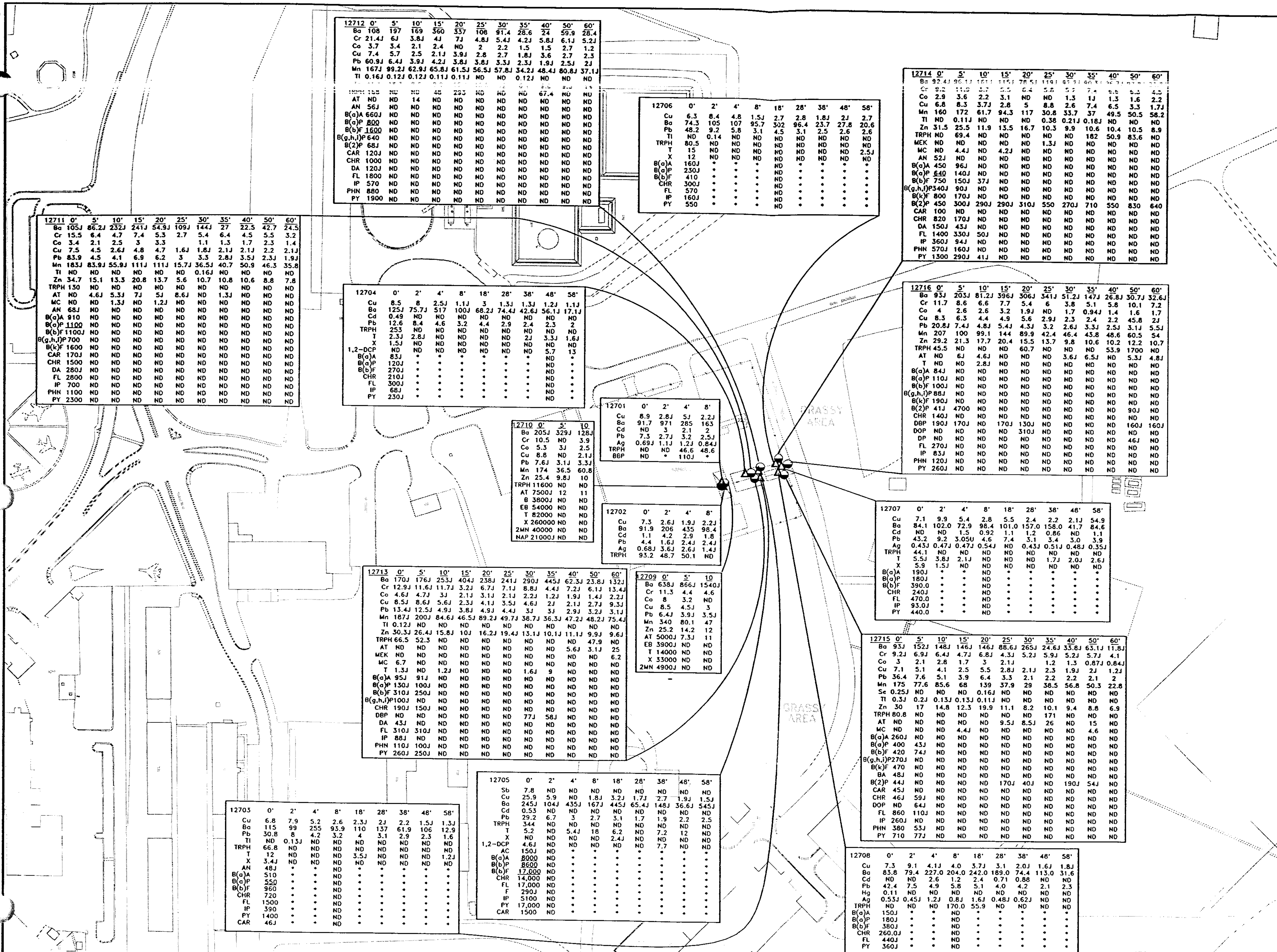
DRN BY: TSSM	DATE: 04/07/99	SAND TRAP AT POL WASHRACK - SWMU 127 SITE PLAN CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 7-1
CHK'D BY: .	REVISION: 0			



April 07, 1999 1:01:06 p.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG7-2.DWG (TSM)
Xrefs: CAN-BASE.DWG

DRN BY: TSSM	DATE: 04/07/99	SAND TRAP AT POL WASHRACK - SWMU 127 SITE PLAN WITH BORING LOCATIONS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00
CHK'D BY: .	REVISION: 0		

FIG. NO. 7-2



12712	0'	5'	10'	15'	20'	25'	30'	35'	40'	50'	60'
Ba	108	197	169	360	337	108	91.4	28.6	24	59.9	28.4
Cr	21.4J	6J	3.8J	4J	7J	4.8J	5.4J	4.2J	5.8J	6.1J	5.2J
Co	3.7	3.4	2.1	2.4	ND	2	2.2	1.5	1.5	2.7	1.2
Cu	7.4	5.7	2.5	2.1J	3.9J	2.8	2.7	1.8J	3.6	2.7	2.3
Pb	60.9J	6.4J	3.9J	4.2J	3.8J	3.8J	3.3J	2.3J	1.9J	2.5J	2J
Mn	167J	99.2J	62.9J	65.8J	61.5J	56.5J	57.8J	34.2J	48.4J	80.8J	37.1J
Tl	0.16J	0.12J	0.12J	0.11J	0.11J	ND	ND	0.12J	ND	ND	ND
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TRPH	[illegible]	ND	ND	48	293	ND	ND	ND	67.4	ND	ND
AT	ND	ND	14	ND	ND	ND	ND	ND	ND	ND	ND
AN	56J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)A	660J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)P	800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(b)F	1600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(g,h,i)P	640	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(2)P	68J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CAR	120J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHR	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DA	120J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FL	1800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP	570	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHN	880	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PY	1900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

12706	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	6.3	8.4	4.8	1.5J	2.7	2.8	1.8J	2J	2.7
Ba	74.3	105	107	95.7	302	96.4	23.7	27.8	20.6
Pb	48.2	9.2	5.8	3.1	4.5	3.1	2.5	2.6	2.6
Tl	ND	0.14	ND	ND	ND	ND	ND	ND	ND
TRPH	80.5	ND	ND	ND	ND	ND	ND	ND	ND
T	15	ND	ND	ND	ND	ND	ND	ND	2.5J
X	12	ND	ND	ND	ND	ND	ND	ND	ND
B(a)A	160J	*	*	*	ND	*	*	*	*
B(a)P	230J	*	*	*	ND	*	*	*	*
B(b)F	410	*	*	*	ND	*	*	*	*
CHR	300J	*	*	*	ND	*	*	*	*
FL	570	*	*	*	ND	*	*	*	*
IP	160J	*	*	*	ND	*	*	*	*
PY	550	*	*	*	ND	*	*	*	*

12714	0'	5'	10'	15'	20'	25'	30'	35'	40'	50'	60'
Ba	92.4J	[illegible]	[illegible]	[illegible]	78.5J	119J	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cr	9.2	[illegible]	3.7	5.5	6.4	5.8	5.7	7.4	[illegible]	[illegible]	4.5
Co	2.9	3.6	2.2	3.1	ND	ND	1.3	1J	1.3	1.6	2.2
Cu	6.8	8.3	3.7J	2.8	5	8.8	2.6	7.4	6.5	3.3	1.7J
Mn	160	172	61.7	94.3	117	30.8	33.7	37	49.5	50.5	58.2
Tl	ND	0.11J	ND	ND	ND	0.38	0.21J	0.18J	ND	ND	ND
Zn	31.5	25.5	11.9	13.5	16.7	10.3	9.9	10.6	10.4	10.5	8.9
TRPH	ND	69.4	ND	ND	ND	ND	ND	182	50.9	83.6	ND
MEK	ND	ND	ND	ND	ND	1.3J	ND	ND	ND	ND	ND
MC	ND	4.4J	ND	4.2J	ND	ND	ND	ND	ND	ND	ND
AN	52J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)A	450	96J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)P	640	140J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(b)F	750	150J	37J	ND	ND	ND	ND	ND	ND	ND	ND
B(g,h,i)P	340J	90J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(k)F	800	170J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(2)P	450	300J	290J	290J	310J	550	270J	710	550	830	640
CAR	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHR	820	170J	ND	ND	ND	ND	ND	ND	ND	ND	ND
DA	150J	43J	ND	ND	ND	ND	ND	ND	ND	ND	ND
FL	1400	330J	50J	ND	ND	ND	ND	ND	ND	ND	ND
IP	360J	94J	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHN	570J	160J	ND	ND	ND	ND	ND	ND	ND	ND	ND
PY	1300	290J	41J	ND	ND	ND	ND	ND	ND	ND	ND

12711	0'	5'	10'	15'	20'	25'	30'	35'	40'	50'	60'
Ba	105J	86.2J	232J	241J	54.9J	109J	144J	27	22.5	42.7	24.5
Cr	15.5	6.4	4.7	7.4	5.3	2.7	5.4	6.4	4.5	5.5	3.2
Co	3.4	2.1	2.5	3	3.3		1.1	1.3	1.7	2.3	1.4
Cu	7.5	4.5	2.6J	4.8	4.7	1.6J	1.8J	2.1J	2.1J	2.2	2.1J
Pb	83.9	4.5	4.1	6.9	6.2	3	3.3	2.8J	3.5J	2.3J	1.9J
Mn	183J	83.9J	55.9J	111J	111J	15.7J	36.5J	40.7	50.9	46.3	35.8
Tl	ND	ND	ND	ND	ND	ND	0.16J	ND	ND	ND	ND
Zn	34.7	15.1	13.3	20.8	13.7	5.6	10.7	10.8	10.6	8.8	7.8
TRPH	130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AT	ND	4.6J	5.3J	7J	5J	8.6J	ND	1.3J	ND	ND	ND
MC	ND	ND	1.3J	ND	1.2J	ND	ND	ND	ND	ND	ND
AN	68J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)A	910	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)P	1100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(b)F	1100J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(g,h,i)P	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(k)F	1600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CAR	170J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHR	1500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DA	280J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FL	2800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHN	1100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PY	2300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

12704	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	8.5	8	2.5J	1.1J	3	1.3J	1.3J	1.2J	1.1J
Ba	125J	75.7J	517	100J	68.2J	74.4J	42.6J	56.1J	17.1J
Cd	0.49	ND	ND	ND	ND	ND	ND	ND	ND
Pb	12.6	8.4	4.6	3.2	4.4	2.9	2.4	2.3	2
TRPH	253	ND	ND	ND	ND	ND	ND	ND	ND
T	2.3J	2.8J	ND	ND	ND	ND	2J	3.3J	1.6J
X	1.5J	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DCP	ND	ND	ND	ND	ND	ND	ND	5.7	13
B(a)A	83J	*	*	*	*	*	*	ND	*
B(a)P	120J	*	*	*	*	*	*	ND	*
B(b)F	270J	*	*	*	*	*	*	ND	*
CHR	210J	*	*	*	*	*	*	ND	*
FL	300J	*	*	*	*	*	*	ND	*
IP	68J	*	*	*	*	*	*	ND	*
PY	230J	*	*	*	*	*	*	ND	*

12716	0'	5'	10'	15'	20'	25'	30'	35'	40'	50'	60'
Ba	93J	203J	81.2J	396J	306J	341J	51.2J	147J	26.8J	30.7J	32.6J
Cr	11.7	8.6	6.6	7.7	5.4	6	3.8	5.1	5.8	10.1	7.2
Co	4	2.6	2.6	3.2	1.9J	ND	1.7	0.94J	1.4	1.6	1.7
Cu	8.3	6.3	4.4	4.9	5.6	2.9J	2.3	2.4	2.2	45.8	2J
Pb	20.8J	7.4J	4.8J	5.4J	4.3J	3.2	2.6J	3.3J	2.5J	3.1J	5.5J
Mn	207	100	99.1	144	89.9	42.4	46.4	43.8	48.6	60.5	54
Zn	29.2	21.3	17.7	20.4	15.5	13.7	9.8	10.6	10.2	12.2	10.7
TRPH	45.5	ND	ND	ND	60.7	ND	ND	ND	53.9	1700	ND
AT	ND	6J	4.6J	ND	ND	ND	3.6J	6.5J	ND	5.3J	4.8J
T	ND	ND	2.8J	ND	ND	ND	ND	ND	ND	ND	ND
B(a)A	84J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)P	110J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(b)F	100J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(g,h,i)P	88J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(k)F	190J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(2)P	41J	4700	ND	ND	ND	ND	ND	ND	ND	90J	ND
CHR	140J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DBP	190J	170J	ND	170J	130J	ND	ND	ND	ND	160J	160J
DOP	ND	ND	ND	ND	310J	ND	ND	ND	ND	ND	ND
DP	ND	ND	ND	ND	ND	ND	ND	ND	ND	46J	ND
FL	270J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP	83J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHN	120J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PY	260J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

12701	0'	2'	4'	8'
Cu	8.9	2.8J	5J	2.2J
Ba	91.7	971	285	163
Cd	ND	3	2.1	2
Pb	7.3	2.7J	3.2	2.5J
Ag	0.69J	1.1J	1.2J	0.84J
TRPH	ND	ND	46.6	48.6
BBP	ND	*	110J	*

12710	0'	5'	10
Ba	205J	329J	128J
Cr	10.5	ND	3.9
Co	5.3	3J	2.5
Cu	8.8	ND	2.1J
Pb	7.6J	3.1J	3.3J
Mn	174	36.5	60.8
Zn	25.4	9.8J	10
TRPH	11600	ND	ND
AT	7500J	12	11
B	3800J	ND	ND
EB	54000	ND	ND
T	82000	ND	ND
X	260000	ND	ND
2MN	40000	ND	ND
NAP	21000J	ND	ND

12702	0'	2'	4'	8'
Cu	7.3	2.6J	1.9J	2.2J
Ba	91.9	206	435	98.4
Cd	1.1	4.2	2.9	1.8
Pb	4.4	1.6J	2.4J	2.4J
Ag	0.68J	3.6J	2.6J	1.4J
TRPH	93.2	48.7	50.1	ND

12707	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	7.1	9.9	5.4	2.8	5.5	2.4	2.2	2.1J	54.9
Ba	84.1	102.0	72.9	98.4	101.0	157.0	158.0	41.7	84.6
Cd	ND	ND	1.5	0.92	1.1	1.2	0.86	ND	1.1
Pb	43.2	9.2	3.05U	4.6	7.4	3.1	3.4	3.0	3.9
Ag	0.43J	0.47J	0.47J	0.54J	ND	0.43J	0.51J	0.48J	0.35J
TRPH	44.1	ND	ND	ND	ND	ND	ND	ND	ND
T	5.5J	3.8J	2.1J	ND	ND	ND	1.7J	2.0J	2.6J
X	5.9	1.5J	ND	ND	ND	ND	ND	ND	ND
B(a)A	190J	*	*	ND	*	*	*	*	*
B(a)P	180J	*	*	ND	*	*	*	*	*
B(b)F	390.0	*	*	ND	*	*	*	*	*
CHR	240J	*	*	ND	*	*	*	*	*
FL	470.0	*	*	ND	*	*	*	*	*
IP	93.0J	*	*	ND	*	*	*	*	*
PY	440.0	*	*	ND	*	*	*	*	*

12713	0'	5'	10'	15'	20'	25'	30'	35'	40'	50'	60'
Ba	170J	176J	253J	404J	238J	241J	290J	445J	62.3J	23.8J	132J
Cr	12.9J	11.6J	11.7J	3.2J	6.7J	7.1J	8.8J	4.4J	7.2J	6.1J	13.4J
Co	4.6J	4.7J	3J	2.1J	3.1J	2.1J	2.2J	1.2J	1.9J	1.4J	2.2J
Cu	8.5J	8.6J	5.6J	2.3J	4.1J	3.5J	4.6J	2J	2.1J	2.7J	9.3J
Pb	13.4J	12.5J	4.9J	3.8J	4.9J	4.4J	3J	3J	2.9J	3.2J	3.1J
Mn	187J	200J	84.6J	46.5J	89.2J	49.7J	38.7J	36.3J	47.2J	48.2J	75.4J
Tl	0.12J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	30.3J	26.4J	15.8J	10J	16.2J	19.4J	13.1J	10.1J	11.1J	9.9J	9.6J
TRPH	66.5	52.3	ND	ND	ND	ND	ND	ND	ND	47.9	ND
AT	ND	ND	ND	ND	ND	ND	ND	ND	5.6J	3.1J	25
MEK	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.2
MC	6.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T	1.3J	ND	1.2J	ND	ND	ND	1.6J	9	ND	ND	ND
B(a)A	95J	91J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)P	130J	100J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(b)F	310J	250J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(g,h,i)P	100J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHR	190J	150J	ND	ND	ND	ND	ND	ND	ND	ND	ND
DBP	ND	ND	ND	ND	ND	ND	77J	58J	ND	ND	ND
DA	43J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FL	310J	310J	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP	88J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHN	110J	100J	ND	ND	ND	ND	ND	ND	ND	ND	ND
PY	260J	250J	ND	ND	ND	ND	ND	ND	ND	ND	ND

12709	0'	5'	10
Ba	638J	866J	1540J
Cr	11.3	4.4	4.6
Co	8	3.2	ND
Cu	8.5	4.5J	3
Pb	6.4J	3.9J	3.5J
Mn	340	80.1	47
Zn	25.2	14.2	12
AT	5000J	7.3J	11
EB	3900J	ND	ND
T	14000	ND	ND
X	33000	ND	ND
2MN	4900J	ND	ND

12715	0'	5'	10'	15'	20'	25'	30'	35'	40'	50'	60'
Ba	93J	152J	148J	146J	146J	88.6J	265J	24.6J	33.8J	63.1J	11.8J
Cr	9.2J	6.9J	6.4J	4.7J	6.8J	4.3J	5.2J	5.9J	5.2J	5.7J	4.1
Co	3	2.1	2.8	1.7	3	2.1J		1.2	1.3	0.87J	0.84J
Cu	7.1	5.1	4.1	2.5	5.5	2.8J	2.1J	2.3	1.9J	2J	1.2J
Pb	36.4	7.6	5.1	3.9	6.4	3.3	2.1	2.2	2.2	2.1	2
Mn	175	77.6	85.6	68	139	37.9	29	38.5	56.8	50.3	22.8
Se	0.25J	ND	ND	ND	0.16J	ND	ND	ND	ND	ND	ND
Tl	0.3J	0.2J	0.13J	0.13J	0.11J	ND	ND	ND	ND	ND	ND
Zn	30	17	14.8	12.3	19.9	11.1	8.2	10.1	9.4	8.8	6.9
TRPH	80.8	ND	ND	ND	ND	ND	ND	171	ND	ND	ND
AT	ND	ND	ND	ND	ND	9.5J	8.5J	26	ND	15	ND
MC	ND	ND	ND	4.4J	ND	ND	ND	ND	ND	4.6	ND
B(a)A	260J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(a)P	400	43J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(b)F	420	74J	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(g,h,i)P	270J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(k)F	470	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BA	48J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B(2)P	44J	ND	ND	ND	ND	170J	40J	ND	190J	54J	ND
CAR	45J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHR	46J	59J	ND	ND	ND	ND	ND	ND	ND	ND	ND
DOP	ND	64J	ND	ND	ND	ND	ND	ND	ND	ND	ND
FL	860	110J	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP	260J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHN	380	53J	ND	ND	ND	ND	ND	ND	ND	ND	ND
PY	710	77J	ND	ND	ND	ND	ND	ND	ND	ND	ND

12705	0'	2'	4'	8'	18'	28'	38'	48'	58'
Sb	7.8	ND	ND	ND	ND	ND	ND	ND	ND
Cu	25.9	5.9	ND	1.8J	3.2J	1.7J	2.7	1.9J	1.5J
Ba	245J	104J	435J	167J	445J	65.4J	148J	36.6J	545J
Cd	0.53	ND	ND	ND	ND	ND	ND	ND	ND
Pb	29.2	6.7	3	2.7	3.1	1.7	1.9	2.2	2.5
TRPH	344	ND	ND	ND	ND	ND	ND	ND	ND
T	5.2	ND	5.4J	18	6.2	ND	7.2	12	ND
X	ND	ND	ND	ND	2.4J	ND	ND	ND	ND
1,2-DCP	4.6J	ND	ND	ND	ND	ND	7.7	ND	ND
AC	150J	ND	*	*	*	*	*	*	*
B(a)A	8000	ND	*	*	*	*	*	*	*
B(b)P	8600	ND	*	*	*	*	*	*	*
B(b)F	17,000	ND	*	*	*	*	*	*	*
CHR	14,000	ND	*	*	*	*	*	*	*
FL	17,000	ND	*	*	*	*	*	*	*
F	290J	ND	*	*	*	*	*	*	*
IP	5100	ND	*	*	*	*	*	*	*
PY	17,000	ND	*	*	*	*	*	*	*
CAR	1500	ND	*	*	*	*	*	*	*

12703	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	6.8	7.9	5.2	2.6	2.3J	2J	2.2	1.5J	1.3J
Ba	115	99	255	93.9	110	137	61.9	106	12.9
Pb	30.8	8	4.2	3.2	4	3.1	2.9	2.3	1.6
Tl	ND	0.13J	ND	ND	ND	ND	ND	ND	ND
TRPH	66.8	ND	ND	ND	ND	ND	ND	ND	ND
T	12	ND	ND	ND	3.5J	ND	ND	ND	1.2J
X	3.4J	ND	ND	ND	ND	ND	ND	ND	ND
AN	48J	*	*	ND	*	*	*	*	*
B(a)A	510	*	*	ND	*	*	*	*	*
B(a)P	550	*	*	ND	*	*	*	*	*
B(b)F	960	*	*	ND	*	*	*	*	*
CHR	720	*	*	ND	*	*	*	*	*
FL	1500	*	*	ND	*	*	*	*	*
IP	390	*	*	ND	*	*	*	*	*
PY	1400	*	*	ND	*	*	*	*	*
CAR	46J	*	*	ND	*	*	*	*	*

12708	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	7.3	9.1	4.1J	4.0	3.7J	3.1	2.0J	1.6J	1.8J
Ba	83.8	79.4	227.0	204.0	242.0	189.0	74.4	113.0	31.6
Cd	ND	ND	2.6	1.2	2.4	0.71	0.88	ND	ND
Pb	42.4	7.5	4.9	5.8	5.1	4.0	4.2	2.1	2.3
Hg	0.11	ND	ND	ND	ND	ND	ND	ND	ND
Ag	0.53J	0.45J	1.2J	0.8J	1.6J	0.48J	0.62J	ND	ND
TRPH	ND	ND	ND	170.0	55.9	ND	ND	ND	ND
B(a)A	150J	*	*	ND	*	*	*	*	*
B(a)P	180J	*	*	ND	*	*	*	*	*
B(b)F	380J	*	*	ND	*	*	*	*	*
CHR	260.0J	*	*	ND	*	*	*	*	*
FL	440J	*	*	ND	*	*	*	*	*
PY	360J	*	*	ND	*	*	*	*	*

LEGEND

12704 PHASE I SOIL BORING LOCATION AND NUMBER

12713 PHASE II SOIL BORING LOCATION AND NUMBER

OIL/WATER SEPARATOR

FENCE

Sb = ANTIMONY (mg/kg)
Cu = COPPER (mg/kg)
Ba = BARIUM (mg/kg)
Cd = CADMIUM (mg/kg)
Pb = LEAD (mg/kg)
Hg = MERCURY (mg/kg)
Ag = SILVER (mg/kg)
AC = ACENAPHTHENE
AN = ANTHRACENE
FL = FLUORANTHENE
PY = PYRENE
Cr = CHROMIUM (mg/k
Co = COBALT (mg/kg)
Mn = MAGNESIUM (mg/kg)
Ni = NICKEL (mg/kg)
Tl = THALLIUM (mg/kg)
Zn = ZINC (mg/kg)
IP = INDENO(1,2,3-CD)PYRENE
AT = ACETONE
BA = BENZOIC ACID
DA = DIBENZ(a,h)ANTHRACENE
MC = METHYLENE CHLORIDE
DP = DIETHYL PHTHALATE
B(a)A = BENZO(A)ANTHRACENE
B(a)P = BENZO(A)PYRENE
B(b)F = BENZO(B)FLURANTHENE
BBP = BENZYL BUTYL PHTHALATE
CHR = CHRYSENE
TRPH = TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/kg)
12-DCP = 1,2-DICHLOROPROPANE
F = FLUORENE
T = TOLUENE
X = XYLENES
CAR = CARBAZOLE
B(g,h,i)P = BENZO(g,h,i)PERYLENE
B(k)F = BENZO(k)FLUORANTHENE
B(2)P = BIS(2-Ethylhexyl)PHTHALATE
CHR = CHRYSENE
DBP = DI-N-BUTYL PHTHALATE
2MN = 2-METHYLNAPHTHALENE
NAP = NAPHTHALENE
PHN = PHENANTHRENE
B = BENZENE
E = ETHYLBENZENE
DOP = DI-N-OCTYL PHTHALATE
12-DCA = 1,2 DICHLOROETHANE

CONCENTRATIONS ARE $\mu g/kg$ EXCEPT WHERE NOTED

ND= CHEMICALS ANALYZED FOR WERE NOT DETECTED

* = ANALYSIS FOR THIS CHEMICAL WAS NOT PERFORMED

___ = CONCENTRATION EXCEEDS TIER II LEVEL

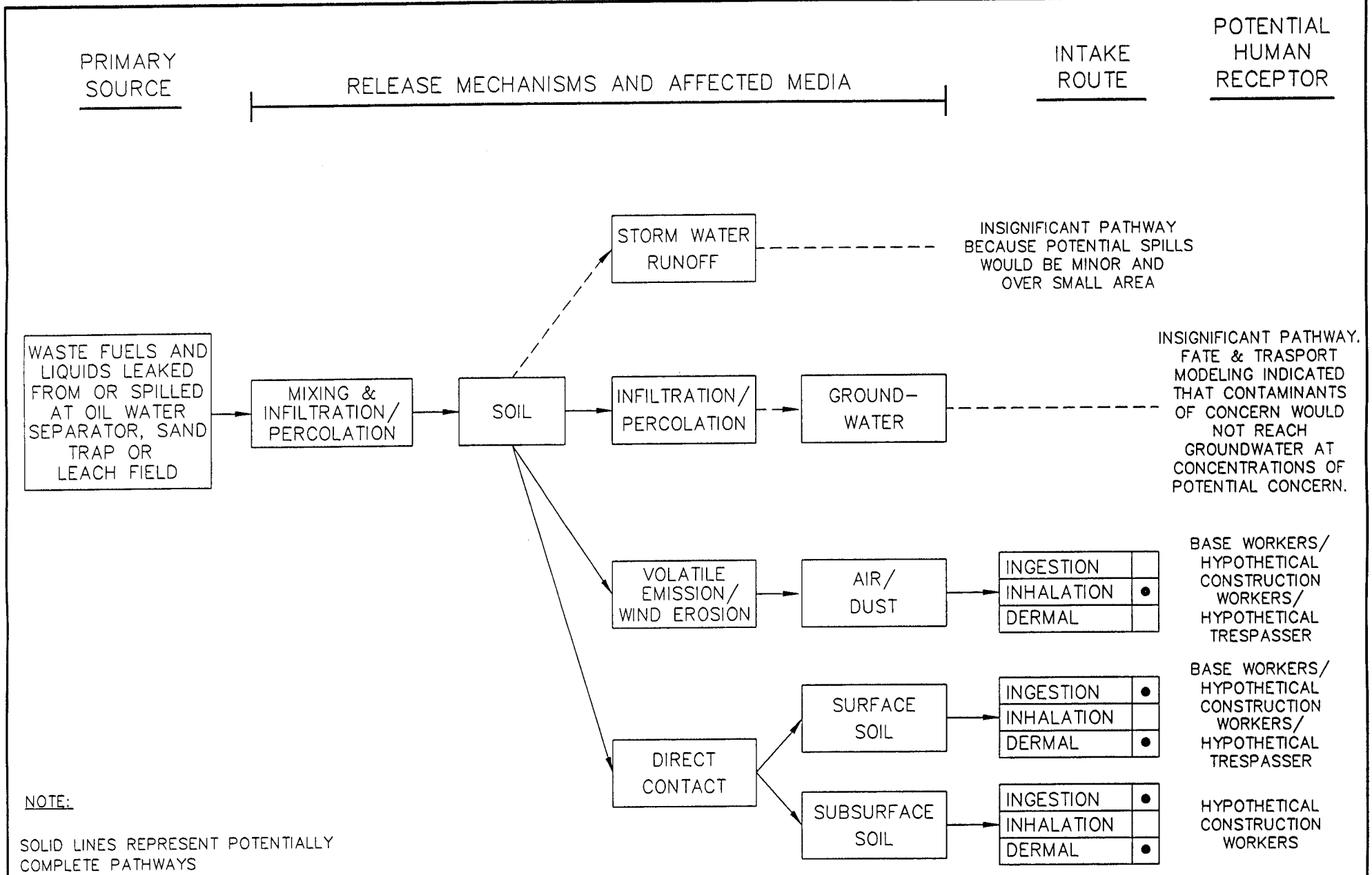
NOTE:
LOCATION AND SIZES OF ANY SAND TRAPS, OIL/WATER SEPARATOR, AND SEWER LINES ARE APPROXIMATE

200 100 0 200
SCALE IN FEET

N

August 06, 1999 10:58:52 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG7-3.DWG (TSM)
Xrefs: CAN-BASE.DWG

DRN BY TSSM	DATE 08/06/99	SAND TRAP AND LEACH FIELDS - SWMU 127 CHEMICAL CONCENTRATIONS DETECTED IN SOIL CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45FM9602CC.00	FIG. NO. 7-3
CHK'D BY	REVISION 0			



NOTE:

SOLID LINES REPRESENT POTENTIALLY COMPLETE PATHWAYS

DASHED LINES REPRESENT INCOMPLETE OR INSIGNIFICANT PATHWAYS

ONLY FUTURE USE EXPOSURES WILL BE CONSIDERED FOR SOILS PRESENTLY COVERED BY PAVEMENT

July 26, 1999 11:32:57 a.m.
Drawing: T:\CANNON\M9602CC\T5500\FIG7-4.DWG (TSM)

DRN BY TSSM	DATE 07/26/99	SITE CONCEPTUAL EXPOSURE MODEL CIVIL ENGINEERING CONTAINER STORAGE AREA SWMU – 77 CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. 45-FM9602CC.00
CHK'D BY .	REVISIONS: 0		FIG. NO. 7-4

The following sections present a brief summary of the major findings of the CMS Report for SWMUs 31, 48A, 77 and 127, including physical characteristics, nature and extent of contamination, risk evaluations, fate and transport modeling, and corrective measure alternatives. These findings are based on the Phase I and II RFI and CMS investigations.

8.1 SWMU 31 SUMMARY

Physical Characteristics

- SWMU 31 (AGE Maintenance Shop Pad) is a concrete area approximately 60 feet by 240 feet. Maintenance of aeronautical ground equipment is completed on the pad.
- A wash rack and oil/water separator are adjacent to the pad, but are not part of this SWMU.

Nature and Extent of Contamination

- The extent of contamination is generally defined by TRPH, SVOC (primarily PAH), and metals concentrations detected in soil. The maximum concentrations were detected in surface soil samples.
- TRPH and SVOC analyses in soil samples collected at greater depths were nondetect in all soil borings while metal concentrations were within background levels.
- The highest detections appear to be just off the pad in grassy areas or expansion joints.

Human Health Risk Evaluation

- Several SVOCs (PAHs) and metals exceeded Tier I (EPA Region VI MSSLs) screening levels for residential exposures; however, only two PAHs exceeded Tier II SSTLs. The concentrations of these PAHs decreased with depth to nondetect.
- The highest concentrations of these PAHs were used in a baseline risk assessment that concluded that there was no unacceptable risk to human health.
- Soils with elevated (maximum) levels of metals and PAHs have been removed.

Ecological Risk Evaluation

- There were no valued ecological resources present at SWMU 31.

Fate and Transport Modeling

- Results of the fate and transport modeling, assuming sorption, dispersion, and biodegradation occurs, show that chemicals of concern will not reach groundwater above allowable concentrations for groundwater. In addition, soils with elevated levels of metals have been removed and, consequently, the maximum concentrations used in the modeling are now significantly less.

Corrective Measure Alternative

- The No Further Action alternative was recommended based on the results of the RFI, CMS, and human health and ecological risk evaluations.

8.2 SWMU 48A SUMMARY

Physical Characteristics

- SWMU 48A was a 20,000-gallon underground storage tank that was removed in 1988. The tank was used historically to store gasoline and later waste products.
- The area is presently paved and used as a parking lot.

Nature and Extent of Contamination

- The extent of contamination is generally defined by TRPH concentrations detected in soil, primarily in one soil boring. Elevated levels of TRPH and PAHs were detected at depths between 10 to 25 feet below ground surface.
- VOC and SVOC, including PAH, analyses in soil samples collected at greater depths were nondetect in all soil borings.
- The highest detections appear to be below the former location of the UST.

Human Health Risk Evaluation

- No chemicals of potential concern exceeded the Tier I (EPA Region VI MSSL) screening level for residential exposures.

Ecological Risk Evaluation

- There are no valued ecological resources present at SWMU 48A.

Fate and Transport Modeling

- Since no chemicals of potential concern exceeded Tier I levels, fate and transport modeling was not completed.

Corrective Measure Alternative

- The No Further Action alternative was recommended based on the results of the RFI, CMS, and human health and ecological risk evaluations.

8.3 SWMU 77 SUMMARY

Physical Characteristics

- SWMU 77 (Civil Engineering Container Storage Area) is an open concrete pad, approximately 150 feet by 250 feet, surrounded by an 8-foot-high fence.

- At one point drums were stored on the pad; however, currently the pad is used for the storage of supplies and used materials.

Nature and Extent of Contamination

- The extent of contamination is generally defined by TRPH and SVOC (primarily PAH) concentrations detected in soil. Elevated levels of PAHs were detected in several surface and near-surface soil samples. Elevated levels of TRPH were detected in a few samples.
- TRPH and SVOC analyses in soil samples collected at greater depths were generally nondetect.

Human Health Risk Evaluation

- Three SVOCs (PAHs) exceeded Tier I (EPA Region VI MSSLs) screening levels for residential exposures; however, none exceeded Tier II SSTLs. The concentrations of these PAHs decreased with depth to nondetect.

Ecological Risk Evaluation

- There were no valued ecological resources present at SWMU 77.

Fate and Transport Modeling

- Results of the fate and transport modeling, assuming sorption, dispersion, and biodegradation occurs, show that chemicals of concern will not reach groundwater above allowable concentrations for groundwater

Corrective Measure Alternative

- The No Further Action alternative was recommended based on the results of the RFI, CMS, and human health and ecological risk evaluations.

8.4 SWMU 127 SUMMARY

Physical Characteristics

- SWMU 127 is a 135-gallon concrete sand trap and leach field that received wash water from the POL refueling truck wash rack at Facility 4065.
- The sand trap and leach field are still present, but are no longer used. A new oil/water separator and leach field were installed in the early 1990's to handle wash water and accidental spills.

Nature and Extent of Contamination

- The extent of contamination is generally defined by TRPH, SVOC (primarily PAH), and BTEX concentrations detected in soil. Elevated levels of PAHs were detected in several surface soil samples. Elevated levels of BTEX and TRPH were detected in only one surface soil sample.

- TRPH, SVOC, and BTEX analyses in soil samples collected at greater depths were generally nondetect.

Human Health Risk Evaluation

- Several VOCs and SVOCs (PAHs) exceeded Tier I (EPA Region VI MSSLs) screening levels for residential exposures; however, only three PAHs exceeded Tier II SSTLs. The concentrations of these PAHs decreased with depth to nondetect.
- The highest concentrations of these PAHs were used in a baseline risk assessment that concluded that there was no unacceptable risk to human health.

Ecological Risk Evaluation

- There were no valued ecological resources present at SWMU 127.

Fate and Transport Modeling

- Results of the fate and transport modeling, assuming sorption, dispersion, and biodegradation occurs, show that chemicals of concern will not reach groundwater above allowable concentrations for groundwater.

Corrective Measure Alternative

- The No Further Action alternative was recommended based on the results of the RFI, CMS, and human health and ecological risk evaluations.

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- Compared detected site soil concentrations (maximum detected concentrations or upper confidence levels if data permitted) to risk-based screening levels (RBSLs) in the "look-up" table provided in ASTM E1739-95[E1]. USEPA Region VI MSSLs were used as the Tier 1 "look-up" table. Throughout this document, the term MSSL will be used when discussing risk-based screening levels. The MSSLs are discussed in detail in Section 4.6.2 and are presented in Appendix C.
- If concentrations of chemicals of potential concern exceeded the Region VI MSSLs at the point(s) of compliance, then they became chemicals of concern and either interim remedial action (e.g., "hot spot" removal), further tier evaluation (i.e., Tier 2 evaluation), or remediation to Tier 1 RBSLs was warranted.
- If concentrations of chemicals of concern did not exceed the Region VI MSSLs, the option recommended was no further action.

4. Tier 2 Evaluation

- A Tier 2 evaluation was warranted if Tier 1 MSSLs were exceeded and interim removal action was not appropriate.
- Additional site data would have been collected, if needed.
- Indirect exposure scenarios were addressed and the appropriate site-specific points of compliance were identified.
- Nonsite-specific assumptions and point(s) of exposure used in Tier 1 were replaced with site-specific data and information. Site-specific target levels (SSTLs) based on 10-6 to 10-4 risk levels were calculated using the site-specific information and relatively simplistic mathematical models.
- Detected site soil concentrations (maximum detected concentrations or upper confidence levels when data permitted) were compared to SSTLs.
- If concentrations of chemicals of concern exceeded the SSTLs at the point(s) of compliance, then interim remedial action (e.g., "hot spot" removal), further tier evaluation (i.e., Tier 3 evaluation), or remediation to Tier 2 SSTLs would have been recommended.
- When concentrations of chemicals of concern did not exceed the SSTLs, the option recommended was no further action.

5. Basic Equation for RBSLs and SSTLs

- SSTL = Target Risk / (Exposure * Toxicity)

For these SWMUs, residential MSSLs were used in the Tier I evaluation. This is a conservative approach because the SWMUs are industrial sites which are not likely to become residential in the foreseeable future.

If the calculation of SSTLs was warranted, the exposure component of the equation was modified to account for the industrial exposures that occur at the sites.

2.5.2 Derivation of USEPA Region VI MSSLs

The MSSLs were taken from the USEPA Region VI table which is provided in Appendix C (USEPA 1997b). The latest available version was used. These MSSLs are based on 1×10^{-6} excess cancer risk or a hazard quotient equal to 1, assuming residential ingestion, dermal, and inhalation exposures. A maximum chemical concentration that exceeds a screening-level MSSL does not mean that a health risk exists because the maximum concentration detected is not the concentration to which people would routinely be exposed, and the exposure assumptions used to derive the MSSL are not site-specific.

For a carcinogen, the soil MSSL is the concentration of a chemical in soil that is estimated to result in an excess cancer risk of 1×10^{-6} (1 in 1,000,000) for Class A and B carcinogens or 1×10^{-5} for Class C carcinogens, assuming long-term (30-year) daily exposures. A range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) is USEPA's target excess cancer risk range for cleanup under Superfund and RCRA (USEPA 1991). Therefore, MSSLs based on target risks of 1×10^{-6} and 1×10^{-5} are conservative (protective) values, and exceedances of these MSSLs do not necessarily mean that a health risk is present. Exceedance of the MSSLs may mean, however, that further evaluation of chemical concentrations, exposure assumptions, and carcinogenicity may be warranted.

For noncarcinogens, MSSLs are the concentrations in soil that are estimated to result in a "hazard quotient" (HQ) of 1.0. A hazard quotient is the ratio of the estimated daily dose from the assumed exposure to a reference dose (RfD), established by USEPA, that is considered safe for a lifetime of daily exposure. A hazard quotient of 1 or less means that no toxic effects are likely to occur, even to sensitive individuals exposed for a lifetime. A hazard quotient above 1 does not mean that toxic effects will necessarily occur, but that further evaluation of exposures and chemical toxicity is required.

USEPA Region VI MSSLs for soil exposures are based on the ingestion, inhalation, and dermal exposure routes. Soil MSSLs are available for industrial and residential scenarios. SWMUs 31, 48A, 77, and 127 are located in industrialized areas of the Base. For the Tier 1 assessment, residential MSSLs were used.

MSSLs for Lead in Soil

USEPA withdrew the toxicity factor (i.e., the RfD) for lead in 1989, primarily due to the lack of a discernible threshold dose and because of the numerous sources of lead in the environment. However, USEPA guidance (USEPA 1994c) recommends an interim soil lead concentration of 400 mg/kg for residential scenarios at CERCLA and RCRA corrective action sites. This level is supported by USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model (USEPA 1994c), which predicts that exposures of children ages 0 to 6 years to soils with approximately these levels will not result in blood lead levels that exceed a level of concern (10 μg/dL) established by the Centers for Disease Control. The interim soil lead concentration is the level above which there is sufficient concern that a site-specific study of risks should be conducted if exposure to children is expected at the site. Based on the residential soil-screening level for lead, USEPA

4.1 SITE DESCRIPTION

The AGE Maintenance Shop Pad is an open concrete area adjacent to the southeast side of the AGE Maintenance Shop, located in Building No. 186 (Figure 4-1). The pad is approximately 60 to 70 feet wide and 240 to 280 feet long. A wash rack occupies an area about 45 feet square beyond the southeast edge of the pad. The AGE Drainage Ditch (SWMU No. 34), investigated in the Appendix I RI (W-C 1993b), lies to the southeast of the maintenance pad and carries runoff to the northeast.

4.2 SITE HISTORY

with JP-4, oils, and diesel fuel, flows off the pad to the southeast. The Appendix I RI investigation of soils lining the AGE Drainage Ditch, southeast of the AGE pad, found negligible to nondetectable levels of target contaminants in the soils sampled. Subsequent to the Appendix I RI, Phase I and Phase II RFIs were completed as discussed below.

4.3 CURRENT USE

Maintenance on aeronautical ground equipment is performed in Building No. 186 and on the south and east sections of the pad. The wash rack (not a target of this investigation) is frequently used to wash and clean support vehicles and equipment. The wash rack is drained separately to an adjacent oil/water separator (OWS) which was a part of the Appendix II investigation. This OWS was removed and replaced with a new one in February 1997. A portion of the drainage from the pad reportedly flows into a sand trap at the northwest corner of the wash rack. This sand trap reportedly empties into the OWS.

4.4 PREVIOUS INVESTIGATIONS

Phase I RFI

Four 10-foot soil borings were drilled and soil samples collected during the Phase I RFI (W-C 1994a) in areas where wash-down water from the maintenance pad enters the AGE ditch and along expansion joints or cracks in the maintenance pad to determine if a release of SWMU-related chemicals posing a hazard to human health or the environment had occurred at these points. The Phase I boring locations and numbers are shown on Figure 4-2. Boring 03101 was drilled in a slight drainage channel entering the AGE ditch to sample the effect maintenance pad runoff may have on the soil at this location. Surface soils at this location were discolored and vegetation within the channel appeared distressed. Since this drainage ditch receives runoff from areas other than the AGE Maintenance Shop, other sources may be contributing contaminants to this sample location. Boring 03102 was drilled in an area of soil cover near the AGE ditch to determine the presence and the lateral extent of potential contaminants in soils at this point. Soils at this location did not appear contaminated and vegetation appeared normal. The high density of buried utilities under the maintenance pad forced the relocation of two borings from the pad itself to nearby sites. Boring 03103 was located just off the slab to the west of the Wash Rack near the expansion joint to ascertain the presence and extent of possible contamination at

this point. Small piles of stained soil observed at this location suggested that oily soils were deposited there. Boring 03104 was located about 10 feet southwest of Boring 03103, just off the edge of the AGE pad. No surface staining was evident at this site.

Soil samples were collected from 0- to 0.5-foot, 1.5- to 3.5-foot, 4- to 6-foot, and 8- to 10-foot depth intervals in Borings 03101 and 03102 and from the 0.5- to 2-foot, 2- to 4-foot, and 8- to 10-foot depth intervals in Borings 03103 and 03104. Target analytes included volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), target analyte list (TAL) metals, and total recoverable petroleum hydrocarbons (TRPH). SVOCs were analyzed only at the surface samples and at selected depth intervals to allow for risk assessment. Surficial samples from the 0- to .5-foot interval were collected in areas of soil cover from the 0.2- to 0.5-foot depth interval to provide a worst-case situation for risk assessment purposes if SVOC contamination was found in these samples. In areas of pavement or concrete surfaces, soil sampling began immediately below the pavement/soil contact. Chemical results are summarized in Tables 4-1 and 4-2.

Tetrachloroethene (PCE) was detected at low concentrations in Boring 03103 at the surface. Anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, carbazole, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, phenanthrene, and pyrene were detected in samples from the surface of Boring 03101, 03102, and 03103 at the surface and in Boring 03102 at 3.5 feet. Antimony, barium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, and zinc were detected above background in surface and subsurface samples to 10 feet in one or more of the borings for the Phase I RFI (W-C 1994a). Asphalt present may be the source of polycyclic aromatic hydrocarbons (PAHs) and metals. Barium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, cadmium, chromium, chrysene, indeno(1,2,3-cd)pyrene, lead, and petroleum hydrocarbons exceeded the risk screening criteria. These results are summarized on Figure 4-3.

Phase II RFI

Three soil borings were drilled and soil samples collected at the AGE Maintenance Shop Pad (W-C 1995c). One boring was drilled near the location of the wash rack (Boring 3107), one boring was drilled in a grassy area northeast of the wash rack (Boring 3105), and one boring was drilled at the bottom of a shallow drainage swale northeast of the wash rack (Boring 3106) (Figure 4-2). The borings were drilled to a total depth of 10 feet. The boring locations were chosen to further assess the lateral and vertical presence and extent of site-related soil contaminants at the 10-foot depth interval. Samples were analyzed for VOCs, SVOCs, TAL metals, and TRPH.

A summary of the detected chemicals for the Phase II RFI soil samples is provided on Figure 4-3 and in Table 4-3. Other than acetone, which was qualified nondetect after it was determined to be laboratory contamination, the only VOC reported in near-surface soil samples was total xylenes at a concentration of 130 μg/kg. Several SVOC compounds, mostly PAHs, were reported for all three near-surface samples. Total PAHs were detected at concentrations of 7,903 μg/kg (Boring 3105), 18,265 μg/kg (Boring 3106) and 25,450 μg/kg (Boring 3107). Other SVOCs detected in near-surface soil samples were bis(2-ethylhexyl)phthalate, butyl benzyl

phthalate, carbazole, dibenzofuran, and 4-methylphenol. Petroleum hydrocarbons were detected at concentrations of 696 mg/kg, 914 mg/kg, and 2,500 mg/kg in near-surface soil samples from Borings 3105, 3106, and 3107, respectively. Asphalt present may be the source of PAHs and metals.

Other than acetone, which was qualified nondetect after it was determined to be laboratory contamination, the only VOC reported in subsurface soil samples was toluene at concentrations of 5.5 μg/kg (estimated) and 4.9 μg/kg (estimated) in Boring 3107. Only one SVOC compound (fluoranthene) was reported for any of the subsurface samples (Boring 3107 at a concentration of 120 μg/kg, estimated). Petroleum hydrocarbons were not reported in any of the subsurface samples.

The maximum concentrations of cadmium, chromium, cobalt, copper, lead, manganese, nickel, and zinc exceeded background levels for the Phase II RFI (W-C 1995b).

TRPH was also addressed in the previous investigations. The maximum detected Phase I and Phase II concentrations (4,070 mg/kg and 2,500 mg/kg, respectively) exceeded the New Mexico Environment Department (NMED) action levels of 1,000 mg/kg. These locations are shown on Figure 4-3. The NMED action levels of 500 mg/kg for benzene, toluene, ethylbenzene, and xylenes (BTEX) and 10 mg/kg for benzene individually were not exceeded.

4.5 HUMAN HEALTH RISK EVALUATION

4.5.1 Site Conceptual Exposure Model

The site conceptual exposure model (SCEM) is a schematic representation of the contaminant source areas, chemical release mechanisms, environmental transport media, potential human intake routes, and potential human receptors. A SCEM should identify complete exposure pathways that may result in human health risks and indicate the data needed to evaluate those pathways. An exposure pathway consists of four necessary elements:

- A source and mechanism of chemical release to the environment
- An environmental transport medium for the released chemical (e.g., air, groundwater, or surface water)
- A point of potential human exposure to transported chemicals (e.g., a domestic drinking water well)
- A human intake mechanism (e.g., inhalation or ingestion) at the point of exposure

All four elements must be present for an exposure pathway to be complete and for chemical exposure to occur. In the SCEM, potentially complete exposure pathways are indicated with solid lines; minor (insignificant) pathways are indicated with dashed lines. Figure 4-4 presents the SCEM for SWMU 31.

The primary source at SWMU 31 (the AGE Maintenance Shop Pad) is waste fluids (e.g., fuels, oils, and solvents) that have leaked or been spilled on the pad and the surrounding surface soil.

Chemicals from the primary source may be transported away from the primary source areas, affecting other media that may in turn act as secondary sources. Mixing and infiltration of the wastes with the soil are shown as the primary chemical release mechanisms. Subsurface soils are an important secondary source of potential chemical release. Site-related chemicals in soils may infiltrate/percolate through the soil and be released to groundwater.

Other release mechanisms, such as direct contact (soil and dermal contact), surface runoff, wind erosion, or volatilization to the atmosphere, are also depicted in the SCEM. Transport by storm runoff is not considered a significant pathway for human exposure at SWMU 31 because runoff settles in the low spots located on the southeast side of the SWMU, but is not transported off-site.

Potential receptors at SWMU 31 include occupational receptors, hypothetical future construction workers, and hypothetical trespassers. SWMU 31 is located in the industrial area of the Base (Figure 1-2); therefore, residential development is not a likely future land use. Surface soil (upper 2 feet of soil column) and air emissions (particulate) from surface soil may provide exposures to occupational receptors and hypothetical trespassers. Surface soil, subsurface soil, and air emissions (volatile and particulate) may provide exposures to hypothetical future construction workers during excavation activities.

Groundwater is used for domestic purposes on and off Base. However, potential groundwater exposures were not evaluated because fate and transport modeling indicates that groundwater will not be impacted (see Section 4.7).

In summary, the potentially complete human exposure pathways at SWMU 31 are:

Occupational Receptors

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

Hypothetical Construction Workers

- Ingestion of subsurface and surface soil
- Dermal Contact with subsurface and surface soil
- Inhalation of volatile emissions and airborne particulate matter from subsurface and surface soil

Hypothetical Trespassers

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

4.5.2 Site Classification

Site classification is a prioritization step that is used to judge the urgency of the need for initial response actions and maximizes the effectiveness of limited resources. There are four classes of sites (ASTM 1996):

Class 1: Immediate threat to human health and safety or sensitive environmental receptors

Class 2: Short-term threat to human health and safety or sensitive environmental receptors

Class 3: Long-term threat to human health and safety or sensitive environmental receptors

Class 4: No demonstrable threat to human health and safety or sensitive environmental receptors

This site presents no explosive threat and contains no free product, no surface water, and no groundwater discharges. There are no public facilities (i.e., daycares, parks, schools, dwellings) located on or near the site. The nearest potable groundwater aquifer is more than 250 feet bgs. Additionally, access to soils is limited primarily to Base personnel. Therefore, SWMU 31 was considered to be a Class 4 site.

4.5.3 Background Comparison

Metals are natural constituents of soils and water. Metals that occur in concentrations within background levels are not considered site-related chemicals of concern and are not evaluated further. To determine if the concentrations of metals detected in surface and subsurface soil at SWMU 31 exceeded background concentrations, the maximum detected concentrations at the site were compared to the calculated background UTLs. The UTLs used in this comparison were calculated as part of the background study for Cannon AFB (W-C 1997). Maximum detected concentrations from surface soils were compared to surface soil UTLs. Maximum detected concentrations from subsurface soils were compared to subsurface UTLs. If the maximum detected concentration exceeded the background UTL, the metal was considered to exceed background and was evaluated in the Tier 1 screen.

Four samples from the Phase I investigation (CAN031-0311-0002, CAN031-0312-0002, CAN031-0313-0002, CAN031-0314-0002) are shown in Table 4-1 as near surface samples. However, these four samples were collected at 1.5 to 3.5 feet below ground surface. Therefore, they were considered to be subsurface samples for purposes of this risk evaluation.

Surface Soil

The maximum detected surface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, nickel, sodium, and zinc were considered to exceed background levels. All other metals were considered to be within background levels. Table 4-4 summarizes the comparison and a discussion is given below.

Three of seven surface soil samples contained aluminum at concentrations (ranging from 9,230 mg/kg to 10,200 mg/kg) which exceeded the background UTL of 8,950 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

Three of seven surface soil samples contained arsenic at concentrations (ranging from 3.7 mg/kg to 4.6 mg/kg) which exceeded the background UTL of 3.6 mg/kg. Therefore, arsenic was considered to exceed background levels and was evaluated further.

Two of seven surface soil samples contained barium at concentrations (ranging from 716 mg/kg to 1,460 mg/kg) which exceeded the background UTL of 670 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

Six of seven surface soil samples contained cadmium at concentrations (ranging from 0.85 mg/kg to 8.7 mg/kg) which exceeded the background UTL of 0.435 mg/kg. Therefore, cadmium was considered to exceed background levels and was evaluated further.

Two of seven surface soil samples contained calcium at concentrations (ranging from 48,600 mg/kg to 173,000 mg/kg) which exceeded the background UTL of 44,800 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

Five of seven surface soil samples contained chromium at concentrations (ranging from 11.3 mg/kg to 130 mg/kg) which exceeded the background UTL of 10.5 mg/kg. Therefore, chromium was considered to exceed background levels and was evaluated further.

Two of seven surface soil samples contained cobalt at concentrations (ranging from 7.6 mg/kg to 22.2 mg/kg) which exceeded the background UTL of 6.6 mg/kg. Therefore, cobalt was considered to exceed background levels and was evaluated further.

Four of seven surface soil samples contained copper at concentrations (ranging from 18.8 mg/kg to 10,700 mg/kg) which exceeded the background UTL of 18.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

One of seven surface soil samples contained iron at a concentration (10,600 mg/kg) which exceeded the background UTL of 10,100 mg/kg. Therefore, iron was considered to exceed background levels and was evaluated further.

Seven of seven surface soil samples contained lead at a concentration (ranging from 20.7 mg/kg to 2,130 mg/kg) which exceeded the background UTL of 12 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

Four of seven surface soil samples contained magnesium at concentrations (ranging from 2,310 mg/kg to 5,230 mg/kg) which exceeded the background UTL of 1,930 mg/kg. Therefore, magnesium was considered to exceed background levels and was evaluated further.

Two of seven surface soil samples contained nickel at concentrations (ranging from 15.8 mg/kg to 1,610 mg/kg) which exceeded the background UTL of 11 mg/kg. Therefore, nickel was considered to exceed background levels and was evaluated further.

One of seven surface soil samples contained sodium at a concentration (193 mg/kg) which exceeded the background UTL of 102 mg/kg. Therefore, sodium was considered to exceed background levels and was evaluated further.

Six of seven surface soil samples contained zinc at concentrations (ranging from 44.7 mg/kg to 479 mg/kg) which exceeded the background UTL of 32.2 mg/kg. Therefore, zinc was considered to exceed background levels and was evaluated further.

Subsurface Soil

The maximum detected subsurface soil concentrations of metals were compared to background concentrations (W-C 1997). Barium, calcium, copper, lead, and zinc were considered to exceed background levels. All other metals were considered to be within background levels. Table 4-5 summarizes the comparison and a discussion is given below.

One of eighteen subsurface soil samples contained barium at a concentration (1,130 mg/kg) which exceeded the background UTL of 890 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

Two of eighteen subsurface soil samples contained calcium at concentrations (ranging from 288,000 to 289,000 mg/kg) which exceeded the background UTL of 237,498 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

One of eighteen subsurface soil samples contained copper at a concentration (10.9 mg/kg) which exceeded the background UTL of 8.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

One of eighteen subsurface soil samples contained lead at a concentration (22.3 mg/kg) which exceeded the background UTL of 8.7 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

One of eighteen subsurface soil samples contained zinc at a concentration (33.5 mg/kg) which exceeded the background UTL of 30.6 mg/kg. Therefore, zinc was considered to exceed background levels and was evaluated further.

Comparison of Site Essential Nutrient Concentrations to RDAs

The maximum detected concentrations of essential nutrients which exceeded background and which do not have EPA Region VI MSSLs established for them were compared to the recommended daily allowances (RDAs) set by the National Research Council.

At SWMU 31, calcium, magnesium, and sodium were compared to the RDAs. Table 4-6 shows that the maximum detected concentrations of calcium, magnesium, and sodium did not cause estimated potential site daily intake to exceed the RDAs. Therefore, these inorganics would not pose a human health risk and were not evaluated further.

4.5.4 Tier 1 Evaluation

The Tier 1 evaluation involves the comparison of the maximum detected site concentrations to conservative, nonsite-specific, risk-based screening levels to determine whether site conditions satisfy the criteria for a quick regulatory closure or warrant a more site-specific evaluation.

Chemicals of Potential Concern

COPCs were identified based on the chemical analytical data (both historic and current) presented in Tables 4-1, 4-2, and 4-3. Metals which exceeded background levels and RDAs and all detected organic compounds (except those considered to be laboratory contaminants) were evaluated as COPCs. TRPH was not considered to be a COPC because it is a complex chemical mixture with varying constituents. Therefore, individual constituents (e.g., BTEX, PAHs, etc.) were used to evaluate potential impacts from TPH at SWMU 31.

Tier 1 Comparison

Maximum detected concentrations of COPCs were compared to the EPA Region VI Residential MSSLs. The comparison is shown in Table 4-7. The table shows that benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, chromium, and lead exceeded the Tier 1 values. Therefore, these compounds were considered to be chemicals of concern (COCs) at SWMU 31.

4.5.5 Tier 2 Evaluation

The Tier 2 evaluation provides an option to determine the target levels for the COCs identified in the Tier 1 comparison. This step uses site-specific information related to exposure parameters and soil properties to develop site-specific target levels (SSTLs).

At SWMU 31, the SSTL(s) were calculated using the RBCA Tool Kit for Chemical Releases developed by Groundwater Services, Inc. (GSI 1999). The site-specific information used to develop the SSTL included the assumption of a commercial and construction worker exposure scenarios. Tier 1 values assumed residential exposure which is highly conservative for SWMU 31. SWMU 31 is located in an industrial area of the Base and is part of the active AGE Maintenance Shop. Therefore, industrial exposures are more appropriate for this site. The following exposure assumptions were used to calculate the SSTL for COCs at SWMU 31.

An exposure frequency of 60 days per year was assumed for the commercial worker scenario. Although SWMU 31 is an active facility, the type of work performed on site does not require regular contact with soil and the area is predominantly covered by concrete. Therefore, worker exposures to contaminated soils are very limited. Additionally, the site does not require significant ground maintenance/landscaping because of the concrete ground cover. Therefore, the assumption of 60 days per year (5 days per month) is conservative and provides protection for Base workers. Standard default values were used for all other exposure parameters. Appendix C shows all the input parameters and assumptions used to calculate the SSTLs at SWMU 31.

The SSTLs for COCs at SWMU 31 and their maximum detected concentrations are shown below.

COCs		SSTLs	Maximum Concentrations
Benzo(a)anthracene		4.3 mg/kg	2.4 mg/kg
Benzo(a)pyrene	0.481	0.43 mg/kg	2.7 mg/kg
Benzo(b)fluoranthene	4.81	1.3 mg/kg	5.6 mg/kg
Dibenzo(a,h)anthracene		3.7 mg/kg	0.63 mg/kg
Indeno(1,2,3-cd)pyrene		4.3 mg/kg	2.3 mg/kg
Arsenic	3.59	16 mg/kg	4.6 mg/kg
Chromium	219	3100 mg/kg	130 mg/kg

The maximum detected concentrations for benzo(a)pyrene and benzo(b)fluoranthene exceed their SSTLs. All other COCs were below their SSTLs.

Lead does not have an EPA-established toxicity factor; therefore, an SSTL could not be calculated for it. However, EPA Region VI recommends a value of 2,000 mg/kg of lead for industrial soils. The maximum detected concentration of lead at SWMU 31 (930 mg/kg) does not exceed the industrial MSSL value.

Detections that exceeded SSTLs included benzo(a)pyrene in three surface soil samples and benzo(b)fluoranthene in one surface soil sample. Concentrations of these two COCs decreased with depth to nondetect in all soil borings (see Figure 4-3). The maximum concentrations of these COCs used for comparisons to SSTLs were those detected in samples collected during the Phase I RFI (W-C 1994a) and used in the Baseline Risk Assessment (W-C 1994b). The Baseline Risk Assessment (BRA) included both human health and ecological risk evaluations and concluded that the risk was within USEPA acceptable levels. The BRA is included with Appendix C.

4.6 ECOLOGICAL RISK EVALUATION

Certain nondomesticated plants and animals will occur, at least at times, in almost any area that is outdoors, regardless of the absence of "natural" habitat and/or the omnipresence of human activity and artificial structures (buildings, pavement). Thus, strictly speaking, virtually any area outside of a building might include "habitat for ecological receptors." Such essentially artificial habitats are not, however, considered *directly* ecologically relevant because they exist and are configured to support human (industrial) functions. Understanding the concept of "direct ecological relevance" is very important in assessing ecological risk at an active military site.

The initial step in ecological evaluation of a site is determining whether the unit has an *ecological component*. This determination is based on the availability, within the subject unit, of *habitat*. Simply defined, the term habitat means the "place where a plant or animal lives" (USACE 1996; USEPA 1997a), but a more functional definition can be paraphrased as the *type of environment* where an organism (or community of similarly adapted organisms) *normally*

lives. If no ecological components are identified, it is concluded that the unit is not of potential ecological concern and no further ecological evaluation is warranted. It is not believed that individual organisms that are occasionally present constitute an ecological component because individuals (unless accorded official protection as endangered or threatened) are not appropriate as assessment endpoints for an ecological risk assessment. As stated by USEPA (1997a), "Ecological effects of most concern are those that can impact populations (or higher levels of biological organization)." By definition, an occasional individual does not constitute a population, nor would any effects on an occasional individual be expected to translate into an effect on a population.

SWMU 31 is a very small area associated with the AGE Maintenance Shop (Building No. 186). The area under investigation does contain a very limited area of manicured grass (lawn). The limited size of the area, coupled with the limited ecological value of lawn areas, suggests that no ecological community is present and, at best, only a few individuals of even the smallest organisms are present. Based on this, SWMU 31 does not contain any significant ecological component such that a formal ecological risk assessment is warranted.

4.7 VADOSE ZONE FATE AND TRANSPORT MODELING

Because chemicals were detected in soil above residential MSSLs at SWMU 31, the fate and transport of contaminants in the vadose, or unsaturated, zone was modeled to evaluate the potential for contaminants in soil to be transported to underlying groundwater. The following provides a brief description of the modeling effort and presents model-predicted concentrations for SWMU 31.

4.7.1 Description of Modeling Effort

The mathematical models HELP and MULTIMED were applied to a conceptual vadose zone model developed for SWMUs 31, 77, and 127, all of which had chemicals detected above MSSLs and which have similar geology and site conditions. The HELP model was used to estimate a net infiltration rate for input into MULTIMED. MULTIMED was then used to model contaminant migration through the vadose zone to the water table.

MULTIMED was run for each chemical detected above MSSLs under steady-state, pulse source, and source decay conditions while considering both sorption and sorption/biodegradation as attenuation mechanisms. Results were used to calculate attenuation factors (AFs) and dilution-attenuation factors (DAFs) which can then be used to predict concentrations, respectively, at the bottom of the unsaturated zone and at the water table after initial mixing in groundwater.

Appendix D provides a detailed description of the modeling approach, model documentation, input parameters, and model output for SWMUs 31, 77, and 127.

4.7.2 Model-Predicted Concentrations

Initial leachate concentrations were calculated for each chemical detected in soil above MSSLs at SWMU 31 using the following equilibrium partitioning equation from the Soil Screening Technical Background Document (USEPA 1996):

$$Cs = Cw \cdot \left[Kd + \frac{\theta w + \theta a \cdot H'}{\rho b} \right]$$

In the above equation, *Cw* is the initial leachate concentration (mg/L) and *Cs* is the maximum detected soil concentration (mg/kg) at the SWMU. *Kd* is the distribution coefficient (L/kg or mL/g), θw is the water-filled soil porosity, θa is the air-filled soil porosity, *H'* is the dimensionless Henry's law constant, and ρb is the dry bulk density (kg/L, g/mL, or g/cm^3). For organic compounds, *Kd* is the product of the normalized organic carbon distribution coefficient, *Koc*, and fraction organic carbon content, *foc*. Porosity and bulk density are taken from the HELP layer 1 (sandy clay loam) at field capacity. Values for *Koc*, *Kd*, and *H'* are taken from USEPA 1996. Other values are the same as used in the MULTIMED model. Calculations for each chemical are shown in Table 4-8.

AFs and DAFs for each chemical and type of model run were then applied to these initial leachate concentrations. The results of this analysis are shown in Table 4-9. Predicted concentrations that exceed USEPA Region VI tap water MSSLs or MCLs are shaded.

For all modeled chemicals (SVOCs and metals), predicted concentrations for steady-state, nontransport decay analyses, are above tap water MSSLs and/or MCLs. However, in general, both organic and inorganic contaminant source mass is expected to decrease over time due to such processes as sorption (organic/inorganic), volatilization (organic), biodegradation (organic), precipitation (inorganic), and ion exchange (inorganic). Therefore, the assumption of a constant, infinite source (i.e., steady-state) is believed to be unrealistic and overly conservative. The results for other analyses are discussed further.

As shown in Table 4-9 for SVOCs (PAHs), predicted concentrations for sorption-only analyses (plus dispersion) are usually at least one order of magnitude, or ten times, below the tap water MSSL. When biodegradation is also considered, predicted concentrations are zero.

Analyses for metals do not consider biodegradation. In addition, converse to results for organic compounds, the use of a 100-year pulse source results in a greater source mass (and lower AFs/DAFs) than the use of a decaying source due to the increase in half-life from 10 years for SVOCs to 100 years for metals. For chromium and lead, predicted concentrations are below the tap water MSSL or MCL. However, for arsenic, the pulse source analysis results in predicted concentrations at the bottom of the vadose zone of one order of magnitude above (4.3×10^{-4} mg/L) and at the water table after initial mixing of groundwater of slightly above (6.0×10^{-5} mg/L) the tap water MSSL (4.5×10^{-5} mg/L). Although the program would not compute a saturated zone concentration, results are similar for the decaying source analysis.

The distribution coefficient values used for both arsenic and chromium are based on the most mobile species of those metals, 3+ and 6+, respectively. For arsenic, if a distribution coefficient of 50 ml/g rather than 29 ml/g is used to account for the presence of the less mobile 5+ species, the initial leachate concentration is 0.092 mg/L, the concentration at the bottom of the vadose zone is 1.5×10^{-4} mg/L, and the concentration at water table after initial mixing is 2.0×10^{-5} mg/L, which is slightly less than the tap water MSSL of 4.5×10^{-5} mg/L.

4.7.3 Assumptions and Limitations

The results of the vadose zone contaminant fate and transport modeling at SWMUs 31, 77, and 127 and predicted concentrations at each SWMU are based on a conservative, analytical approach with many simplifying assumptions. These assumptions and limitations are described in Appendix D. However, to summarize, the implementation of a more complex, numerical model (e.g., typical for RBCA Tier 3) would most likely produce results that are more representative of actual flow and transport processes that presumably occur at SWMUs 31, 77, and 127, due to its semiarid climate. These processes include the effects of capillary forces and soil hysteresis. The use of a numerical model might even result in lower predicted concentrations at the water table for similar assumed source conditions.

4.7.4 Summary of Results

The results of the vadose zone fate and transport modeling for SWMU 31, assuming sorption, dispersion, and biodegradation occurs, indicate that chemicals of concern will not reach groundwater above tap water screening levels.

4.8 VOLUNTARY CORRECTIVE MEASURE IMPLEMENTATION

Concentrations of benzo(a)pyrene and benzo(b)fluoranthene exceeded the SSTLs in surface samples collected from soil boring SB 3101. In addition, there were elevated levels of TRPH, lead, and chromium. In February 1999, a backhoe was used to remove contaminated soil from a 10-foot by 5-foot by 2-foot deep excavation around this soil boring (Foster Wheeler 1999, Appendix E). Confirmation samples collected from the excavation area indicated that contaminated soils had been removed. The excavation was then backfilled with clean fill.

4.9 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVE

Results of the human health and ecological risk evaluations indicate that there is no unacceptable risk to human health and the environment based on the maximum detected concentrations of chemicals of concern in soil at SWMU 31. Furthermore, results of vadose zone fate and transport modeling, assuming sorption, dispersion, and biodegradation occurs, show that chemicals of concern will not reach groundwater above allowable concentrations for tap water. In addition, through a voluntary corrective measure implementation, soil containing those maximum concentrations, were removed. Therefore, the "No Further Action" alternative was evaluated based on the criteria listed in Section 2.3 and as outlined in the CMS Work Plan (W-C 1998).

1. Technical
   - Performance – the No Further Action alternative is effective at being protective of human health and the environment over extended periods of time. This has been demonstrated through Tier I and Tier II human health and ecological risk evaluations, a baseline risk assessment, and fate and transport modeling.
   - Reliability – the No Further Action alternative does not require any operation or maintenance activities and has been proven to be effective before for similar sites and conditions.
   - Implementability – the No Further Action alternative is easy to implement and will meet or exceed applicable standards.
   - Safety – the No Action Alternative poses no threat to the safety of nearby workers.
2. Human Health
   - The No Further Action alternative was determined following the Risk-Based Corrective Action (RBCA) process as outlined in ASTM E1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release sites.
   - Maximum concentrations of most chemicals of concern left in place are less than conservative Tier I EPA Region VI Media-Specific Screening Levels (MSSLs) and calculated Tier II Site-Specific Target Levels (SSTLs).
   - Those chemicals of concern that exceeded SSTLs were only in surface soil samples. The maximum concentrations of these chemicals were used in a baseline risk assessment that concluded there was no unacceptable risk; however, soils containing these maximum concentrations were removed anyhow.
3. Environmental
   - No valued ecological resources are present.
4. Cost
   - The No Further Action alternative is protective of human health and the environment and at the lower cost.

5.1 SITE DESCRIPTION

SWMU No. 48A was a 20,000-gallon underground storage tank located about 125 feet east of the intersection of Argentia Avenue and Torch Boulevard (Figure 5-1). The tank and associated piping were removed in 1988. The area is presently paved and used as a parking lot. The depth of the former tank is unknown.

5.2 SITE HISTORY

As discussed in the site description, the tank and associated piping were removed in 1988. SWMU No. 48A was active from 1941 to 1985. Historically, the site was a gas station from 1941 to 1965. From 1965 to 1985, the tank was used to store waste products. The tank received waste oils, spent solvents, paint thinners, and recovered fuels. The products were removed periodically from the tank. The quantities of each of the waste products stored in the tank are unknown.

5.3 CURRENT USE

The underground storage tank has been removed. The area is currently covered with asphalt pavement and is being used as a parking lot.

5.4 PREVIOUS INVESTIGATIONS

Phase I RFI

During the Phase I RFI, three soil borings were drilled and sampled to a depth of 30 feet bgs (LRL 1993) at the site of the former underground storage tank to determine whether a release of SWMU-related chemicals had occurred from the tank. The previous boring locations are shown on Figure 5-2. Target analytes for the samples collected included Target Compound List (TCL) VOCs, cyanide, TAL metals, and BTEX. Ethylbenzene, toluene, and xylene were detected in Boring No. 48A-2 at 10 and 20 feet. The concentration of xylene was 100 ppm at 20 feet. Metals were detected above background in surface samples and subsurface samples at 20 feet in all of the borings.

Phase II RFI

The Phase I investigation sampled soils to 30 feet bgs. The Phase II investigation included three new soil borings to a depth of 40 feet bgs. Nine soil samples were collected for chemical analysis from the surface to the bottom of each boring. Chemical analysis included VOCs, SVOCs, TAL metals, and TRPH.

Three soil borings were drilled and soil samples collected in the area surrounding the presumed location of the former aboveground storage tank. Two of the borings (4804 and 4805) were drilled to a total depth of 39.5 feet, while the third boring (4806) was drilled to a total depth of 40 feet (Figure 5-2). Two of the borings, one at each end of the UST, were placed at the

presumed location of the unit, while the third boring was placed about 20 feet to the northeast of the presumed north end of the former UST location.

Surface soil samples were collected from 0 to 0.5 feet in Boring 4804, from 0.5 to 2.5 feet in Boring 4805, and from 0 to 2.0 feet in Boring 4806. All borings were also sampled at intervals of 3 to 5 feet, 8 to 10 feet, 13 to 15 feet, 18 to 20 feet, 23 to 25 feet, 28 to 30 feet, 33 to 35 feet, and 38 to 40 feet (39.5 feet in Borings 4804 and 4805).

A summary of the detected chemicals for these soil samples are provided in Figure 5-3 and Table 5-1. Other than acetone and methylene chloride, which were qualified nondetect after they were determined to be laboratory contaminants, the only VOC reported in any of the surface samples was toluene at an estimated concentration of 1.3 μg/kg in Boring 4806 and at a concentration of 5.7 μg/kg in Boring 4804. Only one SVOC, bis(2-ethylhexyl) phthalate, was detected in the surface samples at a concentration of 57 μg/kg (Boring 4804). TRPH was reported in all of the near-surface samples at concentrations of 185 mg/kg (Boring 4804), 61.6 mg/kg (Boring 4805), and 56.2 mg/kg (Boring 4806). The maximum concentrations of aluminum, antimony, calcium chromium, iron, lead, magnesium and nickel exceeded background concentrations in surface soils.

In subsurface soils other than acetone and methylene chloride, which were qualified nondetect after they were determined to be laboratory contaminants, the only VOCs reported were toluene, chlorobenzene, ethylbenzene, xylenes, and 2-butanone. Toluene was reported only in two samples at concentrations of 1.3 and 2.3 μg/kg (Boring 4804-05 and 4806-05). Ethylbenzene was reported in four samples from Boring 4806 at concentrations ranging from 1.8 to 890 μg/kg. Ethylbenzene concentrations decreased with depth to non-defect. Total xylenes were reported in five samples from Boring 4806 ranging from at concentrations of 69 to 12,000 μg/kg. Xylene concentrations decreased with depth to non-defect. 2-Butanone was reported in two samples from Boring 4806 at concentrations of 1,200 μg/kg and 140 μg/kg. Several SVOCs were reported in some of the subsurface samples. Most of these SVOCs are PAH compounds in the subsurface samples from Boring 4806. Total PAH concentrations reported in Boring 4806 ranged from 3,338 μg/kg to 18,990 μg/kg. Other non-PAH compounds reported were acenaphthene, 4-chloroaniline, di-n-butyl phthalate, dibenzofuran, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and phenol. TRPH was reported in several of the subsurface samples. Boring 4804 samples had reported TRPH concentrations of 1,050 mg/kg (estimated) and 81 mg/kg (estimated). None of the subsurface samples in Boring 4805 had reported TRPH concentrations. Boring 4806 samples had reported TRPH concentrations of 729 mg/kg, 17,300 mg/kg, 3,890 mg/kg, 2,080 mg/kg, 1,350 mg/kg, and 199 mg/kg.

The maximum concentrations of antimony, barium, cobalt, manganese, nickel, and zinc exceeded background levels in subsurface soils in the Phase II investigation (W-C 1995b).

TRPH from the Phase II investigation (17,300 mg/kg) exceeds the NMED action level for soil of 1,000 mg/kg. The NMED action levels of 500 mg/kg for BTEX and 10 mg/kg for benzene individually were not exceeded.

5.5 HUMAN HEALTH RISK EVALUATION

5.5.1 Site Conceptual Exposure Model

The SCEM is a schematic representation of the contaminant source areas, chemical release mechanisms, environmental transport media, potential human intake routes, and potential human receptors. A SCEM should identify complete exposure pathways that may result in human health risks and indicate the data needed to evaluate those pathways. An exposure pathway consists of four necessary elements:

- A source and mechanism of chemical release to the environment
- An environmental transport medium for the released chemical (e.g., air, groundwater, or surface water)
- A point of potential human exposure to transported chemicals (e.g., a domestic drinking water well)
- A human intake mechanism (e.g., inhalation or ingestion) at the point of exposure

All four elements must be present for an exposure pathway to be complete and for chemical exposure to occur. In the SCEM, potentially complete exposure pathways are indicated with solid lines; minor (insignificant) pathways are indicated with dashed lines.

The SCEM for SWMU 48A is presented in Figure 5-4. The primary source at the SWMU is waste fuels and fluids that have leaked into subsurface soils or have been spilled on surface soils during tank emptying. Chemicals from the primary source may be transported away from the primary source areas, affecting other media that may in turn act as secondary sources. Mixing and infiltration of the wastes with the soil is shown as the primary chemical release mechanisms. Once released to soil, the chemicals may then be released to groundwater by infiltration/ percolation or to the atmosphere by volatilization or wind erosion. Chemicals could also be released directly to receptors via contact with soil.

Other release mechanisms, such as direct contact (soil ingestion and dermal contact), surface runoff, wind erosion, or volatilization to the atmosphere, are also depicted in the SCEM. Transport by storm runoff is not considered a significant pathway for human exposure at SWMU 48A because the contamination is primarily in the subsurface and the SWMU has been covered with pavement.

Potential receptors at SWMU 48A include occupational receptors, hypothetical future construction workers, and hypothetical trespassers. SWMU 48A is located in the industrial area of the Base; therefore, residential development is not a likely future land use. Surface soil (upper 2 feet of soil column) and air emissions (particulate) from surface soil may provide exposures to occupational receptors and hypothetical trespassers. Surface soil, subsurface soil, and air emissions (volatile and particulate) from soil may provide exposures to hypothetical future construction workers during excavation activities.

Groundwater is used for domestic purposes on and off Base. However, the contaminant source at SWMU 48A was removed in 1988 and the area is currently paved. The nearest potable aquifer is located more than 250 feet bgs. Therefore, potential groundwater exposures were not evaluated.

In summary, the potentially complete human exposure pathways at SWMU 48A are:

Occupational Receptors

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

Hypothetical Future Construction Workers

- Ingestion of subsurface and surface soil
- Dermal Contact with subsurface and surface soil
- Inhalation of volatile emissions and airborne particulate matter from subsurface and surface soil

Hypothetical Trespassers

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

5.5.2 Site Classification

Site classification is a prioritization step that is used to judge the urgency of the need for initial response actions and maximizes the effectiveness of limited resources. There are four classes of sites (ASTM 1996):

Class 1: Immediate threat to human health and safety or sensitive environmental receptors

Class 2: Short-term threat to human health and safety or sensitive environmental receptors

Class 3: Long-term threat to human health and safety or sensitive environmental receptors

Class 4: No demonstrable threat to human health and safety or sensitive environmental receptors

This site presents no explosive threat and contains no free product, no surface water, and no groundwater discharges. There are no public facilities (i.e., daycares, parks, schools, dwellings) located on or near the site. The nearest potable groundwater aquifer is located more than

250 feet bgs. Additionally, access to soils is limited primarily to Base personnel. Therefore, SWMU 48A was considered to be a Class 4 site.

5.5.3 Background Comparison

Metals are natural constituents of soils and water. Metals that occur in concentrations within background levels are not considered site-related chemicals of concern and are not evaluated further. To determine if the concentrations of metals detected in surface and subsurface soil at SWMU 48A exceeded background concentrations, the maximum detected concentrations at the site were compared to the calculated background UTLs. The UTLs used in this comparison were calculated as part of the background study for Cannon AFB (W-C 1997). Maximum detected concentrations from surface soils were compared to surface soil UTLs. Maximum detected concentrations from subsurface soils were compared to subsurface UTLs. If the maximum detected concentration exceeded the background UTL, the metal was considered to exceed background and was evaluated in the Tier 1 screen.

Surface Soil

The maximum detected surface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, antimony, calcium, chromium, iron, lead, magnesium, and nickel were considered to exceed background levels. All other metals were considered to be within background levels. Table 5-2 summarizes the comparison and a discussion is given below.

Two of three surface soil samples contained aluminum concentrations (ranging from 12,900 mg/kg to 15,300 mg/kg) which exceeded the background UTL of 8,950 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

One of three surface soil samples contained antimony at a concentration (5.5 mg/kg) which exceeded the background UTL of 3 mg/kg. Therefore, antimony was considered to exceed background levels and was evaluated further.

Two of three surface soil samples contained calcium at concentrations (ranging from 54,100 mg/kg to 63,800 mg/kg) which exceeded the background UTL of 44,800 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

Two of three surface soil samples contained chromium at concentrations (ranging from 11.3 mg/kg to 13.8 mg/kg) which exceeded the background UTL of 10.5 mg/kg. Therefore, chromium was considered to exceeded background levels and was evaluated further.

One of three surface soil samples contained iron at a concentration (13,300 mg/kg) which exceeded the background UTL of 10,100 mg/kg. Therefore, iron was considered to exceed background levels and was evaluated further.

One of three surface soil samples contained lead at a concentration (18.8 mg/kg) which exceeded the background UTL of 12 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

All three surface soil samples contained magnesium at concentrations (ranging from 2830 mg/kg to 3100 mg/kg) which exceeded the background UTL of 1,930 mg/kg. Therefore, magnesium was considered to exceed background levels and was evaluated further.

One of three surface soil samples contained nickel at a concentration (13.5 mg/kg) which exceeded the background UTL of 11 mg/kg. Therefore, nickel was considered to exceed background levels and was evaluated further.

Subsurface Soil

The maximum detected subsurface soil concentrations of metals were compared to background concentrations (W-C 1997). Barium, calcium, copper, lead, and potassium were considered to exceed background levels. All other metals were considered to be within background levels. Table 5-3 summarizes the comparison and a discussion is given below.

Two of twenty-three subsurface soil samples contained barium at concentrations (ranging from 1,640 mg/kg to 2,390 mg/kg) which exceeded the background UTL of 890 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

Two of twenty-three subsurface soil samples contained calcium at concentrations (ranging from 246,000 to 250,000 mg/kg) which exceeded the background UTL of 237,498 mg/kg. Therefore, calcium was considered to exceeded background levels and was evaluated further.

One of twenty-three subsurface soil samples contained copper at a concentration (14.5 mg/kg) which exceeded the background UTL of 8.3 mg/kg. Therefore, copper was considered to exceed background levels and was evaluated further.

Two of twenty-three subsurface soil samples contained lead at concentrations (15.5 mg/kg and 25.7 mg/kg) which exceeded the background UTL of 8.7 mg/kg. Therefore, lead was considered to exceed background levels and was evaluated further.

One of twenty-three subsurface soil samples contained potassium at a concentration (3,110 mg/kg) which exceeded the background UTL of 2512 mg/kg. Therefore, potassium was considered to exceed background levels and was evaluated further.

Comparison of Site Essential Nutrient Concentrations to RDAs

The maximum detected concentrations of essential nutrients which exceeded background and which do not have EPA Region VI MSSLs established for them were compared to the recommended daily allowances (RDAs) set by the National Research Council.

At SWMU 48A, calcium, magnesium, and potassium were compared to the RDAs. Table 5-4 shows that the maximum detected concentrations of calcium, magnesium, and potassium did not cause estimated potential SWMU daily intake to exceed the RDAs. Therefore, these inorganics would not pose a human health risk and were not evaluated further.

5.5.4 Tier 1 Evaluation

The Tier 1 evaluation involves the comparison of the maximum detected site concentrations to conservative, nonsite-specific, risk-based screening levels to determine whether site conditions satisfy the criteria for a quick regulatory closure or warrant a more site-specific evaluation.

Chemicals of Potential Concern

COPCs were identified based on the chemical analytical data (both historic and current) presented in Table 5-1. Metals which exceeded background levels and all detected organic compounds (except those considered to be laboratory contaminants) were evaluated as COPCs. TPH was not considered to be a COPC because it is a complex chemical mixture with varying constituents. Therefore, individual constituents (e.g., BTEX, PAHs, etc.) were used to evaluate potential impacts from TPH at SWMU 48A.

Tier 1 Comparison

Maximum detected concentrations of COPCs were compared to the EPA Region VI Residential MSSLs. The comparison is shown in Table 5-5. The table shows that none of the detected compounds exceeded the Tier 1 values. Therefore, there are no chemicals of concern (COCs) at SWMU 48A.

5.6 ECOLOGICAL RISK EVALUATION

Certain nondomesticated plants and animals will occur, at least at times, in almost any area that is outdoors, regardless of the absence of "natural" habitat and/or the omnipresence of human activity and artificial structures (buildings, pavement). Thus, strictly speaking, virtually any area outside of a building might include "habitat for ecological receptors." Such essentially artificial habitats are not, however, considered *directly* ecologically relevant because they exist and are configured to support human (industrial) functions. Understanding the concept of "direct ecological relevance" is very important in assessing ecological risk at an active military site.

The initial step in ecological evaluation of a site is determining whether the unit has an *ecological component*. This determination is based on the availability, within the subject unit, of *habitat*. Simply defined, the term habitat means the "place where a plant or animal lives" (USACE 1996; USEPA 1997a), but a more functional definition can be paraphrased as the *type of environment* where an organism (or community of similarly adapted organisms) *normally* lives. If no ecological components are identified, it is concluded that the unit is not of potential ecological concern and no further ecological evaluation is warranted. It is not believed that individual organisms that are occasionally present constitute an ecological component because individuals (unless accorded official protection as endangered or threatened) are not appropriate as assessment endpoints for an ecological risk assessment. As stated by USEPA (1997a), "Ecological effects of most concern are those that can impact populations (or higher levels of biological organization)." By definition, an occasional individual does not constitute a population nor would any effects on an occasional individual be expected to translate into an effect on a population.

SWMU 48A is an asphalt-covered parking lot. This area provides no significant shelter or forage and does not represent any significant ecological component. Formal ecological risk assessment for this SWMU is not warranted.

5.7 VADOSE ZONE CONTAMINANT FATE AND TRANSPORT MODELING

Because chemicals were not detected in soil above MSSLs at SWMU 48A, the fate and transport of contaminants in the vadose, or unsaturated, zone was not modeled.

5.8 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVES

- Results of the human health and ecological risk evaluations indicate that there is minimal risk to human health and the environment based on the maximum detected concentrations of chemicals of concern in soil at SWMU 48A. Therefore, the "No Further Action' alternative was evaluated based on the criteria listed in Section 2.3 and as outlined in the CMS Work Plan (W-C 1998).

1. Technical
   - Performance - the No Further Action alternative is effective at being protective of human health and the environment over extended periods of time. This has been demonstrated through Tier I human health and ecological risk evaluations.
   - Reliability - the No Further Action alternative does not require any operation or maintenance activities and has been proven to be effective before for similar sites and conditions.
   - Implementability - the No Further Action alternative is easy to implement and will meet or exceed applicable standards.
   - Safety - the No Action Alternative poses no threat to the safety of nearby workers.
2. Human Health
   - The No Further Action alternative was determined following the Risk-Based Corrective Action (RBCA) process as outlined in ASTM E1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.
   - Maximum concentrations of chemicals of concern left in place are less than conservative Tier I EPA Region VI Media Specific Screening Levels (MSSLs).
3. Environmental
   - No valued ecological resources are present.
4. Cost
   - The No Further Action alternative is protective of human health and the environment and at the lowest cost.

equipment onto surface soil. Chemicals from the primary source may be transported away from the primary source areas, affecting other media that may in turn act as secondary sources. Mixing and infiltration of the wastes to the subsurface soil are shown as the primary chemical release mechanisms. Subsurface soils are an important secondary source of potential chemical release. Site-related chemicals in soils may infiltrate/percolate through the soil and be released to groundwater.

Other release mechanisms, such as direct contact (soil ingestion and dermal contact), surface runoff, wind erosion, or volatilization to the atmosphere, are also depicted in the SCEM. Transport by storm runoff is not considered a significant pathway for human exposure at SWMU 77 because the site is very flat and there are no developed drainageways on site.

Potential receptors at SWMU 77 include occupational receptors, hypothetical future construction workers, and trespassers. SWMU 77 is located in the industrial area of the Base (Figure 1-2); therefore, residential development is not a likely future land use. Surface soil (upper 2 feet of the soil column) and air emissions (particulate) from surface soil may provide exposure to occupational receptors and hypothetical future trespassers. Surface soil, subsurface soil, and air emissions (volatile and particulate) may provide exposures to hypothetical future construction workers during excavation activities.

Groundwater is used for domestic purposes on and off Base. However, potential groundwater exposures were not evaluated because fate and transport modeling indicates that groundwater will not be impacted (see Section 6.9).

In summary, the potentially complete human exposure pathways at SWMU 77 are:

Occupational Receptors

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

Hypothetical Future Construction Workers

- Ingestion of subsurface and surface soil
- Dermal Contact with subsurface and surface soil
- Inhalation of volatile emissions and airborne particulate matter from subsurface and surface soil

Hypothetical Future Trespassers

- Ingestion of surface soil
- Dermal Contact with surface soil
- Inhalation of airborne particulate matter from surface soil

6.7.2 Site Classification

Site classification is a prioritization step that is used to judge the urgency of the need for initial response actions and maximizes the effectiveness of limited resources. There are four classes of sites:

Class 1: Immediate threat to human health and safety or sensitive environmental receptors

Class 2: Short-term threat to human health and safety or sensitive environmental receptors

Class 3: Long-term threat to human health and safety or sensitive environmental receptors

Class 4: No demonstrable threat to human health and safety or sensitive environmental receptors

This site presents no explosive threat and contains no free product, no surface water, and no groundwater discharges. There are no public facilities (i.e., daycares, parks, schools, dwellings) located on or near the site. The nearest potable groundwater aquifer is located more than 250 feet bgs. Additionally, access to soils is limited primarily to Base personnel. Therefore, SWMU 77 was considered to be a Class 4 site.

6.7.3 Background Comparison

Metals are natural constituents of soils and water. Metals that occur in concentrations within background levels are not considered site-related chemicals of concern and are not evaluated further. To determine if the concentrations of metals detected in surface and subsurface soil at SWMU 77 exceeded background concentrations, the maximum detected concentrations at the site were compared to calculated background UTLs. The UTLs used in this comparison were calculated as part of the background study for Cannon AFB (W-C 1997). Maximum detected concentrations from surface soils were compared to surface soil UTLs. Maximum detected concentrations from subsurface soils were compared to subsurface UTLs. If the maximum detected concentration exceeded the background UTL, the metal was considered to exceed background and was evaluated in the Tier 1 screen.

Surface Soil

The maximum detected surface soil concentrations of metals were compared to background concentrations (W-C 1997). Aluminum, barium, cadmium, calcium, iron, lead, magnesium, manganese, silver, and zinc were considered to exceed background levels. All other metals were considered to be within background levels. Table 6-6 summarizes the comparison and a discussion is given below.

One of eleven surface soil samples contained aluminum at a concentration (9860 mg/kg) which exceeded the background UTL of 8,950 mg/kg. Therefore, aluminum was considered to exceed background levels and was evaluated further.

One of nine surface soil samples contained barium at a concentration (691 mg/kg) which exceeded the background UTL of 670 mg/kg. Therefore, barium was considered to exceed background levels and was evaluated further.

An exposure frequency of 60 days per year was assumed for the commercial worker scenario. Although the SWMU is still active, no one works routinely (8 hours/day, 250 days/year) at the O/WS, the leach field, nor the vehicle washrack. Additionally, the SWMU does not require significant ground maintenance/landscaping because of limited rainfall in the area. Therefore, regular exposure of Base workers to soils at SWMU 127 is unlikely and the assumption of 60 days per year (5 days per month) is conservative and provides protection for Base workers. All other exposure parameter were considered to be the standard default values. Appendix C shows all the input parameters and assumptions used to calculate the SSTLs for COCs at SWMU 127.

The SSTLs for COCs at SWMU 127 and their maximum detected concentrations are shown below.

COCs	SSTLs	Maximum Concentrations	
Benzo(a)anthracene	4.3 mg/kg	8 mg/kg	7.8
Benzo(a)pyrene	0.43 mg/kg	8.6 mg/kg	.78
Benzo(b)fluoranthene	1.3 mg/kg	17 mg/kg	7.8
Dibenzo(a,h)anthracene	3.7 mg/kg	0.28 mg/kg	0.78
Benzene	4.6 mg/kg	3.8 mg/kg	1.5
Xylenes	23,000 mg/kg	260 mg/kg	210

The maximum detected concentrations for benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene exceeded their SSTLs. All other COCs were below their SSTLs.

Detections that exceeded SSTLs included benzo(a)anthracene in one surface soil sample, benzo(a)pyrene in five surface soil samples, and benzo(b)fluoranthene in two surface soil samples. Concentrations of these three COCs decreased with depth to nondetect in all soil borings (see Figure 7-3). The maximum concentrations of these COCs occurred during the Phase I RFI (W-C 1994a). The concentrations were used for comparisons to SSTLs and the Baseline Risk Assessment (W-C 1994b). The Baseline Risk Assessment (BRA) included both human health and ecological risk evaluations and concluded that the risk was within USEPA acceptable levels. The BRA is included with Appendix C.

7.6 ECOLOGICAL RISK EVALUATION

Certain nondomesticated plants and animals will occur, at least at times, in almost any area that is outdoors, regardless of the absence of "natural" habitat and/or the omnipresence of human activity and artificial structures (buildings, pavement). Thus, strictly speaking, virtually any area outside of a building might include "habitat for ecological receptors." Such essentially artificial habitats are not, however, considered *directly* ecologically relevant because they exist and are

TABLE 7-6

COMPARISON OF SWMU 127 MAXIMUM SOIL CONCENTRATIONS TO MSSLs
CANNON AFB, NEW MEXICO

Chemical	Maximum Detected Concentration (mg/kg)	Qual	Residential Soil MSSL Concentration[1] (mg/kg)	Exceeds MSSL?
VOLATILE ORGANICS				
1,1,1-Trichloroethane	0.0018	0.1	690 1400	NO
1,1-Dichloroethene	0.0019		0.53	NO
1,2-Dichloroethane	0.0019		0.34	NO
1,2-Dichloroethene (total)**	0.0013		42	NO
1,2-Dichloropropane	0.013		0.35	NO
2-Butanone	0.0062		6900	NO
Acetone	7.5		1400	NO
Benzene	3.8		0.62	YES
Carbon Tetrachloride	0.0027		0.23	NO
Chlorobenzene	0.0013		54	NO
Ethylbenzene	54		230	NO
Methylene Chloride	0.0067		8.5	NO
Tetrachloroethene	0.0029	.003	4.7 .55	NO
Toluene	82	0.6	520	NO
Trichloroethene	0.0023	.003	2.7	NO
Xylenes	260	10.0	210	YES
SEMIVOLATILE ORGANICS				
2-Methylnaphthalene*	40	4	55	NO
Acenaphthene	0.15	29	2600	NO
Anthracene	0.068		14000	NO
Benzo(a)anthracene	8.00	.08	0.56	YES
Benzo(a)pyrene	8.60	.4	0.056	YES
Benzo(b)fluoranthene	17.00	8	0.56	YES
Benzo(g,h,i)perylene*	5.1	4	55	NO
Benzo(k)fluoranthene	1.60	.08	5.6	NO
Benzoic acid	0.048	20	100,000	NO
Bis(2-ethylhexyl)phthalate	4.7	180	32	NO
Butylbenzylphthalate	0.110	810	240	NO
Carbazole	1.500	.03	22	NO
Chrysene	14.0	8	56	NO
Dibenzo(a,h)anthracene	0.280	.08	0.056	YES
Di-n-Butyl phthalate	0.19		5500	NO
Di-n-octyl phthalate	0.31		1100	NO
Diethylphthalate	0.046		44000	NO
Fluoranthene	17	210	2000	NO
Fluorene	0.29	28	1800	NO
Indeno(1,2,3)pyrene	5.1		0.56	NO YES
Phenanthrene*	8.1	4	55	NO
Pyrene	17	210	1500	NO
TRPH	11600		NA	

TABLE 7-6

COMPARISON OF SWMU 127 MAXIMUM SOIL CONCENTRATIONS TO MSSLs
CANNON AFB, NEW MEXICO

Chemical	Maximum Detected Concentration (mg/kg)	Qual	Residential Soil MSSL Concentration[1] (mg/kg)	Exceeds MSSL?
METALS				
Antimony	7.8		30	NO
Barium	2840		5200	NO
Beryllium	0.83		150	NO
Cadmium	4.2		37	NO
Chromium	25.4		30	NO
Copper	14.5		2800	NO
Iron	11,500		22,000	NO
Lead	48.5		400	NO
Manganese	440		3100	NO
Selenium	0.27		370	NO
Silver	3.6		370	NO
Zinc	73.8		22000	NO

(1) EPA Region Media-Specific Screening Levels for Residential Soil (EPA 1998)

* The MSSL for naphthalene was used as a surrogate for these PAHs. See text.

** The MSSL for cis-1,2-dichloroethylene was used as a surrogate. See text.

mg/kg = milligrams per kilogram

FINAL REPORT - APPENDIXES

CORRECTIVE MEASURES STUDY AT SWMUS 31, 48A, 77, AND 127 CANNON AFB, NEW MEXICO

Prepared for
U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

June 2000

APPENDIX A

Daily Quality Control Reports (DQCRs), Sample Collection Field Sheets (SCFSs), and Survey Data for SWMU 77 CMS Field Investigation

W-C DAILY QUALITY CONTROL REPORT

Date 12-03-98

Day	S	M	T	W	TH	F	S
					X		

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X	X	
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	Report No.	
			X	77-1	
Humidity	Dry	Moderate	Humid		
			X		

COE Project Manager Steve Peterson
Project Cannon AFB, SWMU 77
Project No. 45FM9602CC.00
Contract No. DACA-45-96-D-0017

Subcontractors on Site: None

Equipment on Site: PID, hand auger, decon equipment

Visitors on Site: John Pike, Cannon AFB

W-C Personnel on Site: Mike Sonderman, Dan Galde

Work Performed (including sampling): Located SWMU 77 boring locations. Drilled + sampled 2 hand auger borings ~~for~~ near boring 7710 and collected 4 samples for PCB analysis. Drilled one hand auger boring near 7709 and collected 2 samples for 8260A VOCs, 8270 SVOCs, 8081 Pest. ~~PCBs~~ 418.1 TRPH.

Project SWMU-77 Report No. 77-1
Project No. 45FM9602CC.00 Date 12-03-98

Quality Control Activities (including field calibration): Calibrated PID to 100 ppm
Isobutylene. collected following QA/QC samples:
C77-HA01-303 (QA sp(4); C77-HA02-203 (dup)
C77-HA01-101 (MS/MSD
Health and Safety and Activities: PPE = Level D
Problems Encountered/Corrective Actions Taken: None
Downtime/Standby: None
Office Work Performed/ Additional Comments: ~~[illegible]~~ paper work

By Michael M. Sonderman Title Site Manager

Michael M. Sonderman

Sheet 2 of 2

W-C DAILY QUALITY CONTROL REPORT

Date 12-05-98

Day	S	M	T	W	TH	F	S
							X

Weather	Bright Sun	Clear	Overcast	Rain	Snow
		X			
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	Report No.	
			X	77-2	
Humidity	Dry	Moderate	Humid		
	X				

COE Project Manager Steve Peterson
Project Cannon AFB, SWMU 77
Project No. 45FM9602CC.00
Contract No. DACA-45-96-D-0017

Subcontractors on Site: None

Equipment on Site: PID, Hand auger equipment, decon equipment

Visitors on Site: None

W-C Personnel on Site: Mike Sonderman, Dan Galde

Work Performed (including sampling): Mob sampled as drilled and sampled following hand auger borings HA-04, HA05, HA06. collected 2 samples per boring. Tried to contact base personnel to access CEV storage Area. Retrieved samples for following analysis: 8260 A VOCs, 8270 SVOCs/8081 Pest., 418.1 TRPH and 8015 TPH DRO.

Project SWMU-77 Report No. 77-2
Project No. 45FM9602CC.00 Date 12-05-98

Quality Control Activities (including field calibration): Calibrated PID to 100 ppm

Isobutylene. Collected MS/MSD C77-HA05-104

Health and Safety and Activities: PPE = Level D

Problems Encountered/Corrective Actions Taken: Could not access HA07 thru HA09 locations. Will try again tomorrow.

Downtime/Standby: None

Office Work Performed/ Additional Comments: filled out COCs and other paper work.

By Michael M. Sonderman Title Site Manager

W-C DAILY QUALITY CONTROL REPORT

Date 12-06-98

Day	S	M	T	W	TH	F	S
	X						

Weather	Bright Sun	Clear	Overcast	Rain	Snow
		X			
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	Report No.	
			X	77-3	
Humidity	Dry	Moderate	Humid		
	X				

COE Project Manager Steve Peterson
Project Cannon AFB, SWMU 77
Project No. 45FM9602CC.00
Contract No. DACA-45-96-D-0017

Subcontractors on Site: None

Equipment on Site: Hand auger equipment, PID, decon equipment, pick axe

Visitors on Site: None

W-C Personnel on Site: Mike Sonderman, Dan Galde

Work Performed (including sampling): Drilled + Sampled HA07 thru HA09, Collected samples for 8260A VOCs, 8270 SVOCs, 418.1 TRPH + ~~TPH~~ sample, Patched asphalt at all 3 boring locations.

Project SWMU-77 Report No. 77.3
Project No. 45FM9602CC.00 Date 12-06-98

Quality Control Activities (including field calibration): Calibrated PID to 100 ppm Isobutylene.

Health and Safety and Activities: PPE = Level D

Problems Encountered/Corrective Actions Taken:

Gained access to CE Storage Area.

Downtime/Standby:

Office Work Performed/ Additional Comments: Started packing supplies for demob, cleaned van, packed coolers.

By Michael M. Sonderman Title Site Manager

Michael M. Sonderman

W-C DAILY QUALITY CONTROL REPORT

Date 12-07-98

Day	S	M	T	W	TH	F	S
		X					

Weather	Bright Sun	Clear	Overcast	Rain	Snow
					X

Temp	To 32	32-50	50-70	70-85	85 up
	X				

Wind	Still	Moderate	High	Report No.
		X		

Humidity	Dry	Moderate	Humid	
			X	77-4

COE Project Manager Steve Peterson
Project Cannon AFB, SWMU 77
Project No. 45FM9602CC.00
Contract No. DACA-45-96-D-0017

Subcontractors on Site: Lydick Surveyors

Equipment on Site: None

Visitors on Site: None

W-C Personnel on Site: Mike Sonderman, Dan Galde

Work Performed (including sampling): Dropped off coolers at CE Building for Fed Ex pick up. Called for pick up of supplies at hotel. Dropped off Landfill 5 staging area keys. Drove to Albequerque & flew back to Omaha.

Project SWMU-77 Report No. 77-4
Project No. 45FM9602CC.00 Date 12-07-98

Quality Control Activities (including field calibration): ~~Calibrated PID to 100 ppm Isobutylene.~~ MS

Health and Safety and Activities: PPE = Level D

Problems Encountered/Corrective Actions Taken: Missed flight due to snow. Made next flight out of Albuquerque to Denver.

Downtime/Standby: ~ 2 hours.

Office Work Performed/ Additional Comments:

By Michael M. Sonderman Title Site Manager

Michael M. Sonderman

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **Cannon AFB, NM** PROJECT NO. **45FM9602CC.00**

SAMPLE NO. C77-HA01-001 BORING NO. 77-HA01

DATE/TIME COLLECTED: 12-03-98 / 1018 PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: **Stainless steel hand auger** / 0.6'-1.1' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES NO SPLIT SAMPLE NO.

SAMPLE QC DUPLICATE: YES NO DUPLICATE SAMPLE NO.

MS/MSD REQUESTED: (YES) NO MS/MSD C77-HA01-101

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
1 - 8 oz. glass jar	4° C	8082, PCB
1-8oz " "	4°C	8082 PCB MS/MSD

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH: 0-0.6' bgs DESCRIPTION: Loose, moist, red, gravel (GC), with clay and fine sand (fill)

0.6' - 1.1' bgs med. stiff, moist, red, low plastic silt (ML), with some clay and fine sand (Alluvium)

GENERAL COMMENTS

River rock gravel on ground surface
Sample interval = 0.6' to 1.1' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA01-003

BORING NO. 77-HA01

DATE/TIME COLLECTED: 12-03-98 / 1033

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 2.6-3.6' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: (YES) NO

SPLIT SAMPLE NO. C77-HA01-303 Lab's #5432

SAMPLE QC DUPLICATE: YES [NO]

DUPLICATE SAMPLE NO.

MS/MSD REQUESTED: YES [NO]

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
1 - 8 oz. glass jar	4° C	8082, PCB
1-8oz glass jar	4°C	8082 PCB (QA split)

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH: 2.6-3.6' bgs DESCRIPTION: med. stiff, sl. moist, red, low plastic silt (ML), with some fine sand, very lightly cemented nodules

GENERAL COMMENTS

Sample from 2.6-3.6' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **Cannon AFB, NM** PROJECT NO. **45FM9602CC.00**

SAMPLE NO. C77-HA02-001 BORING NO. 77-HA02

DATE/TIME COLLECTED: 12-03-98 / 1043 PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: **Stainless steel hand auger** / 0.3 - 0.8' bgs

SAMPLE MEDIA:	SOIL	SEDIMENT	SLUDGE
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.
MS/MSD REQUESTED:	YES	NO	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
1 - 8 oz. glass jar	4° C	8082, PCB

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
0-0.3' bgs	Loose, moist, red gravel (GC) with clay + fine sand (fill)
0.3-0.8' bgs	med. stiff, moist, red low plastic silt (ML) with clay and fine sand

GENERAL COMMENTS

Sample interval from 0.3 to 0.8' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **Cannon AFB, NM** PROJECT NO. **45FM9602CC.00**

SAMPLE NO. C77-HA02-003 BORING NO. 77-HA02

DATE/TIME COLLECTED: 12-03-98 / 1049 PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: **Stainless steel hand auger** / 2.3'-3.3' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES [NO] SPLIT SAMPLE NO.

SAMPLE QC DUPLICATE: [YES] NO DUPLICATE SAMPLE NO. C77-HA02-203

MS/MSD REQUESTED: YES [NO]

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
1 - 8 oz. glass jar	4° C	8082, PCB
1-8oz glass jar	4°C	8082, PCB Dup.

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH: 2.3-3.3' bgs DESCRIPTION: med. stiff, sl. moist, red low plastic silt (ML) with some fine sand.

GENERAL COMMENTS

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **Cannon AFB, NM** PROJECT NO. **45FM9602CC.00**

SAMPLE NO. C77-HA03-001 BORING NO. HA 03

DATE/TIME COLLECTED: 12-03-98 / 1332 PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: **Stainless steel hand auger** / 1.3-1.8' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES [NO] SPLIT SAMPLE NO.

SAMPLE QC DUPLICATE: YES [NO] DUPLICATE SAMPLE NO.

MS/MSD REQUESTED: YES [NO]

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	* 3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH
~~1 - 8 oz. glass jar~~	4° C	* 8081 Pest.

* in same 8oz jar

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
0-0.5' bgs	gravel
0.5-1.3' bgs	med. stiff, moist, red, fine sand (SM) with silt and asphalt
1.3'-1.8' bgs	med. stiff, moist, ~~red~~ lt reddish-brown, low plastic silt (ML) with trace clay

GENERAL COMMENTS

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **Cannon AFB, NM** PROJECT NO. **45FM9602CC.00**

SAMPLE NO. C77-HA03-004 BORING NO. HA03

DATE/TIME COLLECTED: 12-03-98 / 1344 PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: **Stainless steel hand auger** / 2.8'-3.8' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES NO SPLIT SAMPLE NO.

SAMPLE QC DUPLICATE: YES NO DUPLICATE SAMPLE NO.

MS/MSD REQUESTED: YES NO

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	* 3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH
~~1 - 8 oz. glass jar~~	4° C	* 8081 Pest.

* In same 8 oz jar

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
2.8-3.8' bgs	med. stiff red, moist, low plastic silt (ML)

GENERAL COMMENTS

Sample from 2.8'-3.8' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77 - HA04 - 001

BORING NO. HA04

DATE/TIME COLLECTED: 12-05-98 / 1055

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 0.5' - 1.0' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES [NO]

SAMPLE QC DUPLICATE: YES [NO]

MS/MSD REQUESTED: YES [NO]

SPLIT SAMPLE NO.

DUPLICATE SAMPLE NO.

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	* 3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH
~~1 - 8 oz. glass jar~~	~~4° C~~	* 8081 Pest.

* in same 8 oz jar

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH: 0 - 0.5' DESCRIPTION: stiff, moist, red low plastic silt (ML) with gravel and sand (fill)

0.5' - 1.0' bgs red, stiff, moist, red low plastic silt (ML) with trace white mineralization

GENERAL COMMENTS

Sample from 0.5 - 1.0' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA04-004

BORING NO. HA04

DATE/TIME COLLECTED: 12-05-98 / 1105

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 2.5' - 3.5' bgs

SAMPLE MEDIA:	SOIL	SEDIMENT	SLUDGE
SAMPLE QA SPLIT:	YES	NO	
SAMPLE QC DUPLICATE:	YES	NO	
MS/MSD REQUESTED:	YES	NO	

SPLIT SAMPLE NO.

DUPLICATE SAMPLE NO.

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	* 3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH
~~1 - 8 oz. glass jar~~	4° C	* 8081 Pest.

* in same 8 oz glass jar

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH: 2.5'-3.5' bgs

DESCRIPTION: med. stiff, moist, red low plastic silt (ML) with lighter caliche material in last 0.1' of auger.

GENERAL COMMENTS

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA05-001

BORING NO. HA05

DATE/TIME COLLECTED: 12-05-98 / 1128

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 0.5-1.0' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES [NO]

SAMPLE QC DUPLICATE: YES [NO]

MS/MSD REQUESTED: YES [NO]

SPLIT SAMPLE NO.

DUPLICATE SAMPLE NO.

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	* 3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH
~~1 - 8 oz. glass jar~~	4° C	* 8081 Pest.

* In same 8oz jar

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
0.0-0.5' bgs	med stiff, moist, red low plastic silt (ML) with gravel (fill)
0.5'-1.0' bgs	med stiff, moist, red low plastic silt (ML)

GENERAL COMMENTS

Sample from 0.5'-1.0' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA05-004

BORING NO. HA05

DATE/TIME COLLECTED: 12-05-98 / 1138

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 2.5'-3.5'

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES NO

SPLIT SAMPLE NO.

SAMPLE QC DUPLICATE: YES NO

DUPLICATE SAMPLE NO. C77-HA05-104

MS/MSD REQUESTED: YES NO

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	* 3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH
~~1 - 8 oz. glass jar~~	4° C	* 8081 Pest.

* in same 8oz jar

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
2.5'-3.5' bgs	med. stiff, moist, red, low plastic silt (ML)

GENERAL COMMENTS

Sample collected from 2.5'-3.5' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA06-001

BORING NO. HA06

DATE/TIME COLLECTED: 12-05-98/1157

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 0.5'-1.0' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES [NO]

SAMPLE QC DUPLICATE: YES [NO]

MS/MSD REQUESTED: YES [NO]

SPLIT SAMPLE NO.

DUPLICATE SAMPLE NO.

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	* 3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH
~~1 - 8 oz. glass jar~~	4° C	* 8081 Pest.

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
0.0-0.5' bgs	med stiff, moist, red low plastic silt (ML) with gravel (fill)
0.5'-1.0' bgs	med stiff, moist, red low plastic silt (ML)

GENERAL COMMENTS

Sample from 0.5' to 1.0' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **Cannon AFB, NM** PROJECT NO. **45FM9602CC.00**

SAMPLE NO. C77-HA06-004 BORING NO. HA06

DATE/TIME COLLECTED: 12-05-98 / 1212 PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: **Stainless steel hand auger** / 2.5-3.5' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES SPLIT SAMPLE NO. C77-HA06-304

SAMPLE QC DUPLICATE: YES DUPLICATE SAMPLE NO. C77-HA06-204

MS/MSD REQUESTED: YES NO

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	* 3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	8015 TPH (DRO)
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH
~~1 - 8 oz. glass jar~~	4° C	* 8081 Pest.

* in same 8 oz glass jar

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
2.5'-3.5' bgs	med. stiff, moist, red, low plastic silt (ML) with few caliche nodules at 3.3 to 3.5' bgs

GENERAL COMMENTS

Sample from 2.5' to 3.5' bgs collected 8015 TPH sample.

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA07-002

BORING NO. HA07

DATE/TIME COLLECTED: 12-06-98 / 1055

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 1.5-2.0' bgs

SAMPLE MEDIA:	SOIL	SEDIMENT	SLUDGE
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.
MS/MSD REQUESTED:	YES	~~NO~~	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
0-0.3' bgs	asphalt pavement
0.3-1.5' bgs	Loose, moist, red, fine-grained sand (SC) with silt and gravel (SW grade)
1.5-2.0' bgs	med. stiff, moist, red, low plastic silt (ML)

GENERAL COMMENTS

Sample from 1.5'-2.0' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA07-005

BORING NO. HA07

DATE/TIME COLLECTED: 12-06-98 / 1110

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 3.5'-4.5' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES NO SPLIT SAMPLE NO.

SAMPLE QC DUPLICATE: YES NO DUPLICATE SAMPLE NO.

MS/MSD REQUESTED: YES ~~NO~~

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
3.5-4.5' bgs	red, stiff, moist, red low plastic silt (ML), trace fine sand.

GENERAL COMMENTS

sample from 3.5-4.5' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **Cannon AFB, NM** PROJECT NO. **45FM9602CC.00**

SAMPLE NO. C77-HA08-003 BORING NO. HA08

DATE/TIME COLLECTED: 12-06-98/1125 PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: **Stainless steel hand auger / 2.0-2.5'**

SAMPLE MEDIA:	SOIL	SEDIMENT	SLUDGE
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.
MS/MSD REQUESTED:	YES	NO	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
0-0.3'	asphalt pavement
0.3-2.0' bgs	Loose, sl. moist, red fine-grained sand (SC) with trace gravel (subgrade)
2.0-2.5'	med. stiff, ~~[illegible]~~ moist, red low plastic silt (ML)

GENERAL COMMENTS

Sample collected from 2.0-2.5' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA08~~B~~-006

BORING NO. HA08

DATE/TIME COLLECTED: 12-06-98 / 1140

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 4-6' bgs

SAMPLE MEDIA: SOIL SEDIMENT SLUDGE

SAMPLE QA SPLIT: YES NO

SAMPLE QC DUPLICATE: YES NO

MS/MSD REQUESTED: YES NO

SPLIT SAMPLE NO.

DUPLICATE SAMPLE NO.

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	~~8015 TPH (DRO)~~
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH:	DESCRIPTION:
4-6'	med stiff, moist, red low plastic silt (ML) trace fine sand, caliche in tip of auger

GENERAL COMMENTS

Sample collected from 4-6' bgs

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **Cannon AFB, NM** PROJECT NO. **45FM9602CC.00**

SAMPLE NO. C77-HA09-002 BORING NO. HA09

DATE/TIME COLLECTED: 12-06-98 / 1200 PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: **Stainless steel hand auger / 1.0'-1.5' bgs**

SAMPLE MEDIA:	SOIL	SEDIMENT	SLUDGE
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.
MS/MSD REQUESTED:	YES	NO	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	•8015 TPH (DRO)
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH: 0-0.3 DESCRIPTION: asphalt pavement

0.3'-1.0' bgs loose, sl. moist, red fine sand (SC) with silt + gravel (subgrade)

1.0'-1.5' bgs med. stiff, moist, red low plastic silt (ML)

GENERAL COMMENTS

sample collected from 1.0-1.5' bgs
collected 8015 TPH

SOIL SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: Cannon AFB, NM

PROJECT NO. 45FM9602CC.00

SAMPLE NO. C77-HA09-005

BORING NO. HA09

DATE/TIME COLLECTED: 12-06-98 / ~~1227~~ mt 1215

PERSONNEL: M. Sonderman, D. Galde

SAMPLE METHOD / DEPTH: Stainless steel hand auger / 3-5' bgs

SAMPLE MEDIA:	SOIL	SEDIMENT	SLUDGE
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.
MS/MSD REQUESTED:	YES	NO	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 4 oz. glass jar	4° C	8260A VOCs
1 - 8 oz. glass jar	4° C	3550B/8270B SVOCs
1 - 8 oz. glass jar	4° C	9071/418.1 TRPH

HNU MEASUREMENTS

Background	0
Breathing zone	0
Boring	0
Headspace	0

SAMPLE DESCRIPTION

DEPTH: 3-5' bgs

DESCRIPTION:

GENERAL COMMENTS

collected sample from 3-5' bgs.

SURVEY DATA FOR SWMU 77 CMS FIELD ACTIVITIES
CANNON AFB, NEW MEXICO

Location	Northing	Easting	Elevation (ft. above MSL)
HA01	1239627.20	809291.18	4323.64
HA02	1239588.99	809279.29	4323.25
HA03	1239488.00	809284.79	4322.64
HA04	1239460.55	809282.98	4322.25
HA05	1239459.09	809242.80	4322.04
HA06	1239467.18	809212.90	4322.12
HA07	1239546.51	808858.53	4323.51
HA08	1239573.54	808843.16	4324.13
HA09	1239607.61	808833.87	4323.64

ft. = feet
MSL = Mean sea level

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA01-001			C77-HA01-003			C77-HA02-001			C77-HA02-003			C77-HA03-001			C77-HA03-004		
COLLECT DATE			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8260) (µg/kg)																				
1,1,1-Trichloroethane		0/14													<	33	U	<	33	U
1,1,2,2-Tetrachloroethane		0/14													<	33	U	<	33	U
1,1,2-Trichloroethane		0/14													<	33	U	<	33	U
1,1-Dichloroethane		0/14													<	33	U	<	33	U
1,1-Dichloroethene		0/14													<	33	U	<	33	U
1,2-Dichloroethane		0/14													<	33	U	<	33	U
1,2-Dichloropropane		0/14													<	33	U	<	33	U
2-Hexanone		0/14													<	56	U	<	55	U
Acetone		0/14													<	56	U	<	55	U
Benzene		0/14													<	33	U	<	33	U
Bromodichloromethane		0/14													<	33	U	<	33	U
Bromoform		0/14													<	33	U	<	33	U
Bromomethane		0/14													<	33	U	<	33	U
Carbon Disulfide		0/14													<	33	U	<	33	U
Carbon Tetrachloride		0/14													<	33	U	<	33	U
Chlorobenzene		0/14													<	33	U	<	33	U
Chloroethane		0/14													<	33	U	<	33	U
Chloroform		0/14													<	33	U	<	33	U
Chloromethane	12	1/14													<	33	U	<	33	U
cis-1,2-Dichloroethylene		0/14													<	33	U	<	33	U
cis-1,3-Dichloropropene		0/14													<	33	U	<	33	U
Dibromochloromethane		0/14													<	33	U	<	33	U
Dichlorodifluoromethane		0/14													<	33	U	<	33	U
Ethylbenzene		0/14													<	33	U	<	33	U
M,P-Xylene (Sum of Isomers)		0/14													<	33	U	<	33	U
Methyl Ethyl Ketone (2-Butanone)		0/14													<	33	U	<	33	U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)		0/14													<	56	U	<	55	U
Methylene Chloride		0/14													<	56	U	<	55	U
O-Xylene (1,2-Dimethylbenzene)		0/14													<	42	U	<	38	U
Styrene		0/14													<	33	U	<	33	U
Tetrachloroethylene(PCE)		0/14													<	33	U	<	33	U
Toluene		0/14													<	33	U	<	33	U
trans-1,2-Dichloroethene		0/14													<	33	U	<	33	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA01-001			C77-HA01-003			C77-HA02-001			C77-HA02-003			C77-HA03-001			C77-HA03-004		
COLLECT DATE			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8260) (µg/kg), cont.																				
trans-1,3-Dichloropropene		0/14													<	33	U	<	33	U
Trichloroethylene (TCE)		0/14													<	33	U	<	33	U
Trichlorofluoromethane		0/14													<	33	U	<	33	U
Vinyl Chloride		0/14													<	33	U	<	33	U
SEMIVOLATILE ORGANICS (METHOD 8270) (µg/kg)																				
1,2,4-Trichlorobenzene		0/14													<	37	U	<	37	U
1,2-Dichlorobenzene		0/14													<	37	U	<	37	U
1,2-Diphenylhydrazine		0/14													<	74	U	<	73	U
1,3-Dichlorobenzene		0/14													<	37	U	<	37	U
1,4-Dichlorobenzene		0/14													<	37	U	<	37	U
2,2'-Oxybis(1-Chloro)Propane		0/14													<	37	U	<	37	U
2,4,5-Trichlorophenol		0/14													<	74	U	<	73	U
2,4,6-Trichlorophenol		0/14													<	74	U	<	73	U
2,4-Dichlorophenol		0/14													<	74	U	<	73	U
2,4-Dimethylphenol		0/14													<	37	U	<	37	U
2,4-Dinitrophenol		0/14													<	370	UJ	<	370	UJ
2,4-Dinitrotoluene		0/14													<	74	U	<	73	U
2,6-Dinitrotoluene		0/14													<	74	U	<	73	U
2-Chloronaphthalene		0/14													<	37	U	<	37	U
2-Chlorophenol		0/14													<	37	U	<	37	U
2-Methylnaphthalene		0/14													<	37	U	<	37	U
2-Methylphenol (O-Cresol)		0/14													<	37	U	<	37	U
2-Nitroaniline		0/14													<	74	U	<	73	U
2-Nitrophenol		0/14													<	37	U	<	37	U
3,3'-Dichlorobenzidine		0/14													<	370	U	<	370	U
3-Nitroaniline		0/14													<	190	U	<	180	U
4,6-Dinitro-2-Methylphenol		0/14													<	370	UJ	<	370	UJ
4-Bromophenyl Phenyl Ether		0/14													<	74	U	<	73	U
4-Chloro-3-Methylphenol		0/14													<	37	U	<	37	U
4-Chloroaniline		0/14													<	37	U	<	37	U
4-Chlorophenyl Phenyl Ether		0/14													<	37	U	<	37	U
4-Methylphenol (P-Cresol)		0/14													<	37	U	<	37	U
4-Nitroaniline		0/14													<	74	U	<	73	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA01-001			C77-HA01-003			C77-HA02-001			C77-HA02-003			C77-HA03-001			C77-HA03-004		
COLLECT DATE			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg), cont.																				
4-Nitrophenol		0/14													<	370	U	<	370	U
Acenaphthene		0/14													<	37	U	<	37	U
Acenaphthylene		0/14													<	37	U	<	37	U
Aniline		0/14													<	37	U	<	37	U
Anthracene		0/14													<	37	U	<	37	U
Benzidine		0/14													<	930	U	<	920	U
Benzo(a)anthracene	35	2/14													<	37	U	<	37	U
Benzo(a)pyrene	39	2/14													<	37	U	<	37	U
Benzo(b)fluoranthene	36	2/14													<	37	U	<	37	U
Benzo(g,h,i)perylene	13	1/14													<	37	U	<	37	U
Benzo(k)fluoranthene	32	2/14													<	37	U	<	37	U
Benzoic Acid		0/14													<	930	U	<	920	U
Benzyl Alcohol		0/14													<	37	U	<	37	U
Benzyl Butyl Phthalate		0/14													<	37	U	<	37	U
bis(2-Chloroethoxy) Methane		0/14													<	37	U	<	37	U
bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)		0/14													<	37	U	<	37	U
bis(2-Ethylhexyl) Phthalate	1700	1/14													<	37	U	<	37	U
Carbazole		0/14													<	37	U	<	37	U
Chrysene	39	2/14													<	37	U	<	37	U
Di-N-Butyl Phthalate	20	1/14													<	37	U	<	37	U
Di-N-Octylphthalate	450	6/14													<	37	U	25	37	
Dibenz(a,h)anthracene	10	1/14													<	37	U	<	37	U
Dibenzofuran		0/14													<	37	U	<	37	U
Diethyl Phthalate		0/14													<	37	U	<	37	U
Dimethyl Propanedioic		0/14													<	37	U	<	37	U
Fluoranthene	87	4/14													<	37	U	<	37	U
Fluorene		0/14													<	37	U	<	37	U
Hexachlorobenzene		0/14													<	74	U	<	73	U
Hexachlorobutadiene		0/14													<	37	U	<	37	U
Hexachlorocyclopentadiene		0/14													<	74	U	<	73	U
Hexachloroethane		0/14													<	74	U	<	73	U
Indeno(1,2,3-c,d)pyrene	25	1/14													<	37	U	<	37	U
Isophorone		0/14													<	37	U	<	37	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA01-001			C77-HA01-003			C77-HA02-001			C77-HA02-003			C77-HA03-001			C77-HA03-004		
COLLECT DATE			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg), cont.																				
N-Nitrosodi-N-Propylamine		0/14													<	37	U	<	37	U
N-Nitrosodiphenylamine		0/14													<	37	U	<	37	U
Naphthalene		0/14													<	37	U	<	37	U
Nitrobenzene		0/14													<	37	U	<	37	U
Pentachlorophenol		0/14													<	370	U	<	370	U
Phenanthrene	35	2/14													<	37	U	<	37	U
Phenol		0/14													<	37	U	<	37	U
Pyrene	72	2/14													<	37	U	<	37	U
PESTICIDES/PCB (μg/kg)																				
Aldrin		0/8													<	1.9	U	<	1.9	U
Alpha BHC (Alpha Hexachlorocyclohexane)		0/8													<	1.9	U	<	1.9	U
Alpha Endosulfan		0/8													<	1.9	U	<	1.9	U
Alpha-Chlordane		0/8													<	1.9	U	<	1.9	U
Beta BHC (Beta Hexachlorocyclohexane)		0/8													<	1.9	U	<	1.9	U
Beta Endosulfan		0/8													<	3.7	U	<	3.6	U
Chlordane		0/8													<	370	U	<	360	U
DDD (1,1-bis(Chlorophenyl)-2,2-Dichloroethane)		0/8													<	3.7	U	<	3.6	U
DDE (1,1-bis(Chlorophenyl)-2,2-Dichloroethene)	3.46	2/9													<	3.7	U	<	3.6	U
DDT (1,1-bis(Chlorophenyl)-2,2,2-Trichloroethane)	4.56	2/9													<	3.7	U	<	3.6	U
Delta BHC (Delta Hexachlorocyclohexane)		0/8													<	1.9	U	<	1.9	U
Dieldrin		0/8													<	3.7	U	<	3.6	U
Endosulfan Sulfate		0/8													<	3.7	U	<	3.6	U
Endrin		0/8													<	3.7	U	<	3.6	U
Endrin Aldehyde		0/8													<	3.7	U	<	3.6	U
Endrin Ketone		0/8													<	3.7	U	<	3.6	U
Gamma BHC (Lindane)		0/8													<	1.9	U	<	1.9	U
Gamma-Chlordane		0/8													<	1.9	U	<	1.9	U
Heptachlor		0/8													<	1.9	U	<	1.9	U
Heptachlor Epoxide		0/8													<	1.9	U	<	1.9	U
Methoxychlor		0/8													<	19	U	<	19	U
PCB-1016 (Arochlor 1016)		0/4	<	38	U	<	35	U	<	38	U	<	35	U						
PCB-1221 (Arochlor 1221)		0/4	<	38	U	<	35	U	<	38	U	<	35	U						
PCB-1232 (Arochlor 1232)		0/4	<	38	U	<	35	U	<	38	U	<	35	U						

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA01-001			C77-HA01-003			C77-HA02-001			C77-HA02-003			C77-HA03-001			C77-HA03-004		
COLLECT DATE			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98			12/3/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
PESTICIDES/PCB (µg/kg), cont.																				
PCB-1242 (Arochlor 1242)		0/4	<	38	U	<	35	U	<	38	U	<	35	U						
PCB-1248 (Arochlor 1248)		0/4	<	38	U	<	35	U	<	38	U	<	35	U						
PCB-1254 (Arochlor 1254)		0/4	<	38	U	<	35	U	<	38	U	<	35	U						
PCB-1260 (Arochlor 1260)		0/4	<	38	U	<	35	U	<	38	U	<	35	U						
TOXaphene		0/8													<	190	U	<	190	U
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																				
Gasoline Components	11	1/2																		
Petroleum Hydrocarbons, TRPH		0/14													<	20	U	<	20	U
Phc As Diesel Fuel		0/2																		

RL - Reporting Limit
Qual - Qualification
µg/kg - micrograms per kilogram
J - Estimated
U - Nondetect
UJ - Estimated Nondetect

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA04-001			C77-HA04-004			C77-HA05-001			C77-HA05-004			C77-HA06-001			C77-HA06-004		
COLLECT DATE			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8260) (μg/kg)																				
1,1,1-Trichloroethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
1,1,2,2-Tetrachloroethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
1,1,2-Trichloroethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
1,1-Dichloroethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
1,1-Dichloroethene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
1,2-Dichloroethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
1,2-Dichloropropane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
2-Hexanone		0/14	<	56	U	<	54	U	<	57	U	<	56	U	<	56	U	<	55	U
Acetone		0/14	<	68	U	<	130	U	<	57	U	<	56	U	<	56	U	<	55	U
Benzene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Bromodichloromethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Bromoform		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Bromomethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Carbon Disulfide		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Carbon Tetrachloride		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Chlorobenzene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Chloroethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Chloroform		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Chloromethane	12	1/14	<	33	U	12	32		<	34	U	<	34	U	<	33	U	<	33	U
cis-1,2-Dichloroethylene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
cis-1,3-Dichloropropene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Dibromochloromethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Dichlorodifluoromethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Ethylbenzene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
M,P-Xylene (Sum of Isomers)		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Methyl Ethyl Ketone (2-Butanone)		0/14	<	56	U	<	54	U	<	57	U	<	56	U	<	56	U	<	55	U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)		0/14	<	56	U	<	54	U	<	57	U	<	56	U	<	56	U	<	55	U
Methylene Chloride		0/14	<	39	U	<	42	U	<	40	U	<	38	U	<	38	U	<	38	U
O-Xylene (1,2-Dimethylbenzene)		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Styrene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Tetrachloroethylene(PCE)		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Toluene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
trans-1,2-Dichloroethene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA04-001			C77-HA04-004			C77-HA05-001			C77-HA05-004			C77-HA06-001			C77-HA06-004		
COLLECT DATE			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8260) (µg/kg), cont.																				
trans-1,3-Dichloropropene		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Trichloroethylene (TCE)		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Trichlorofluoromethane		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
Vinyl Chloride		0/14	<	33	U	<	32	U	<	34	U	<	34	U	<	33	U	<	33	U
SEMIVOLATILE ORGANICS (METHOD 8270) (µg/kg)																				
1,2,4-Trichlorobenzene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
1,2-Dichlorobenzene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
1,2-Diphenylhydrazine		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
1,3-Dichlorobenzene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
1,4-Dichlorobenzene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
2,2'-Oxybis(1-Chloro)Propane		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
2,4,5-Trichlorophenol		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
2,4,6-Trichlorophenol		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
2,4-Dichlorophenol		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
2,4-Dimethylphenol		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
2,4-Dinitrophenol		0/14	<	370	UJ	<	360	UJ	<	380	UJ	<	370	UJ	<	370	UJ	<	370	UJ
2,4-Dinitrotoluene		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
2,6-Dinitrotoluene		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
2-Chloronaphthalene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
2-Chlorophenol		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
2-Methylnaphthalene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
2-Methylphenol (O-Cresol)		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
2-Nitroaniline		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
2-Nitrophenol		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
3,3'-Dichlorobenzidine		0/14	<	370	U	<	360	U	<	380	U	<	370	U	<	370	U	<	370	U
3-Nitroaniline		0/14	<	190	U	<	180	U	<	190	U	<	190	U	<	190	U	<	180	U
4,6-Dinitro-2-Methylphenol		0/14	<	370	UJ	<	360	UJ	<	380	UJ	<	370	UJ	<	370	UJ	<	370	UJ
4-Bromophenyl Phenyl Ether		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
4-Chloro-3-Methylphenol		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
4-Chloroaniline		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
4-Chlorophenyl Phenyl Ether		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
4-Methylphenol (P-Cresol)		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
4-Nitroaniline		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA04-001			C77-HA04-004			C77-HA05-001			C77-HA05-004			C77-HA06-001			C77-HA06-004		
COLLECT DATE			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg), cont.																				
4-Nitrophenol		0/14	<	370	U	<	360	U	<	380	U	<	370	U	<	370	U	<	370	U
Acenaphthene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Acenaphthylene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Aniline		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Anthracene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Benzidine		0/14	<	930	U	<	900	U	<	950	U	<	940	U	<	930	U	<	920	U
Benzo(a)anthracene	35	2/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Benzo(a)pyrene	39	2/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Benzo(b)fluoranthene	36	2/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Benzo(g,h,i)perylene	13	1/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Benzo(k)fluoranthene	32	2/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Benzoic Acid		0/14	<	930	U	<	900	U	<	950	U	<	940	U	<	930	U	<	920	U
Benzyl Alcohol		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Benzyl Butyl Phthalate		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
bis(2-Chloroethoxy) Methane		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
bis(2-Ethylhexyl) Phthalate	1700	1/14	1700	37		<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Carbazole		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Chrysene	39	2/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Di-N-Butyl Phthalate	20	1/14	20	37		<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Di-N-Octylphthalate	450	6/14	16	37		<	36	U	450	38		16	37		<	37	U	<	37	U
Dibenz(a,h)anthracene	10	1/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Dibenzofuran		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Diethyl Phthalate		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Dimethyl Propanedioic		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Fluoranthene	87	4/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Fluorene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Hexachlorobenzene		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
Hexachlorobutadiene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Hexachlorocyclopentadiene		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
Hexachloroethane		0/14	<	74	U	<	72	U	<	76	U	<	75	U	<	74	U	<	73	U
Indeno(1,2,3-c,d)pyrene	25	1/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Isophorone		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA04-001			C77-HA04-004			C77-HA05-001			C77-HA05-004			C77-HA06-001			C77-HA06-004		
COLLECT DATE			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg), cont.																				
N-Nitrosodi-N-Propylamine		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
N-Nitrosodiphenylamine		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Naphthalene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Nitrobenzene		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Pentachlorophenol		0/14	<	370	U	<	360	U	<	380	U	<	370	U	<	370	U	<	370	U
Phenanthrene	35	2/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Phenol		0/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
Pyrene	72	2/14	<	37	U	<	36	U	<	38	U	<	37	U	<	37	U	<	37	U
PESTICIDES/PCB (μg/kg)																				
Aldrin		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Alpha BHC (Alpha Hexachlorocyclohexane)		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Alpha Endosulfan		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Alpha-Chlordane		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Beta BHC (Beta Hexachlorocyclohexane)		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Beta Endosulfan		0/8	<	3.7	U	<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
Chlordane		0/8	<	370	U	<	350	U	<	380	U	<	370	U	<	370	U	<	360	U
DDD (1,1-bis(Chlorophenyl)-2,2-Dichloroethane)		0/8	<	3.7	U	<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
DDE (1,1-bis(Chlorophenyl)-2,2-Dichloroethene)	3.46	2/9	3.46	1.9		<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
DDT (1,1-bis(Chlorophenyl)-2,2,2-Trichloroethane)	4.56	2/9	4.56	1.9		<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
Delta BHC (Delta Hexachlorocyclohexane)		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Dieldrin		0/8	<	3.7	U	<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
Endosulfan Sulfate		0/8	<	3.7	U	<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
Endrin		0/8	<	3.7	U	<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
Endrin Aldehyde		0/8	<	3.7	U	<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
Endrin Ketone		0/8	<	3.7	U	<	3.5	U	<	3.8	U	<	3.7	U	<	3.7	U	<	3.6	U
Gamma BHC (Lindane)		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Gamma-Chlordane		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Heptachlor		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Heptachlor Epoxide		0/8	<	1.9	U	<	1.8	U	<	1.9	U	<	1.9	U	<	1.9	U	<	1.9	U
Methoxychlor		0/8	<	19	U	<	18	U	<	19	U	<	19	U	<	19	U	<	19	U
PCB-1016 (Arochlor 1016)		0/4																		
PCB-1221 (Arochlor 1221)		0/4																		
PCB-1232 (Arochlor 1232)		0/4																		

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA04-001			C77-HA04-004			C77-HA05-001			C77-HA05-004			C77-HA06-001			C77-HA06-004		
COLLECT DATE			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98			12/5/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
PESTICIDES/PCB (μg/kg), cont.																				
PCB-1242 (Arochlor 1242)		0/4																		
PCB-1248 (Arochlor 1248)		0/4																		
PCB-1254 (Arochlor 1254)		0/4																		
PCB-1260 (Arochlor 1260)		0/4																		
TOXaphene		0/8	<	190	U	<	180	U	<	190	U	<	190	U	<	190	U	<	190	U
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																				
Gasoline Components	11	1/2																11	5.5	
Petroleum Hydrocarbons, TRPH		0/14	<	20	U	<	20	U	<	20	U	<	20	U	<	20	U	<	20	U
Phc As Diesel Fuel		0/2																<	27	U

RL - Reporting Limit
Qual - Qualification
μg/kg - micrograms per kilogram
J - Estimated
U - Nondetect
UJ - Estimated Nondetect

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA07-002			C77-HA07-005			C77-HA08-003			C77-HA08-006			C77-HA09-002			C77-HA09-005		
COLLECT DATE			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8260) (μg/kg)																				
1,1,1-Trichloroethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
1,1,2,2-Tetrachloroethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
1,1,2-Trichloroethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
1,1-Dichloroethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
1,1-Dichloroethene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
1,2-Dichloroethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
1,2-Dichloropropane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
2-Hexanone		0/14	<	56	U	<	56	U	<	57	U	<	56	U	<	57	U	<	56	U
Acetone		0/14	<	56	U	<	56	U	<	57	U	<	56	U	<	57	U	<	56	U
Benzene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Bromodichloromethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Bromoform		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Bromomethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Carbon Disulfide		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Carbon Tetrachloride		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Chlorobenzene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Chloroethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Chloroform		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Chloromethane	12	1/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
cis-1,2-Dichloroethylene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
cis-1,3-Dichloropropene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Dibromochloromethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Dichlorodifluoromethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Ethylbenzene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
M,P-Xylene (Sum of Isomers)		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Methyl Ethyl Ketone (2-Butanone)		0/14	<	56	U	<	56	U	<	57	U	<	56	U	<	57	U	<	56	U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)		0/14	<	56	U	<	56	U	<	57	U	<	56	U	<	57	U	<	56	U
Methylene Chloride		0/14	<	41	U	<	41	U	<	41	U	<	33	U	<	39	U	<	43	U
O-Xylene (1,2-Dimethylbenzene)		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Styrene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Tetrachloroethylene(PCE)		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Toluene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
trans-1,2-Dichloroethene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA07-002			C77-HA07-005			C77-HA08-003			C77-HA08-006			C77-HA09-002			C77-HA09-005		
COLLECT DATE			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
VOLATILE ORGANICS (METHOD 8260) (μg/kg), cont.																				
trans-1,3-Dichloropropene		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Trichloroethylene (TCE)		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Trichlorofluoromethane		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
Vinyl Chloride		0/14	<	34	U	<	33	U	<	34	U	<	33	U	<	34	U	<	34	U
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg)																				
1,2,4-Trichlorobenzene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
1,2-Dichlorobenzene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
1,2-Diphenylhydrazine		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
1,3-Dichlorobenzene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
1,4-Dichlorobenzene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
2,2'-Oxybis(1-Chloro)Propane		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
2,4,5-Trichlorophenol		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
2,4,6-Trichlorophenol		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
2,4-Dichlorophenol		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
2,4-Dimethylphenol		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
2,4-Dinitrophenol		0/14	<	370	UJ	<	370	UJ	<	380	UJ	<	370	UJ	<	380	UJ	<	370	UJ
2,4-Dinitrotoluene		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
2,6-Dinitrotoluene		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
2-Chloronaphthalene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
2-Chlorophenol		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
2-Methylnaphthalene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
2-Methylphenol (O-Cresol)		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
2-Nitroaniline		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
2-Nitrophenol		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
3,3'-Dichlorobenzidine		0/14	<	370	U	<	370	U	<	380	U	<	370	U	<	380	U	<	370	U
3-Nitroaniline		0/14	<	190	U	<	190	U	<	190	U	<	190	U	<	190	U	<	190	U
4,6-Dinitro-2-Methylphenol		0/14	<	370	UJ	<	370	UJ	<	380	UJ	<	370	UJ	<	380	UJ	<	370	UJ
4-Bromophenyl Phenyl Ether		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
4-Chloro-3-Methylphenol		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
4-Chloroaniline		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
4-Chlorophenyl Phenyl Ether		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
4-Methylphenol (P-Cresol)		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
4-Nitroaniline		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA07-002			C77-HA07-005			C77-HA08-003			C77-HA08-006			C77-HA09-002			C77-HA09-005		
COLLECT DATE			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg), cont.																				
4-Nitrophenol		0/14	<	370	U	<	370	U	<	380	U	<	370	U	<	380	U	<	370	U
Acenaphthene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Acenaphthylene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Aniline		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Anthracene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Benzidine		0/14	<	940	U	<	930	U	<	960	U	<	930	U	<	960	U	<	940	U
Benzo(a)anthracene	35	2/14	9	37		<	37	U	<	38	U	<	37	U	35	38		<	37	U
Benzo(a)pyrene	39	2/14	9	37		<	37	U	<	38	U	<	37	U	39	38		<	37	U
Benzo(b)fluoranthene	36	2/14	9	37		<	37	U	<	38	U	<	37	U	36	38		<	37	U
Benzo(g,h,i)perylene	13	1/14	<	37	U	<	37	U	<	38	U	<	37	U	13	38		<	37	U
Benzo(k)fluoranthene	32	2/14	10	37		<	37	U	<	38	U	<	37	U	32	38		<	37	U
Benzoic Acid		0/14	<	940	U	<	930	U	<	960	U	<	930	U	<	960	U	<	940	U
Benzyl Alcohol		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Benzyl Butyl Phthalate		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
bis(2-Chloroethoxy) Methane		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
bis(2-Ethylhexyl) Phthalate	1700	1/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Carbazole		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Chrysene	39	2/14	11	37		<	37	U	<	38	U	<	37	U	39	38		<	37	U
Di-N-Butyl Phthalate	20	1/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Di-N-Octylphthalate	450	6/14	<	37	U	34	37		<	38	U	<	37	U	160	38		<	37	U
Dibenz(a,h)anthracene	10	1/14	<	37	U	<	37	U	<	38	U	<	37	U	10	38		<	37	U
Dibenzofuran		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Diethyl Phthalate		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Dimethyl Propanedioic		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Fluoranthene	87	4/14	25	37		8	37		<	38	U	<	37	U	87	38		9	37	
Fluorene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Hexachlorobenzene		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
Hexachlorobutadiene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Hexachlorocyclopentadiene		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
Hexachloroethane		0/14	<	75	U	<	74	U	<	77	U	<	74	U	<	77	U	<	75	U
Indeno(1,2,3-c,d)pyrene	25	1/14	<	37	U	<	37	U	<	38	U	<	37	U	25	38		<	37	U
Isophorone		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA07-002			C77-HA07-005			C77-HA08-003			C77-HA08-006			C77-HA09-002			C77-HA09-005		
COLLECT DATE			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
SEMIVOLATILE ORGANICS (METHOD 8270) (μg/kg), cont.																				
N-Nitrosodi-N-Propylamine		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
N-Nitrosodiphenylamine		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Naphthalene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Nitrobenzene		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Pentachlorophenol		0/14	<	370	U	<	370	U	<	380	U	<	370	U	<	380	U	<	370	U
Phenanthrene	35	2/14	11	37		<	37	U	<	38	U	<	37	U	35	38		<	37	U
Phenol		0/14	<	37	U	<	37	U	<	38	U	<	37	U	<	38	U	<	37	U
Pyrene	72	2/14	19	37		<	37	U	<	38	U	<	37	U	72	38		<	37	U
PESTICIDES/PCB (μg/kg)																				
Aldrin		0/8																		
Alpha BHC (Alpha Hexachlorocyclohexane)		0/8																		
Alpha Endosulfan		0/8																		
Alpha-Chlordane		0/8																		
Beta BHC (Beta Hexachlorocyclohexane)		0/8																		
Beta Endosulfan		0/8																		
Chlordane		0/8																		
DDD (1,1-bis(Chlorophenyl)-2,2-Dichloroethane)		0/8																		
DDE (1,1-bis(Chlorophenyl)-2,2-Dichloroethene)	3.46	2/9																		
DDT (1,1-bis(Chlorophenyl)-2,2,2-Trichloroethane)	4.56	2/9																		
Delta BHC (Delta Hexachlorocyclohexane)		0/8																		
Dieldrin		0/8																		
Endosulfan Sulfate		0/8																		
Endrin		0/8																		
Endrin Aldehyde		0/8																		
Endrin Ketone		0/8																		
Gamma BHC (Lindane)		0/8																		
Gamma-Chlordane		0/8																		
Heptachlor		0/8																		
Heptachlor Epoxide		0/8																		
Methoxychlor		0/8																		
PCB-1016 (Arochlor 1016)		0/4																		
PCB-1221 (Arochlor 1221)		0/4																		
PCB-1232 (Arochlor 1232)		0/4																		

TABLE A.1.3

SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES AT SWMU 77
CANNON AFB, NEW MEXICO

FIELD ID			C77-HA07-002			C77-HA07-005			C77-HA08-003			C77-HA08-006			C77-HA09-002			C77-HA09-005		
COLLECT DATE			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98			12/6/98		
	Maximum	Frequency	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
PESTICIDES/PCB (μg/kg), cont.																				
PCB-1242 (Arochlor 1242)		0/4																		
PCB-1248 (Arochlor 1248)		0/4																		
PCB-1254 (Arochlor 1254)		0/4																		
PCB-1260 (Arochlor 1260)		0/4																		
TOXaphene		0/8																		
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																				
Gasoline Components	11	1/2													<	5.7	U			
Petroleum Hydrocarbons, TRPH		0/14	<	20	U	<	20	U	<	20	U	<	20	U	<	20	U	<	20	U
Phc As Diesel Fuel		0/2													<	29	U			

RL - Reporting Limit
Qual - Qualification
μg/kg - micrograms per kilogram
J - Estimated
U - Nondetect
UJ - Estimated Nondetect

Main Screen

RBCA Tool Kit for Chemical Releases
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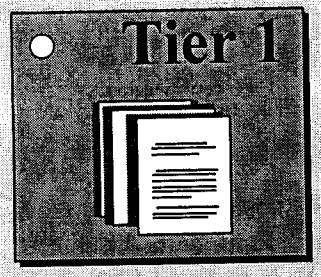
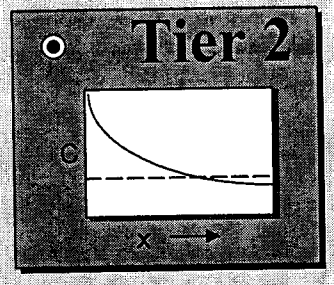
1. Project Information

Site Name: SWMU 31
Location: Cannon AFB
Compl. By: S. Volkmer
Date: May 25,1999 Job ID: 45FM9602CC00

2. Which Type of RBCA Analysis? ?



Generic Values
On-Site
Exposure



Site-Specific Values
On- or Off-Site Exposure

3. Calculation Options ?

Affects which input data are required

- ☐ ***Baseline Risks (Forward mode)***
- ☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Standards...

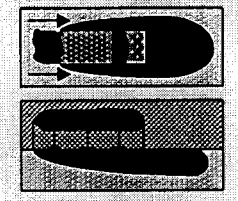
5. Commands and Options

New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: SWMU 31
Location: Cannon AFB
Compl. By: S. Volkmer
Job ID: 45FM9602CC00 Date: May 25,1999

1. Groundwater Exposure



Groundwater Ingestion/ Surface Water Impact

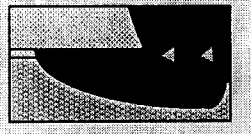
Receptor	None	None	None
Type:	On-site	Off-site1	Off-site2

Source Media:

Distance to GW receptors

	On-site	Off-site1	Off-site2	
☐ Affected Groundwater	0	0	0	(ft)
☐ Affected Soils Leaching to Groundwater	0	0	0	(ft)

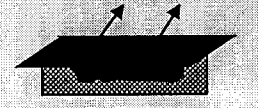
GW Discharge to Surface Water Exposure



- ☐ Swimming
- ☐ Fish Consumption
- ☐ Aquatic Life Protection

Enter ALP Criteria

2. Surface Soil Exposure

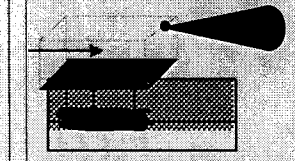


Direct Ingestion and Dermal Contact

Receptor	Com.	No off-site receptors
Type:	On-site	

Construction Worker ☑

3. Air Exposure

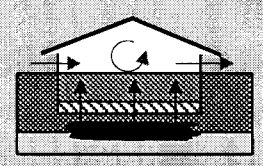


Volatilization and Particulates to Outdoor Air Inhalation

Receptor	Com.	None	None	
Type:	On-site	Off-site1	Off-site2	
	0	0	0	(ft)

Construction worker ☑

- ☑ Affected Soils--Volatilization to Ambient Outdoor Air
- ☐ Affected Groundwater--Volatilization to Ambient Outdoor Air
- ☑ Affected Surface Soils--Particulates to Ambient Outdoor Air



Volatilization to Indoor Air Inhalation

Receptor	None	No off-site receptors
Type:	On-site	

- ☐ Affected Soils--Volatilization to Enclosed Space
- ☐ Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

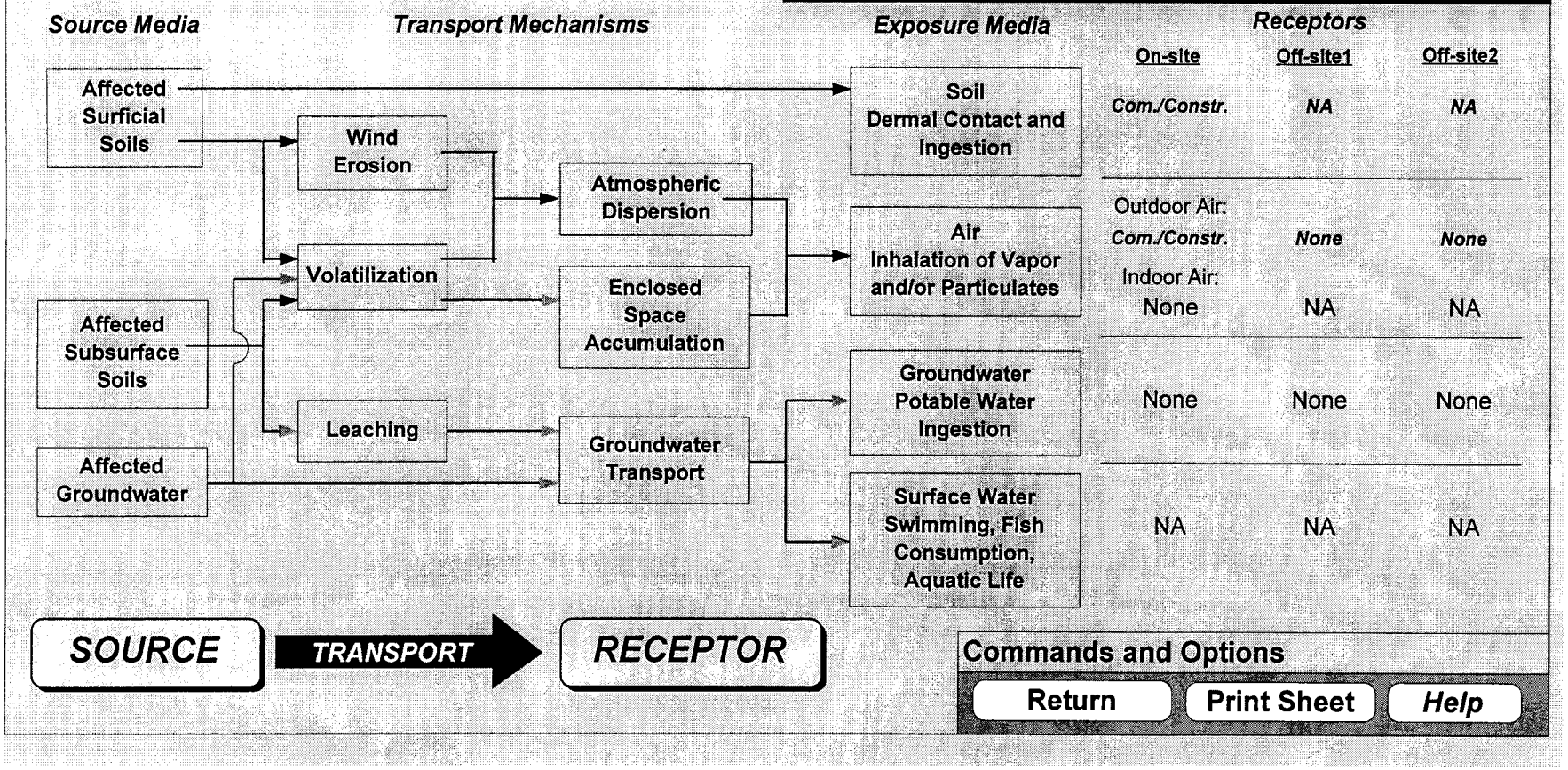
Main Screen | Print Sheet | Set Units | *Help*

Exposure Factors & Target Risks | Exposure Flowchart

Exposure Pathway Flowchart

Site Name: SWMU 31
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999



Receptors	On-site	Off-site1	Off-site2
Soil Dermal Contact and Ingestion	Com./Constr.	NA	NA
Air Inhalation of Vapor and/or Particulates: Outdoor Air	Com./Constr.	None	None
Air Inhalation of Vapor and/or Particulates: Indoor Air	None	NA	NA
Groundwater Potable Water Ingestion	None	None	None
Surface Water Swimming, Fish Consumption, Aquatic Life	NA	NA	NA

Commands and Options

Return | Print Sheet | Help

RBCA Tool Kit for Chemical Releases, Version 1.0a

Site Name: SWMU 31
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs

COC Select: *Sort List:* ?

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

Dibenzo(a,h)Anthracene
Benzo(b)Fluoranthene
Benzo(a)Pyrene
Chromium (VI)
Arsenic
Indeno(1,2,3,c,d)Pyrene
Benzo(a)Anthracene

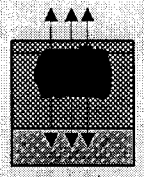
Representative COC Concentration ?

Groundwater Source Zone		Soil Source Zone		Mole Fraction in Source Material
Calculate / Enter Site Data		Calculate / Enter Site Data		
(mg/L)	note	*(mg/kg)*	note	*(-)*

Transport Modeling Options

Site Name: SWMU 31 | Job ID: 45FM9602CC00
Location: Cannon AFB | Date: May 25,1999
Compl. By: S. Volkmer

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors ?

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  - Thickness of surface soil zone [2] *(ft)*
- ○ User-specified VF from other model [Enter VF Values]

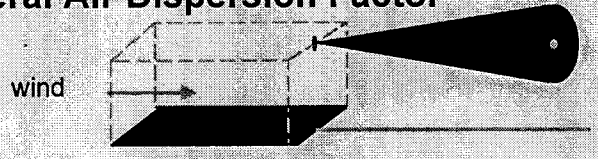
Indoor Air Volatilization Factors ?

- ○ Johnson & Ettinger model
- ○ User-specified VF from other model [Enter VF Values]

Soil-to-Groundwater Leaching Factor

- ○ ASTM Model ?
  - ☐ Apply Soil Attenuation Model (SAM)
  - ☐ Allow first-order biodecay [Enter Decay Rates]
- ○ User-specified LF from other model [Enter LF Values]

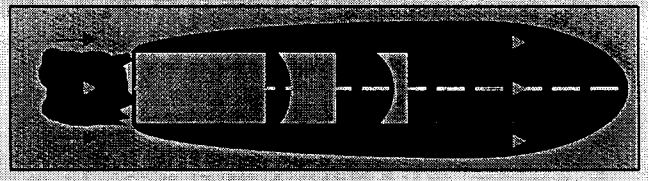
2. Lateral Air Dispersion Factor



?

	Off-site 1	Off-site 2	
○ 3-D Gaussian dispersion model			
○ User-Specified ADF	1.00E+0	1.00E+0	*(-)*

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model ?

- ○ Domenico equation with dispersion only (no biodegradation)
- ○ Domenico equation first-order decay [Enter Decay Rates]
- ○ Modified Domenico equation using electron acceptor superposition [Enter Site Data]

[Enter Directly] Biodegradation Capacity [NC] *(mg/L)*

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data [Enter DAF Values]

n o

4. Commands and Options

Main Screen | **Print Sheet** | ***Help***

Site-Specific Soil Parameters

Site Name: SWMU 31
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999

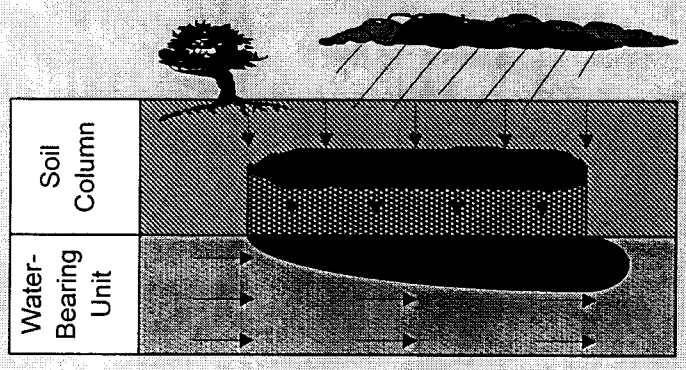
1. Soil Source Zone Characteristics

Hydrogeology

	General Case	Construction	
Depth to water-bearing unit	0		(ft)
Capillary zone thickness	0.295275591		(ft)
Soil column thickness	-0.295275591		(ft)

Affected Soil Zone

Depth to top of affected soils	0		(ft)
Depth to base of affected soils	50		(ft)
Affected soil area	90000	90000	(ft^2)
Length of affected soil parallel to assumed wind direction	450	450	(ft)
Length of affected soil parallel to assumed GW flow direction			(ft)



2. Surface Soil Column

Predominant USCS Soil Type

SM: Silty Sand

or Enter Directly

	Vadose Zone	Capillary Fringe	
Total porosity	0.41		(-)
Volumetric water content	0.12	0.369	(-)
Volumetric air content	0.29	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+1		(cm/d)
Vapor permeability	1.1E-12		(ft^2)
Capillary zone thickness	3.0E-1		(ft)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	or	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | Help

Site-Specific Air Parameters

Site Name: SWMU 31
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999

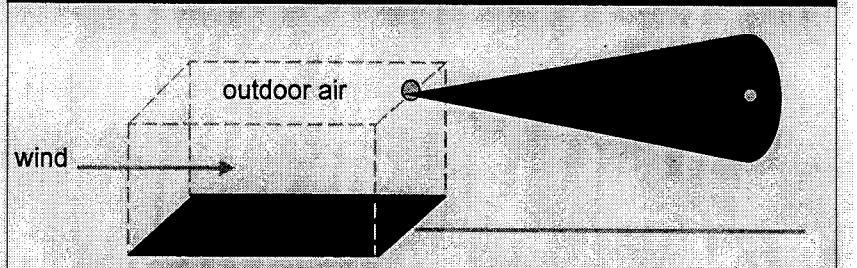
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor			(ft)
or NA	or		
Horizontal dispersivity			(ft)
Vertical dispersivity			(ft)

Air Source Zone

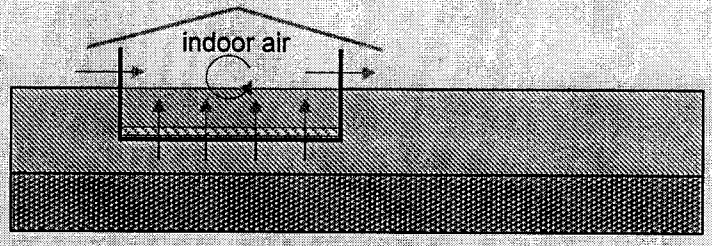
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	6.56168	9.84252	(ft)
Foundation area	753.474	753.474	(ft^2)
Foundation perimeter	111.549	111.549	(ft)
Building air exchange rate	1.4E-4	2.3E-4	(1/s)
Depth to bottom of foundation slab	0.49213	0.49213	(ft)
Convective air flow through cracks	0.0E+0	0.0E+0	(ft^3/s)
Foundation thickness	0.492125984		(ft)
Foundation crack fraction	0.01		(-)
Volumetric water content of cracks	0.12		(-)
Volumetric air content of cracks	0.26		(-)
Indoor/Outdoor differential pressure	0		(g/cm/s^2)



3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | Help

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition		ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Dibenzo(a,h)Anthracene	53-70-3	PAH	278.35	4	2.00E-02	4	5.24E-06	4	5.87	Koc	4	3.81E-07	1.57E-05	4	5.20E-10	4	5.00E-04	4	-	-	-
Benzo(b)Fluoranthene	205-99-2	PAH	252	5	2.26E-02	6	5.56E-06	7	5.74	Koc	25	2.01E-05	8.29E-04	25	6.67E-07	25	1.47E-02	25	-	-	-
Benzo(a)Pyrene	50-32-8	PAH	252.3	PS	4.30E-02	PS	9.00E-06	PS	6.01	Koc	PS	1.13E-06	4.66E-05	PS	5.68E-04	PS	1.62E-03	PS	-	-	-
Chromium (VI)	18540-29-9	N	52	0	0.00E+00	0	0.00E+00	0	f(pH)	Kd	30	0.00E+00	0.00E+00	0	0.00E+00	14	1.67E+05	27	-	-	-
Arsenic	7440-38-2	N	74.9	4	0.00E+00	0	0.00E+00	0	f(pH)	Kd	24	0.00E+00	0.00E+00	0	0.00E+00	14	4.41E+05	27	-	-	-
Indeno(1,2,3,c,d)Pyrene	193-39-5	PAH	276.34	4	2.33E-02	4	4.41E-06	4	7.53	Koc	4	5.07E-12	2.09E-10	4	1.00E-09	4	6.20E-02	29	-	-	-
Benzo(a)Anthracene	56-55-3	PAH	228.3	4	5.10E-02	4	9.00E-06	4	6.14	Koc	4	1.38E-08	5.69E-07	4	1.50E-07	4	5.70E-03	5	-	-	-

Site Name: SWMU 31
Site Location: Cannon AFB

Completed By: S. Volkmer
Date Completed: May 25,1999

Job ID: 45FM9602CC00

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

	Reference Dose (mg/kg/day)		(mg/kg/day)		Reference Conc. (mg/m3)		Slope Factors 1/(mg/kg/day)		1/(mg/kg/day)		Unit Risk Factor 1/(µg/m3)			
Constituent	Oral RfD_oral	ref	Dermal RfD_dermal	ref	Inhalation RfC_inhal	ref	Oral SF_oral	ref	Dermal SF_dermal	ref	Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Dibenzo(a,h)Anthracene	-	0	-	-	4.00E-01	31	7.30E+00	R	8.20E+00	TX	-	-	B2	TRUE
Benzo(b)Fluoranthene	-	-	-	-	1.00E+00	31	7.30E-01	R	8.20E-01	TX	8.80E-05	31	B2	TRUE
Benzo(a)Pyrene	-	-	-	-	1.10E+01	31	7.30E+00	PS	8.20E+00	TX	2.09E-03	PS	B2	TRUE
Chromium (VI)	3.00E-03	R	-	-	1.05E-04	R	7.30E-03	0	2.92E-01	TX	1.20E-02	R	A	TRUE
Arsenic	3.00E-04	R	-	-	-	0	1.50E+p0	R	7.50E+00	TX	4.31E-03	R	A	TRUE
Indeno(1,2,3,c,d)Pyrene	-	0	-	-	1.10E+00	31	7.30E-01	R	8.20E-01	TX	8.80E-05	31	B2	TRUE
Benzo(a)Anthracene	-	-	-	-	1.00E+00	31	7.30E-01	R	8.20E-01	TX	8.80E-05	31	B2	TRUE

Site Name: SWMU 31

Site Location: Cannon AFB

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Biocon-centration Factor (L-wat/kg-fish)
Dibenzo(a,h)Anthracene	-	-	-	-	-	-	1
Benzo(b)Fluoranthene	-	-	0.00E+00	ACGIH	-	-	1
Benzo(a)Pyrene	2.00E-04	57 31776 (17 Jul 92)	2.00E-01	PS	-	-	1
Chromium (VI)	1.00E-01	56 FR 3526 (30 Jan 91)	-	-	1.50E-02	33	1
Arsenic	5.00E-02	50 FR 46936 (13 Nov 85)	2.00E-03	NIOSH	3.60E-01	33	1
Indeno(1,2,3,c,d)Pyrene	-	-	-	-	-	-	1
Benzo(a)Anthracene	-	-	0.00E+00	ACGIH	-	-	10100

Site Name: SWMU 31

Site Location: Cannon AFB

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Dibenzo(a,h)Anthracene	0.05	2.7	4.4	21	690	2.7E+1	D	0.01	32	0.66	32	1880	1880	H
Benzo(b)Fluoranthene	0.05	0.81	2.2	10	46	5.8E+0	D	0.01	32	0.66	32	1220	1220	H
Benzo(a)Pyrene	0.05	-	-	-	-	-	-	0.01	32	0.66	32	1060	1060	H
Chromium (VI)	0	0.001	-	-	-	3.0E-3	D	0.01	C	0.007	S	-	-	-
Arsenic	0	0.001	-	-	-	3.0E-3	D	0.01	C	0.053	S	-	-	-
Indeno(1,2,3,c,d)Pyrene	0.05	1.9	4.2	20	380	1.9E+1	D	0.01	32	0.66	32	1460	1460	H
Benzo(a)Anthracene	0.05	-	-	-	-	-	-	0.01	32	0.66	32	1360	1360	H

Site Name: SWMU 31

Site Location: Cannon AFB

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: SWMU 31
Site Location: Cannon AFB

Completed By: S. Volkmer
Date Completed: May 25,1999

Job ID: 45FM9602CC00

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			60	180
EF_D	Exposure frequency for dermal exposure	350			60	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
IR_{air-In}	Inhalation rate indoor (m^3/day)	15			20	
$IR_{air-Out}$	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	Com./Constr.		
Outdoor Air:			
Particulates from Surface Soils	Com./Constr.	None	None
Volatilization from Soils	Com./Constr.	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Subsurface Soils	None	NA	NA
Volatilization from Groundwater	None	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
RBCA calculation mode	Backward Only
Risk goal calculation option	Individual & Cumulative Constituent Risks
Soil volatilization model option	Surface & subsurface models
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	9.0E+4	9.0E+4	(ft^2)
W	Length of source-zone area parallel to wind	4.5E+2	4.5E+2	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	6.9E-14		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	2.0E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	NA			(ft)
h_v	Vadose zone thickness	NA			(ft)
ρ_s	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-2			(-)
θ_T	Soil total porosity	4.1E-1			(-)
K_{vs}	Vertical hydraulic conductivity	8.6E+1			(cm/d)
k_v	Vapor permeability	1.1E-12			(ft^2)
L_{gw}	Depth to groundwater	NA			(ft)
L_s	Depth to top of affected soils	0.0E+0			(ft)
L_{base}	Depth to base of affected soils	5.0E+1			(ft)
L_{subs}	Thickness of affected soils	5.0E+1			(ft)
pH	Soil/groundwater pH	6.8E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.12	0.12	(-)
θ_a	Volumetric air content	0.041	0.29	0.26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	NA	(ft)
A_b	Foundation area	NA	NA	(cm^2)
X_{crk}	Foundation perimeter	NA	NA	(ft)
ER	Building air exchange rate	NA	NA	(1/s)
L_{crk}	Foundation thickness	NA	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	NA	NA	(ft)
η	Foundation crack fraction	NA	NA	(-)
dP	Indoor/outdoor differential pressure	NA	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	NA	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	NA	(ft)
I_f	Net groundwater infiltration rate	NA	(cm/yr)
U_{gw}	Groundwater Darcy velocity	NA	(cm/d)
V_{gw}	Groundwater seepage velocity	NA	(cm/d)
K_s	Saturated hydraulic conductivity	NA	(cm/d)
i	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{eff}	Effective porosity in water-bearing unit	NA	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT

Site Name: SWMU 31 | Completed By: S. Volkmer | Job ID: 45FM9602CC00

Site Location: Cannon AFB | Date Completed: May 25,1999

SOIL (0 - 50 ft) SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option:

SSTL Results For Complete Exposure Pathways ("X" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater Ingestion / Discharge to Surface Water			Soil Vol. to Indoor Air	X Soil Volatilization and Surface Soil Particulates to Outdoor Air				X Surface Soil Inhalation, Ingestion,Dermal Contact		Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)	None	None	None	None	Commercial	Construction Worker	None	None	Commercial	Construction Worker	(mg/kg)	"■" if yes	
53-70-3	Dibenzo(a,h)Anthracene		NA	NA	NA	NA	>3.7E+0	>3.7E+0	NA	NA	NC	NC	>3.7E+0	☐	NA
205-99-2	Benzo(b)Fluoranthene		NA	NA	NA	NA	1.3E+0	>8.1E+1	NA	NA	4.3E+0	3.2E+1	1.3E+0	☐	NA
50-32-8	Benzo(a)Pyrene		NA	NA	NA	NA	1.8E+0	>1.7E+1	NA	NA	4.3E-1	3.2E+0	4.3E-1	☐	NA
18540-29-9	Chromium (VI)		NA	NA	NA	NA	6.7E+4	5.6E+5	NA	NA	3.1E+3	4.3E+3	3.1E+3	☐	NA
7440-38-2	Arsenic		NA	NA	NA	NA	1.9E+5	1.6E+6	NA	NA	1.6E+1	6.6E+1	1.6E+1	☐	NA
193-39-5	Indeno(1,2,3,c,d)Pyrene		NA	NA	NA	NA	>2.1E+4	>2.1E+4	NA	NA	4.3E+0	3.2E+1	4.3E+0	☐	NA
56-55-3	Benzo(a)Anthracene		NA	NA	NA	NA	>7.9E+1	>7.9E+1	NA	NA	4.3E+0	3.2E+1	4.3E+0	☐	NA

">" indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

Main Screen

RBCA Tool Kit for Chemical Releases
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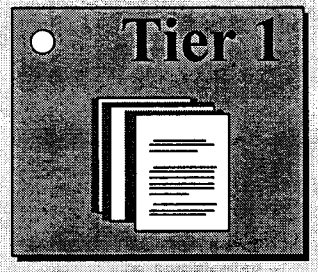
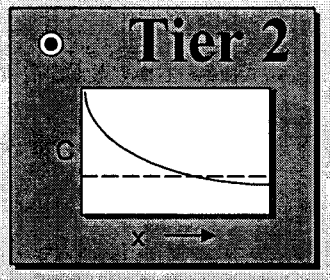
1. Project Information

Site Name:	SWMU 77
Location:	Cannon AFB
Compl. By:	S. Volkmer
Date:	May 25,1999
Job ID:	45FM9602CC00

2. Which Type of RBCA Analysis?



Generic Values
On-Site
Exposure



Site-Specific Values
On- or Off-Site Exposure

3. Calculation Options

Affects which input data are required

- ☐ ***Baseline Risks (Forward mode)***
- ☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Standards...

5. Commands and Options

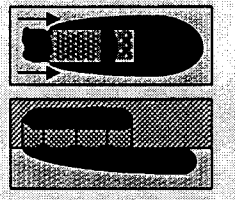
New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: SWMU 77
Location: Cannon AFB
Compl. By: S. Volkmer
Job ID: 45FM9602CC00 Date: May 25,1999

1. Groundwater Exposure

?



Groundwater Ingestion/ Surface Water Impact

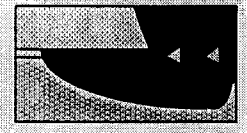
Receptor Type:	None / On-site	None / Off-site1	None / Off-site2

Source Media:

Distance to GW receptors

	On-site	Off-site1	Off-site2	
☐ Affected Groundwater	0	0	0	(ft)
☐ Affected Soils Leaching to Groundwater	0	0	0	(ft)

GW Discharge to Surface Water Exposure

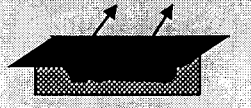


- ☐ Swimming
- ☐ Fish Consumption
- ☐ Aquatic Life Protection

Enter ALP Criteria

2. Surface Soil Exposure

?



Direct Ingestion and Dermal Contact

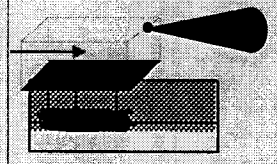
Receptor Type:	Com. / On-site	No off-site receptors

Construction Worker ☑

3. Air Exposure

Volatilization and Particulates to Outdoor Air Inhalation

?



Receptor Type:	Com. / On-site	None / Off-site1	None / Off-site2	
	0	0	0	(ft)

Construction worker ☑

- ☑ Affected Soils--Volatilization to Ambient Outdoor Air
- ☐ Affected Groundwater--Volatilization to Ambient Outdoor Air
- ☑ Affected Surface Soils--Particulates to Ambient Outdoor Air

Volatilization to Indoor Air Inhalation

Receptor Type:	None / On-site	No off-site receptors

- ☐ Affected Soils--Volatilization to Enclosed Space
- ☐ Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

Main Screen | Print Sheet | Set Units | *Help*

Exposure Factors & Target Risks | Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: SWMU 77
Location: Cannon AFB
Compl. By: S. Volkmer
Job ID: 45FM9602CC00 Date: May 25,1999

1. Exposure Parameters

		Residential			Commercial	
Age Adjustment?		Adult	(Age 0-6)	(Age 0-16)	Chronic	Construc.
Averaging time, carcinogens (yr)		70				
Averaging time, non-carcinogens (yr)		30			25	1
Body weight (kg)		70	15	35	70	
Exposure duration (yr)		30	6	16	25	1
Exposure frequency (days/yr)		350			60	180
Dermal exposure frequency (days/yr)		350			60	
Skin surface area, soil contact (cm^2)	☐	5800		2023	5800	5800
Soil dermal adherence factor ($mg/cm^2/day$)		1				
Water ingestion rate (L/day)		2			1	
Soil ingestion rate (mg/day)	☐	100	200		50	100
Indoor air inhalation rate (m^3/day)		15			20	
Outdoor air inhalation rate (m^3/day)		20			20	10
Swimming exposure time (hr/event)		3				
Swimming event frequency (events/yr)		12	12	12		
Swimming water ingestion rate (L/hr)	☐	0.05	0.5			
Skin surface area, swimming (cm^2)	☐	23000		8100		
Fish consumption rate (kg/day)		0.025				
Contaminated fish fraction (unitless)		1				

2. Risk Goal Calculation Options

- ○ Individual Constituent Risk Goals Only
- ○ Cumulative Constituent Risk Goals Only
- ◉ Individual and Cumulative Risk Goals

3. Target Health Risk Limits

	Individual	Cumulative
Target Risk (Class A/B carcins.)	1.0E-6	1.0E-5
Target Risk (Class C carcinogens)	1.0E-5	
Target Hazard Quotient	1.0E+0	
Target Hazard Index		1.0E+0

4. Commands and Options

Return to Exposure Pathways

Use Default Values

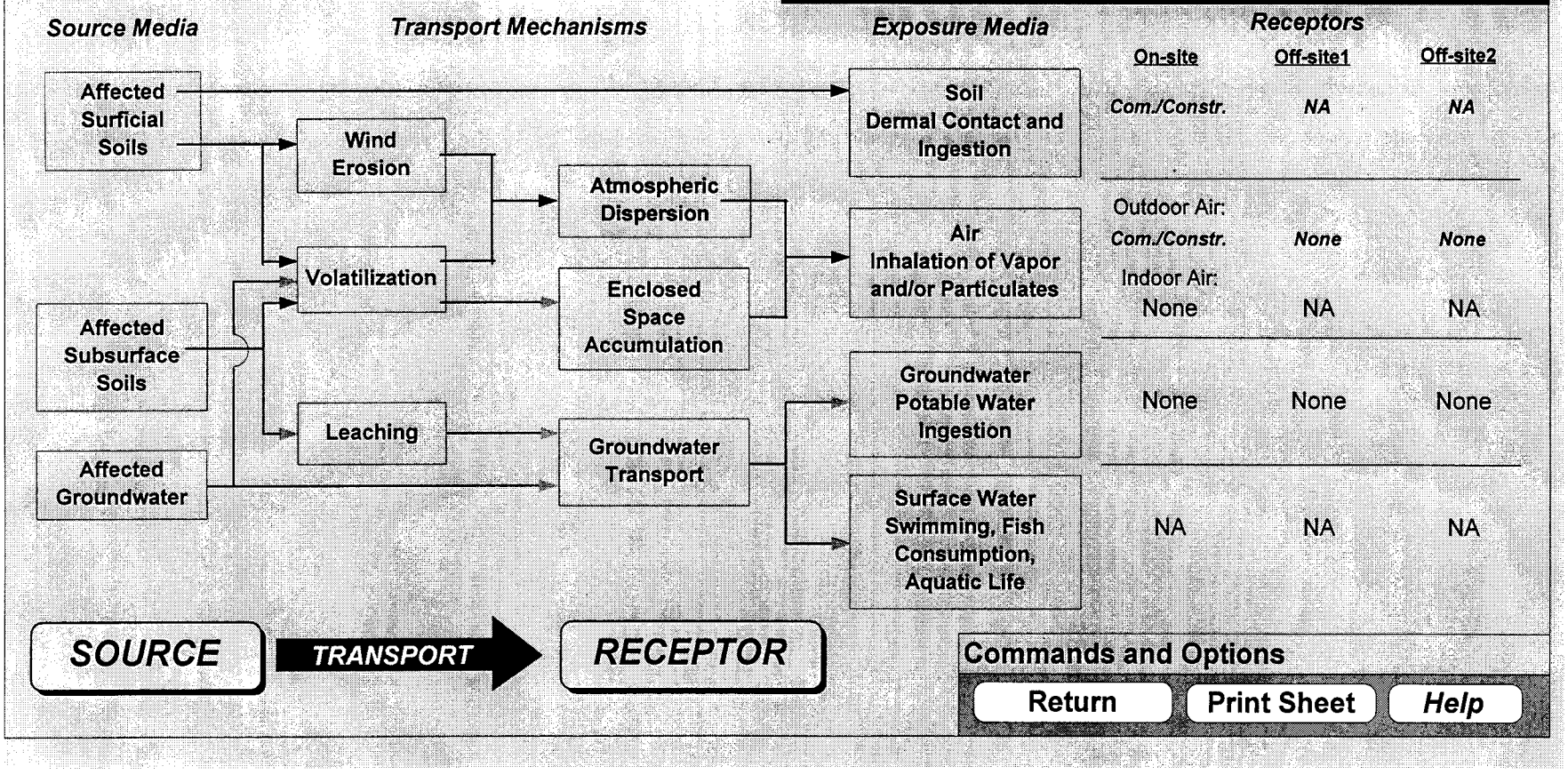
Print Sheet

Help

Exposure Pathway Flowchart

Site Name: SWMU 77
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999



Receptors	On-site	Off-site1	Off-site2
Soil Dermal Contact and Ingestion	Com./Constr.	NA	NA
Air Inhalation of Vapor and/or Particulates – Outdoor Air:	Com./Constr.	None	None
Air Inhalation of Vapor and/or Particulates – Indoor Air:	None	NA	NA
Groundwater Potable Water Ingestion	None	None	None
Surface Water Swimming, Fish Consumption, Aquatic Life	NA	NA	NA

Commands and Options

Return | Print Sheet | Help

RBCA Tool Kit for Chemical Releases, Version 1.0a

Site Name: SWMU 77
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs

COC Select: *Sort List:* ?

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

Dibenzo(a,h)Anthracene
Benzo(b)Fluoranthene
Benzo(a)Pyrene

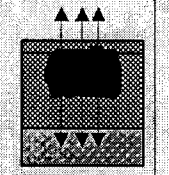
Representative COC Concentration ?

Groundwater Source Zone		Soil Source Zone		Mole Fraction in Source Material
Calculate	Enter Site Data	Calculate	Enter Site Data	
(mg/L)	note	*(mg/kg)*	note	*(-)*

Transport Modeling Options

Site Name: SWMU 77 | Job ID: 45FM9602CC00
Location: Cannon AFB | Date: May 25,1999
Compl. By: S. Volkmer

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors ?

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  - Thickness of surface soil zone [2] *(ft)*
- ○ User-specified VF from other model [Enter VF Values]

Indoor Air Volatilization Factors ?

- ○ Johnson & Ettinger model
- ○ User-specified VF from other model [Enter VF Values]

Soil-to-Groundwater Leaching Factor ?

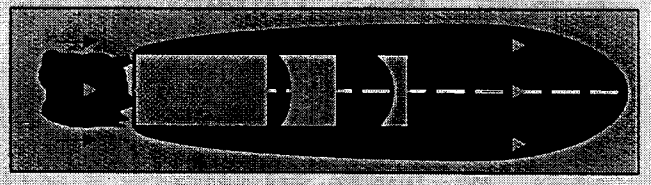
- ○ ASTM Model
  - ☐ Apply Soil Attenuation Model (SAM)
  - ☐ Allow first-order biodecay [Enter Decay Rates]
- ○ User-specified LF from other model [Enter LF Values]

2. Lateral Air Dispersion Factor

?

	Off-site 1	Off-site 2	
○ 3-D Gaussian dispersion model			
○ User-Specified ADF	1.00E+0	1.00E+0	*(-)*

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model ?

- ○ Domenico equation with dispersion only (no biodegradation)
- ○ Domenico equation first-order decay [Enter Decay Rates]
- ○ Modified Domenico equation using electron acceptor superposition [Enter Site Data]

[Enter Directly] Biodegradation Capacity [NC] *(mg/L)*

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data [Enter DAF Values]

n o

4. Commands and Options

Main Screen | **Print Sheet** | ***Help***

Site-Specific Soil Parameters

Site Name: SWMU 77
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999

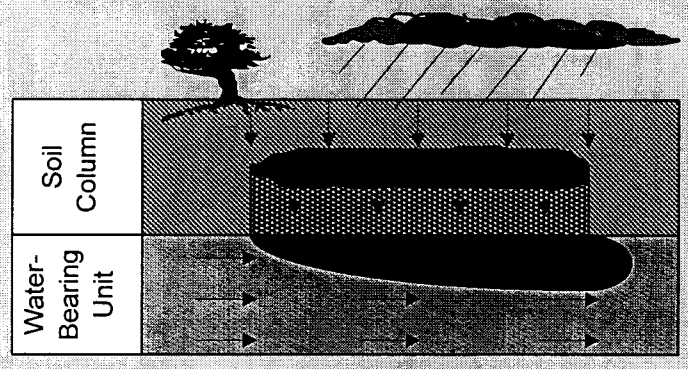
1. Soil Source Zone Characteristics

Hydrogeology

	General Case	Construction	
Depth to water-bearing unit	0		(ft)
Capillary zone thickness	0.295275591		(ft)
Soil column thickness	-0.295275591		(ft)

Affected Soil Zone

Depth to top of affected soils	0		(ft)
Depth to base of affected soils	50		(ft)
Affected soil area	90000	90000	(ft^2)
Length of affected soil parallel to assumed wind direction	450	450	(ft)
Length of affected soil parallel to assumed GW flow direction	0		(ft)



2. Surface Soil Column

Predominant USCS Soil Type

SM: Silty Sand

or Enter Directly

	Vadose Zone	Capillary Fringe	
Total porosity	0.41		(-)
Volumetric water content	0.12	0.369	(-)
Volumetric air content	0.29	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+1		(cm/d)
Vapor permeability	1.1E-12		(ft^2)
Capillary zone thickness	3.0E-1		(ft)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	or	
Average annual precipitation	0	(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | Help

Site-Specific Air Parameters

Site Name: SWMU 77
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999

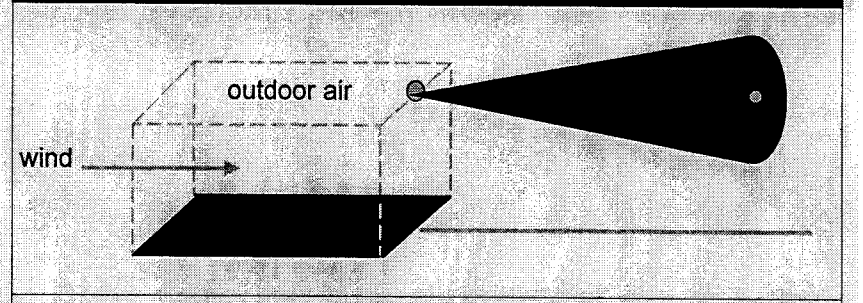
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor			(ft)
or NA	or		
Horizontal dispersivity			(ft)
Vertical dispersivity			(ft)

Air Source Zone

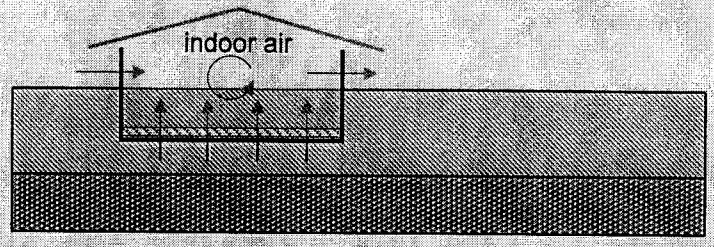
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	6.56168	9.84252	(ft)
Foundation area	753.474	753.474	(ft^2)
Foundation perimeter	111.549	111.549	(ft)
Building air exchange rate	1.4E-4	2.3E-4	(1/s)
Depth to bottom of foundation slab	0.49213	0.49213	(ft)
Convective air flow through cracks	0.0E+0	0.0E+0	(ft^3/s)
Foundation thickness	0.492125984		(ft)
Foundation crack fraction	0.01		(-)
Volumetric water content of cracks	0.12		(-)
Volumetric air content of cracks	0.26		(-)
Indoor/Outdoor differential pressure	0		(g/cm/s^2)



3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | Help

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	Diffusion Coefficients in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition		ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Dibenzo(a,h)Anthracene	53-70-3	PAH	278.35	4	2.00E-02	4	5.24E-06	4	5.87	Koc	4	3.81E-07	1.57E-05	4	5.20E-10	4	5.00E-04	4	-	-	-
Benzo(b)Fluoranthene	205-99-2	PAH	252	5	2.26E-02	6	5.56E-06	7	5.74	Koc	25	2.01E-05	8.29E-04	25	6.67E-07	25	1.47E-02	25	-	-	-
Benzo(a)Pyrene	50-32-8	PAH	252.3	PS	4.30E-02	PS	9.00E-06	PS	6.01	Koc	PS	1.13E-06	4.66E-05	PS	5.68E-04	PS	1.62E-03	PS	-	-	-

Site Name: SWMU 77
Site Location: Cannon AFB

Completed By: S. Volkmer
Date Completed: May 25,1999

Job ID: 45FM9602CC00

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Reference Dose (mg/kg/day) Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Slope Factors 1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Dibenzo(a,h)Anthracene	-	0	-	-	4.00E-01	31	7.30E+00	R	8.20E+00	TX	-	-	B2	TRUE
Benzo(b)Fluoranthene	-	-	-	-	1.00E+00	31	7.30E-01	R	8.20E-01	TX	8.80E-05	31	B2	TRUE
Benzo(a)Pyrene	-	-	-	-	1.10E+01	31	7.30E+00	PS	8.20E+00	TX	2.09E-03	PS	B2	TRUE

Site Name: SWMU 77

Site Location: Cannon AFB

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Biocon-centration Factor (L-wat/kg-fish)
Dibenzo(a,h)Anthracene	-	-	-	-	-	-	1
Benzo(b)Fluoranthene	-	-	0.00E+00	ACGIH	-	-	1
Benzo(a)Pyrene	2.00E-04	57 31776 (17 Jul 92)	2.00E-01	PS	-	-	1

Site Name: SWMU 77

Site Location: Cannon AFB

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Dibenzo(a,h)Anthracene	0.05	2.7	4.4	21	690	2.7E+1	D	0.01	32	0.66	32	1880	1880	H
Benzo(b)Fluoranthene	0.05	0.81	2.2	10	46	5.8E+0	D	0.01	32	0.66	32	1220	1220	H
Benzo(a)Pyrene	0.05	-	-	-	-	-	-	0.01	32	0.66	32	1060	1060	H

Site Name: SWMU 77

Site Location: Cannon AFB

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: SWMU 77
Site Location: Cannon AFB

Completed By: S. Volkmer
Date Completed: May 25,1999

Job ID: 45FM9602CC00

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			60	180
EF_D	Exposure frequency for dermal exposure	350			60	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
IR_{air-In}	Inhalation rate indoor (m^3/day)	15			20	
$IR_{air-Out}$	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	Com./Constr.		
Outdoor Air:			
Particulates from Surface Soils	Com./Constr.	None	None
Volatilization from Soils	Com./Constr.	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Subsurface Soils	None	NA	NA
Volatilization from Groundwater	None	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
RBCA calculation mode	Backward Only
Risk goal calculation option	Individual & Cumulative Constituent Risks
Soil volatilization model option	Surface & subsurface models
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	9.0E+4	9.0E+4	(ft^2)
W	Length of source-zone area parallel to wind	4.5E+2	4.5E+2	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	6.9E-14		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	2.0E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	NA			(ft)
h_v	Vadose zone thickness	NA			(ft)
ρ_s	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-2			(-)
θ_T	Soil total porosity	4.1E-1			(-)
K_{vs}	Vertical hydraulic conductivity	8.6E+1			(cm/d)
k_v	Vapor permeability	1.1E-12			(ft^2)
L_{gw}	Depth to groundwater	NA			(ft)
L_s	Depth to top of affected soils	0.0E+0			(ft)
L_{base}	Depth to base of affected soils	5.0E+1			(ft)
L_{subs}	Thickness of affected soils	5.0E+1			(ft)
pH	Soil/groundwater pH	6.8E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.12	0.12	(-)
θ_a	Volumetric air content	0.041	0.29	0.26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	NA	(ft)
A_b	Foundation area	NA	NA	(cm^2)
X_{crk}	Foundation perimeter	NA	NA	(ft)
ER	Building air exchange rate	NA	NA	(1/s)
L_{crk}	Foundation thickness	NA	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	NA	NA	(ft)
η	Foundation crack fraction	NA	NA	(-)
dP	Indoor/outdoor differential pressure	NA	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	NA	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	NA	(ft)
I_f	Net groundwater infiltration rate	NA	(cm/yr)
U_{gw}	Groundwater Darcy velocity	NA	(cm/d)
V_{gw}	Groundwater seepage velocity	NA	(cm/d)
K_s	Saturated hydraulic conductivity	NA	(cm/d)
i	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{eff}	Effective porosity in water-bearing unit	NA	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT

Site Name: SWMU 77 | Completed By: S. Volkmer | Job ID: 45FM9602CC00

Site Location: Cannon AFB | Date Completed: May 25,1999

SOIL (0 - 50 ft) SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option:

SSTL Results For Complete Exposure Pathways ("X" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater Ingestion / Discharge to Surface Water			Soil Vol. to Indoor Air	X Soil Volatilization and Surface Soil Particulates to Outdoor Air				X Surface Soil Inhalation, Ingestion, Dermal Contact		Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)	None	None	None	None	Commercial	Construction Worker	None	None	Commercial	Construction Worker	(mg/kg)	"■" if yes	
53-70-3	Dibenzo(a,h)Anthracene		NA	NA	NA	NA	>3.7E+0	>3.7E+0	NA	NA	NC	NC	>3.7E+0	☐	NA
205-99-2	Benzo(b)Fluoranthene		NA	NA	NA	NA	1.3E+0	>8.1E+1	NA	NA	4.3E+0	3.2E+1	1.3E+0	☐	NA
50-32-8	Benzo(a)Pyrene		NA	NA	NA	NA	1.8E+0	>1.7E+1	NA	NA	4.3E-1	3.2E+0	4.3E-1	☐	NA

">" indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

Main Screen

RBCA Tool Kit for Chemical Releases
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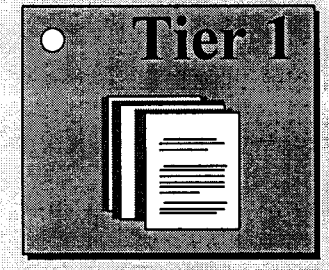
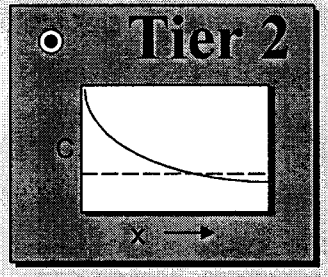
1. Project Information

Site Name:	SWMU 127		
Location:	Cannon AFB		
Compl. By:	S. Volkmer		
Date:	May 25,1999	Job ID:	45FM9602CC00

2. Which Type of RBCA Analysis?



Generic Values
On-Site
Exposure



Site-Specific Values
On- or Off-Site Exposure

3. Calculation Options

Affects which input data are required

- ☐ ***Baseline Risks (Forward mode)***
- ☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Standards...

5. Commands and Options

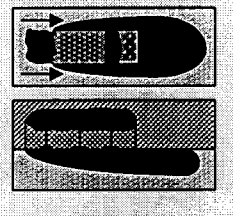
New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: SWMU 127
Location: Cannon AFB
Compl. By: S. Volkmer
Job ID: 45FM9602CC00 Date: May 25,1999

1. Groundwater Exposure

?



Groundwater Ingestion/ Surface Water Impact

Receptor Type:	None / On-site	None / Off-site1	None / Off-site2

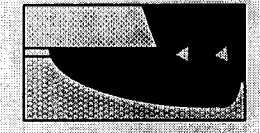
Source Media:

- ☐ Affected Groundwater
- ☐ Affected Soils Leaching to Groundwater

Distance to GW receptors (ft)

	On-site	Off-site1	Off-site2
Affected Groundwater	0	0	0
Affected Soils Leaching to Groundwater	0	0	0

GW Discharge to Surface Water Exposure

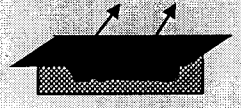


- ☐ Swimming
- ☐ Fish Consumption
- ☐ Aquatic Life Protection

Enter ALP Criteria

2. Surface Soil Exposure

?



Direct Ingestion and Dermal Contact

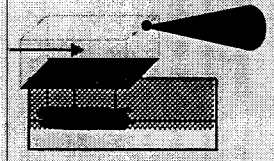
Receptor Type:	Com. / On-site	No off-site receptors

Construction Worker ☑

3. Air Exposure

Volatilization and Particulates to Outdoor Air Inhalation

?



Receptor Type:	Com. / On-site	None / Off-site1	None / Off-site2
	0	0	0 (ft)

Construction worker ☑

- ☑ Affected Soils--Volatilization to Ambient Outdoor Air
- ☐ Affected Groundwater--Volatilization to Ambient Outdoor Air
- ☑ Affected Surface Soils--Particulates to Ambient Outdoor Air

Volatilization to Indoor Air Inhalation

Receptor Type:	None / On-site	No off-site receptors

- ☐ Affected Soils--Volatilization to Enclosed Space
- ☐ Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

Main Screen | **Print Sheet** | **Set Units** | ***Help***

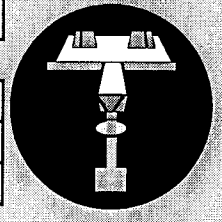
■ □ Exposure Factors & Target Risks | Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: SWMU 127
Location: Cannon AFB
Compl. By: S. Volkmer
Job ID: 45FM9602CC00 Date: May 25,1999

1. Exposure Parameters

Age Adjustment?	Residential Adult	Residential (Age 0-6)	Residential (Age 0-16)	Commercial Chronic	Commercial Construc.
Averaging time, carcinogens (yr)	70				
Averaging time, non-carcinogens (yr)	30			25	1
Body weight (kg)	70	15	35	70	
Exposure duration (yr)	30	6	16	25	1
Exposure frequency (days/yr)	350			60	180
Dermal exposure frequency (days/yr)	350			60	
☐ Skin surface area, soil contact (cm^2)	5800		2023	5800	5800
Soil dermal adherence factor ($mg/cm^2/day$)	1				
Water ingestion rate (L/day)	2			1	
☐ Soil ingestion rate (mg/day)	100	200		50	100
Indoor air inhalation rate (m^3/day)	15			20	
Outdoor air inhalation rate (m^3/day)	20			20	10
Swimming exposure time (hr/event)	3				
Swimming event frequency (events/yr)	12	12	12		
☐ Swimming water ingestion rate (L/hr)	0.05	0.5			
☐ Skin surface area, swimming (cm^2)	23000		8100		
Fish consumption rate (kg/day)	0.025				
Contaminated fish fraction (unitless)	1				



2. Risk Goal Calculation Options

- ○ Individual Constitiuent Risk Goals Only
- ○ Cumulative Constituent Risk Goals Only
- ◉ Individual and Cumulative Risk Goals

3. Target Health Risk Limits

	Individual	Cumulative
Target Risk (Class A/B carcins.)	1.0E-6	1.0E-5
Target Risk (Class C carcinogens)	1.0E-5	
Target Hazard Quotient	1.0E+0	
Target Hazard Index		1.0E+0

4. Commands and Options

Return to Exposure Pathways

Use Default Values

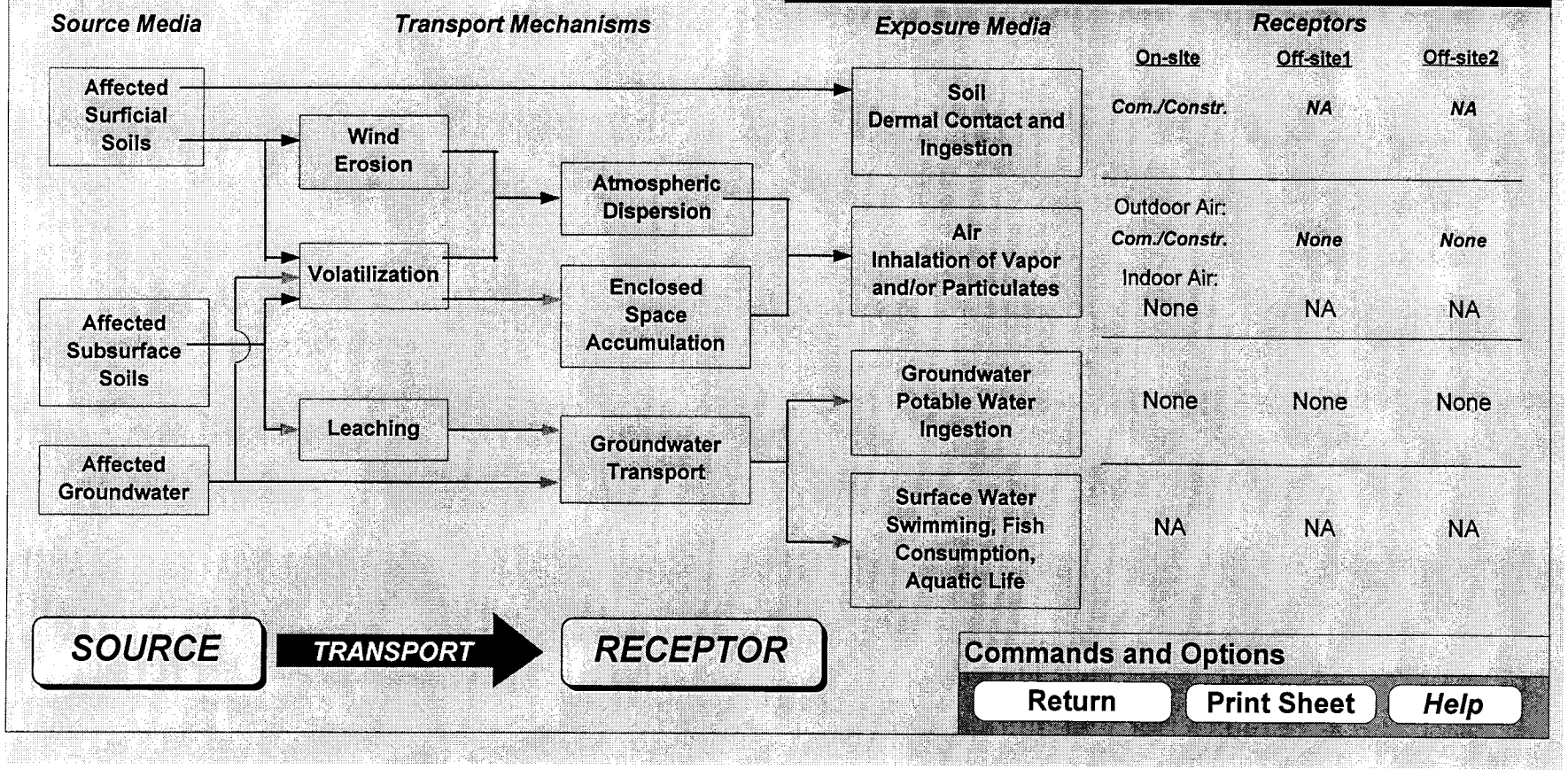
Print Sheet

Help

Exposure Pathway Flowchart

Site Name: SWMU 127
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999



Receptors	On-site	Off-site1	Off-site2
Soil Dermal Contact and Ingestion	Com./Constr.	NA	NA
Air Inhalation of Vapor and/or Particulates: Outdoor Air	Com./Constr.	None	None
Air Inhalation of Vapor and/or Particulates: Indoor Air	None	NA	NA
Groundwater Potable Water Ingestion	None	None	None
Surface Water Swimming, Fish Consumption, Aquatic Life	NA	NA	NA

Commands and Options

Return | Print Sheet | Help

RBCA Tool Kit for Chemical Releases, Version 1.0a

Site Name: SWMU 127
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

☐ Apply Raoult's Law ?

Selected COCs

COC Select: *Sort List:* ?

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

Dibenzo(a,h)Anthracene
Benzo(b)Fluoranthene
Benzo(a)Pyrene
Benzene
Xylene (mixed isomers)
Benzo(a)Anthracene

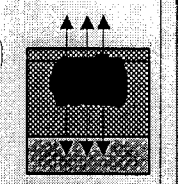
Representative COC Concentration ?

Groundwater Source Zone		Soil Source Zone		Mole Fraction in Source Material
Calculate / Enter Site Data		Calculate / Enter Site Data		
(mg/L)	note	*(mg/kg)*	note	*(-)*

Transport Modeling Options

Site Name: SWMU 127 | Job ID: 45FM9602CC00
Location: Cannon AFB | Date: May 25,1999
Compl. By: S. Volkmer

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors ?

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  - Thickness of surface soil zone [2] *(ft)*
- ○ User-specified VF from other model [Enter VF Values]

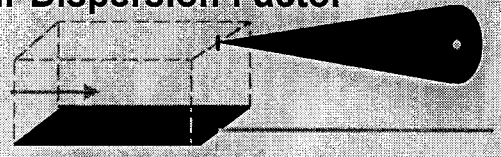
Indoor Air Volatilization Factors ?

- ○ Johnson & Ettinger model
- ○ User-specified VF from other model [Enter VF Values]

Soil-to-Groundwater Leaching Factor ?

- ○ ASTM Model
  - ☐ Apply Soil Attenuation Model (SAM)
  - ☐ Allow first-order biodecay [Enter Decay Rates]
- ○ User-specified LF from other model [Enter LF Values]

2. Lateral Air Dispersion Factor

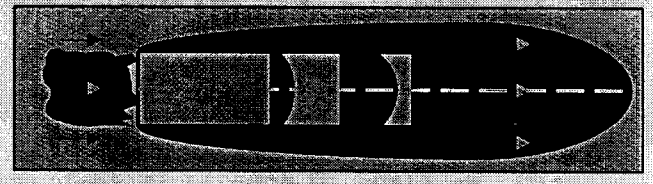


?

- ○ 3-D Gaussian dispersion model
- ○ User-Specified ADF

Off-site 1	Off-site 2	
1.00E+0	1.00E+0	*(-)*

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model ?

- ○ Domenico equation with dispersion only (no biodegradation)
- ○ Domenico equation first-order decay [Enter Decay Rates]
- ○ Modified Domenico equation using electron acceptor superposition [Enter Site Data]

[Enter Directly] Biodegradation Capacity [NC] *(mg/L)*

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data [Enter DAF Values]

n *o*

4. Commands and Options

Main Screen | **Print Sheet** | ***Help***

Site-Specific Soil Parameters

Site Name: SWMU 127
Location: Cannon AFB
Compl. By: S. Volkmer
Job ID: 45FM9602CC00
Date: May 25,1999

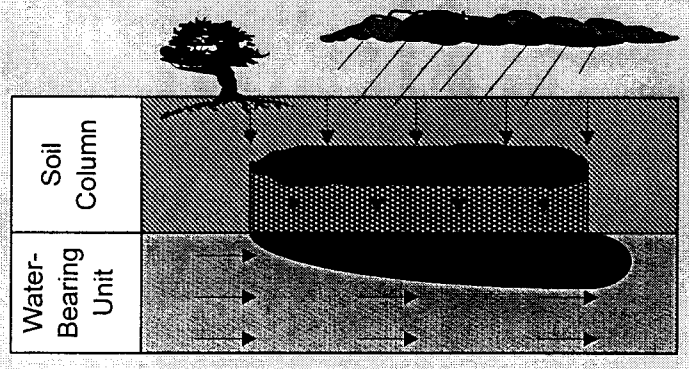
1. Soil Source Zone Characteristics

Hydrogeology

	General Case	Construction	
Depth to water-bearing unit	0		(ft)
Capillary zone thickness	0.295275591		(ft)
Soil column thickness	-0.295275591		(ft)

Affected Soil Zone

Depth to top of affected soils	0		(ft)
Depth to base of affected soils	50		(ft)
Affected soil area	90000	90000	(ft^2)
Length of affected soil parallel to assumed wind direction	450	450	(ft)
Length of affected soil parallel to assumed GW flow direction			(ft)



2. Surface Soil Column

	Vadose Zone	Capillary Fringe	
Predominant USCS Soil Type	SM: Silty Sand		
or Enter Directly	or		
Total porosity	0.41		(-)
Volumetric water content	0.12	0.369	(-)
Volumetric air content	0.29	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+1		(cm/d)
Vapor permeability	1.1E-12		(ft^2)
Capillary zone thickness	3.0E-1		(ft)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	or	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | Help

Site-Specific Air Parameters

Site Name: SWMU 127
Location: Cannon AFB
Compl. By: S. Volkmer

Job ID: 45FM9602CC00
Date: May 25,1999

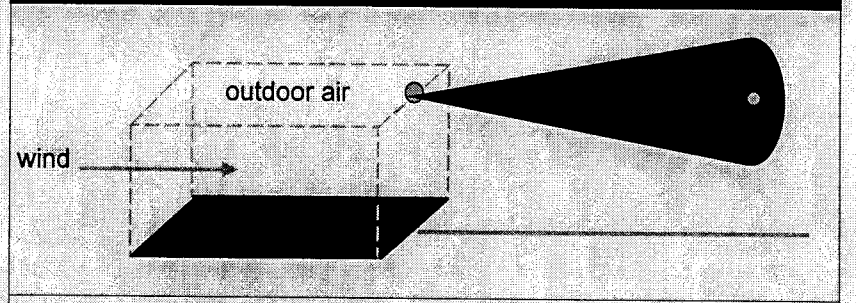
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor			(ft)
or NA		or	
Horizontal dispersivity			(ft)
Vertical dispersivity			(ft)

Air Source Zone

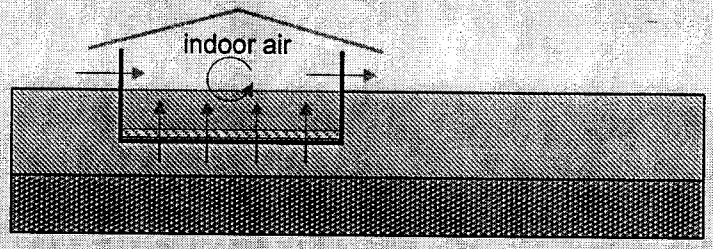
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	6.56168	9.84252	(ft)
Foundation area	753.474	753.474	(ft^2)
Foundation perimeter	111.549	111.549	(ft)
Building air exchange rate	1.4E-4	2.3E-4	(1/s)
Depth to bottom of foundation slab	0.49213	0.49213	(ft)
Convective air flow through cracks	0.0E+0	0.0E+0	(ft^3/s)
Foundation thickness	0.492125984		(ft)
Foundation crack fraction	0.01		(-)
Volumetric water content of cracks	0.12		(-)
Volumetric air content of cracks	0.26		(-)
Indoor/Outdoor differential pressure	0		(g/cm/s^2)



3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | Help

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition		ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Dibenzo(a,h)Anthracene	53-70-3	PAH	278.35	4	2.00E-02	4	5.24E-06	4	5.87	Koc	4	3.81E-07	1.57E-05	4	5.20E-10	4	5.00E-04	4	-	-	-
Benzo(b)Fluoranthene	205-99-2	PAH	252	5	2.26E-02	6	5.56E-06	7	5.74	Koc	25	2.01E-05	8.29E-04	25	6.67E-07	25	1.47E-02	25	-	-	-
Benzo(a)Pyrene	50-32-8	PAH	252.3	PS	4.30E-02	PS	9.00E-06	PS	6.01	Koc	PS	1.13E-06	4.66E-05	PS	5.68E-04	PS	1.62E-03	PS	-	-	-
Benzene	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
Xylene (mixed isomers)	1330-20-7	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	Koc	A	7.03E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5	-	-	-
Benzo(a)Anthracene	56-55-3	PAH	228.3	4	5.10E-02	4	9.00E-06	4	6.14	Koc	4	1.38E-08	5.69E-07	4	1.50E-07	4	5.70E-03	5	-	-	-

Site Name: SWMU 127
Site Location: Cannon AFB

Completed By: S. Volkmer
Date Completed: May 25,1999

Job ID: 45FM9602CC00

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Reference Dose (mg/kg/day) Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Slope Factors 1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Dibenzo(a,h)Anthracene	-	0	-	-	4.00E-01	31	7.30E+00	R	8.20E+00	TX	-	-	B2	TRUE
Benzo(b)Fluoranthene	-	-	-	-	1.00E+00	31	7.30E-01	R	8.20E-01	TX	8.80E-05	31	B2	TRUE
Benzo(a)Pyrene	-	-	-	-	1.10E+01	31	7.30E+00	PS	8.20E+00	TX	2.09E-03	PS	B2	TRUE
Benzene	3.00E-03	R	-	-	5.95E-03	R	2.90E-02	PS	2.99E-02	TX	8.29E-06	PS	A	TRUE
Xylene (mixed isomers)	2.00E+00	A,R	1.84E+00	TX	7.00E+00	A	-	-	-	-	-	-	D	FALSE
Benzo(a)Anthracene	-	-	-	-	1.00E+00	31	7.30E-01	R	8.20E-01	TX	8.80E-05	31	B2	TRUE

Site Name: SWMU 127

Site Location: Cannon AFB

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Biocon-centration Factor (L-wat/kg-fish)
Dibenzo(a,h)Anthracene	-	-	-	-	-	-	1
Benzo(b)Fluoranthene	-	-	0.00E+00	ACGIH	-	-	1
Benzo(a)Pyrene	2.00E-04	57 31776 (17 Jul 92)	2.00E-01	PS	-	-	1
Benzene	5.00E-03	52 FR 25690	3.25E+00	PS	-	-	12.6
Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	-	-	1
Benzo(a)Anthracene	-	-	0.00E+00	ACGIH	-	-	10100

Site Name: SWMU 127

Site Location: Cannon AFB

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Dibenzo(a,h)Anthracene	0.05	2.7	4.4	21	690	2.7E+1	D	0.01	32	0.66	32	1880	1880	H
Benzo(b)Fluoranthene	0.05	0.81	2.2	10	46	5.8E+0	D	0.01	32	0.66	32	1220	1220	H
Benzo(a)Pyrene	0.05	-	-	-	-	-	-	0.01	32	0.66	32	1060	1060	H
Benzene	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	C	0.005	S	720	720	H
Xylene (mixed isomers)	0.5	0.08	0.39	1.4	0.16	2.9E-1	D	0.005	C	0.005	S	360	360	H
Benzo(a)Anthracene	0.05	-	-	-	-	-	-	0.01	32	0.66	32	1360	1360	H

Site Name: SWMU 127

Site Location: Cannon AFB

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: SWMU 127
Site Location: Cannon AFB

Completed By: S. Volkmer
Date Completed: May 25,1999

Job ID: 45FM9602CC00

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			60	180
EF_D	Exposure frequency for dermal exposure	350			60	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
IR_{air-In}	Inhalation rate indoor (m^3/day)	15			20	
$IR_{air-Out}$	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	Com./Constr.		
Outdoor Air:			
Particulates from Surface Soils	Com./Constr.	None	None
Volatilization from Soils	Com./Constr.	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Subsurface Soils	None	NA	NA
Volatilization from Groundwater	None	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
RBCA calculation mode	Backward Only
Risk goal calculation option	Individual & Cumulative Constituent Risks
Soil volatilization model option	Surface & subsurface models
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	9.0E+4	9.0E+4	(ft^2)
W	Length of source-zone area parallel to wind	4.5E+2	4.5E+2	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	6.9E-14		(g/cm^2/s)
L_{as}	Thickness of affected surface soils	2.0E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	NA			(ft)
h_v	Vadose zone thickness	NA			(ft)
ρ_b	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-2			(-)
θ_T	Soil total porosity	4.1E-1			(-)
K_{vs}	Vertical hydraulic conductivity	8.6E+1			(cm/d)
k_v	Vapor permeability	1.1E-12			(ft^2)
L_{gw}	Depth to groundwater	NA			(ft)
L_s	Depth to top of affected soils	0.0E+0			(ft)
L_{base}	Depth to base of affected soils	5.0E+1			(ft)
L_{subs}	Thickness of affected soils	5.0E+1			(ft)
pH	Soil/groundwater pH	6.8E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.12	0.12	(-)
θ_a	Volumetric air content	0.041	0.29	0.26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	NA	(ft)
A_b	Foundation area	NA	NA	(cm^2)
X_{crk}	Foundation perimeter	NA	NA	(ft)
ER	Building air exchange rate	NA	NA	(1/s)
L_{crk}	Foundation thickness	NA	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	NA	NA	(ft)
η	Foundation crack fraction	NA	NA	(-)
dP	Indoor/outdoor differential pressure	NA	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	NA	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	NA	(ft)
I_f	Net groundwater infiltration rate	NA	(cm/yr)
U_{gw}	Groundwater Darcy velocity	NA	(cm/d)
V_{gw}	Groundwater seepage velocity	NA	(cm/d)
K_s	Saturated hydraulic conductivity	NA	(cm/d)
i	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{eff}	Effective porosity in water-bearing unit	NA	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT | **User-Specified COC Data**

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (0 - 50 ft)	
	value (mg/L)	note	value (mg/kg)	note
Dibenzo(a,h)Anthracene			2.8E-1	
Benzo(b)Fluoranthene			1.7E+1	
Benzo(a)Pyrene			8.6E+0	
Benzene			3.8E+0	
Xylene (mixed isomers)			2.6E+2	
Benzo(a)Anthracene			8.0E+0	

Site Name: SWMU 127
Site Location: Cannon AFB
Completed By: S. Volkmer

Date Completed: May 25,1999
Job ID: 45FM9602CC00

RBCA SITE ASSESSMENT

Site Name: SWMU 127 | Completed By: S. Volkmer | Job ID: 45FM9602CC00

Site Location: Cannon AFB | Date Completed: May 25,1999

SOIL (0 - 50 ft) SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option:

SSTL Results For Complete Exposure Pathways ("X" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater Ingestion / Discharge to Surface Water			Soil Vol. to Indoor Air	X Soil Volatilization and Surface Soil Particulates to Outdoor Air				X Surface Soil Inhalation, Ingestion, Dermal Contact		Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)	None	None	None	None	Commercial	Construction Worker	None	None	Commercial	Construction Worker	(mg/kg)	"■" if yes	
53-70-3	Dibenzo(a,h)Anthracene		NA	NA	NA	NA	>3.7E+0	>3.7E+0	NA	NA	NC	NC	>3.7E+0	☐	NA
205-99-2	Benzo(b)Fluoranthene		NA	NA	NA	NA	1.3E+0	>8.1E+1	NA	NA	4.3E+0	3.2E+1	1.3E+0	☐	NA
50-32-8	Benzo(a)Pyrene		NA	NA	NA	NA	1.8E+0	>1.7E+1	NA	NA	4.3E-1	3.2E+0	4.3E-1	☐	NA
71-43-2	Benzene		NA	NA	NA	NA	4.6E+0	2.7E+1	NA	NA	1.2E+1	2.3E+1	4.6E+0	☐	NA
1330-20-7	Xylene (mixed isomers)		NA	NA	NA	NA	>5.0E+2	>5.0E+2	NA	NA	2.4E+5	2.3E+4	2.3E+4	☐	NA
56-55-3	Benzo(a)Anthracene		NA	NA	NA	NA	>7.9E+1	>7.9E+1	NA	NA	4.3E+0	3.2E+1	4.3E+0	☐	NA

">" indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

4.1 SITE BACKGROUND

4.1.1 Site Description

The AGE Maintenance Shop Pad is an open asphaltic concrete area adjacent to the southeast side of the AGE Maintenance Shop, located in Building No. 186. The pad is approximately 60 to 70 feet wide and 240 feet long (Figure 4-1). A wash rack occupies an area about 45 feet square beyond the southeast edge of the pad. The AGE Drainage Ditch (SWMU No. 34, investigated in the Appendix I RI) (W-C 1992) lies to the southeast of the maintenance pad and carries runoff to the northeast.

The maintenance pad has a slight gradient to the southeast, which directs surface runoff from the area north and east of Building 186 toward the AGE ditch. Runoff northwest of the wash rack is directed along an expansion joint southwestward off of the pad.

4.1.2 Site History

The maintenance pad has been active since 1971. Water from washing and surface or storm water, potentially contaminated with waste oils and fuel, flows off the pad to the southeast. The Appendix I RI investigation of soils lining the AGE drainage ditch to the southeast of the AGE pad found negligible to nondetectable levels of target contaminants in the soils sampled (W-C 1992).

4.1.3 Current Use

Maintenance on aeronautical ground equipment is performed in Building No. 186 and on the south and east sections of the pad. The wash rack (not a target of this investigation) is frequently used to wash and clean support vehicles and equipment. The wash rack is separately drained to an adjacent OWS, which is not a part of this investigation. A portion

of the drainage from the pad reportedly drains into a sand trap at the northwest corner of the wash rack. This sand trap reportedly empties into the OWS.

4.2 SUMMARY OF RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION

4.2.1 Physical Investigation

Four 10-foot soil borings were drilled and soil samples were collected in areas where wash-down water and storm water from the maintenance pad enters the AGE ditch and along expansion joints or cracks in the maintenance pad to determine if a release of SWMU-related chemicals posing a hazard to human health or the environment has occurred at these points. Boring numbers and sample descriptions are in Table 4-1 and Figure 4-1. Boring 03101 was drilled in a small drainage channel entering the AGE drainage ditch to determine if maintenance pad runoff has affected soil at this location. Surface soils in the drainage channel are discolored and vegetation within the channel appears stressed. Since this drainage channel receives runoff from locations other than the AGE Maintenance Shop, (e.g., the parking area near Facility 191), other sources may be contributing contaminants to this sample location. Boring 03102 was drilled in an area of soil cover near the AGE drainage ditch to determine if runoff from the pad has contaminated soils at this location. Soils at this location did not appear contaminated and vegetation appeared normal. The high density of buried utilities under the maintenance pad forced the relocation of two borings from the pad itself to nearby sites. Boring 03103 was located just off the slab to the west of the Wash Rack near the expansion joint. Small piles of stained soil were observed at this location suggesting the potential for petroleum contamination of the near-surface soils. Boring 03104 was located about 10 feet southwest of Boring 03103, just off the edge of the AGE pad. No surface staining was evident at this location.

Soil samples were collected from the 0- to 0.5-foot, 1.5- to 3.5-foot, 4- to 6-foot, and 8- to 10-foot depth intervals in Borings 03101 and 03102 and from the 0.5- to 2-foot, 2- to 4-foot, and 8- to 10-foot depth intervals in Borings 03103 and 03104. Target analytes included VOCs, SVOCs, metals, and TPH. Surficial samples from the 0 to .5-foot interval were collected in areas of soil cover from the 0.2- to 0.5-foot depth interval to provide surface soil

data for risk assessment purposes. In areas of pavement or concrete surfaces, soil sampling began immediately below the pavement/soil contact.

4.2.2 Chemical Investigation

Soil samples were collected from four borings (03101, 03102, 03103, and 03104). Sampling and analyses performed are summarized in Table 4-1. Summaries of the analytical results for these soil samples are provided in Table 4-2a (near-surface samples) and Table 4-2b (subsurface samples). The tables provide results for analytes detected at least once in the sample group. Complete analytical results are provided in Appendix A of the RFI report.

4.2.3 Data Assessment

The quality of the analytical data was evaluated in the RFI Report, and the data were deemed to be of adequate quality to meet the objectives of the RFI. However, data quality issues that may affect the risk assessment are more fully discussed here.

Elevated reporting limits resulting from sample dilution may limit the usability of the data if concentrations of some analytes are thereby diluted to levels below the reporting limit. That is, chemicals may be reported as nondetect when they are actually present in the sample at levels of potential concern. Section 4.1.6 of the QCSR (Appendix A of the RFI report) presents a discussion of elevated reporting limits; however, only mercury had significantly elevated reporting limits. This does not affect the usability of the data at this SWMU, because mercury was properly quantified nondetect in all but two samples, so there is no reason to believe that mercury would be present at concentrations of concern in the two samples with elevated reporting limits. There were also elevated reporting limits for lead and TPH analyses; however, there is no impact on the usability of the associated data because these analytes were detected at concentrations above elevated reporting limits.

Manganese data were rejected in all samples at this SWMU. Therefore, the manganese concentration at this SWMU is unknown. Although this is a data gap, it is not viewed as crucial for the following reasons. Since manganese has not been determined to be a chemical of concern at other SWMU with similar waste streams at Cannon AFB, manganese is not likely to be associated with the wastes at this SWMU. Additionally, manganese is an

essential nutrient and would have to be present at very high concentrations to be at a level of concern. Therefore, there is no reason to believe that manganese would be present at a concentration that would pose a significant health risk compared to other semivolatile and volatile compounds that are quantified at this site. Therefore, although manganese has not been quantified, it is not likely that this will impact the conclusions of the risk assessment.

4.2.4 Nature and Extent of Contamination

The sampling at this SWMU (Figure 4-2) was directed at areas just off the edge of the pavement where materials that may have been spilled during equipment maintenance would be expected to run off or be carried by wash water or storm water. The surface samples at two of the four borings (Borings 03103 and 03101) were found to be contaminated with petroleum hydrocarbons in excess of 1,000 mg/kg. The maximum TPH concentration was 4,070 mg/kg at the surface of Boring 03103. These surface samples were also contaminated with various semivolatile organic compounds (SVOCs) at or slightly above reporting limits. In general, there was no significant contamination in the samples below 2 feet of depth, and the surface soil contamination is likely to be limited to areas immediately adjacent to the edge of the pavement. The contamination detected in surface soils could have resulted from equipment wash water and/or from the pavement itself.

4.3 HUMAN HEALTH RISK ASSESSMENT

4.3.1 Exposure Pathway Flow Charts

Figure 4-3 shows the exposure pathway flow chart of chemical sources and potential human exposure pathways for the AGE Maintenance Shop Pad. In the flow chart, potentially complete exposure pathways are indicated with solid lines; incomplete or insignificant pathways are indicated with broken lines.

The primary sources are waste fluids (e.g., fuels, oils, and solvents) that may have been discharged or spilled on the pad. Chemicals from the primary source may be released to other media (soil, air, or water) that may in turn act as secondary sources of release or exposure. Mixing and infiltration of the wastes to the soil and storm water runoff are shown as primary chemical release mechanisms. Soils are a secondary source of potential chemical

release. Chemicals in soils may infiltrate/percolate through the soil and be released to groundwater, be released to the air via volatile emissions or wind erosion, or result in exposure via direct contact (e.g., dermal contact or incidental soil ingestion).

As shown on the flow chart, surface soils may provide exposures to Base workers (occupational exposures), hypothetical future construction workers, or hypothetical future trespassers (if the Base is closed in the future). Air emissions (volatile and particulates) from surface soil may also provide exposures to Base workers, construction workers, and trespassers. Subsurface soils and air emissions from subsurface soil (i.e., during excavation) may provide exposures to construction workers. Groundwater is used for domestic purposes on and off Base. Groundwater is probably an insignificant pathway because very little contamination was found in subsurface soils. Nevertheless, fate and transport modeling was conducted to determine if contaminants of concern in soils at the SWMU could reach groundwater at concentrations of concern. Results of the fate and transport modeling (Section 4.3.4.2) indicate that contaminants will not reach groundwater at concentrations of potential concern. Therefore, this pathway was not evaluated further. Residential exposures to soils are not considered for this SWMU because the SWMU is located in an industrial area, so even if the Base closes in the future, industrial rather than residential use is the reasonable future use of the site.

In summary, potential complete human exposure pathways to be evaluated in the risk assessment are:

Occupational Workers

- Ingestion of and dermal contact with surface soil
- Inhalation of volatile emissions and airborne particulate matter from surface soil

Hypothetical Construction Workers

- Ingestion of and dermal contact with surface and subsurface soil
- Inhalation of volatile emissions and airborne particulate matter from surface and subsurface soil

Hypothetical Trespassers

- Ingestion of and dermal contact with surface soil
- Inhalation of volatile emissions and airborne particulate matter from surface soil

4.3.2 Comparison of Metals Concentrations to Background

Metals are natural constituents of soils. Therefore, SWMU concentrations of metals of potential concern were evaluated to assess whether they exceeded background levels. Metals that occur in concentrations within background levels are not considered SWMU-related chemicals of concern and are not evaluated further.

Background levels were defined by the upper tolerance limit (UTL) of concentrations from 37 background soil samples collected at Cannon AFB and by literature values for regional soils (USGS 1984). The background data and calculation of UTLs are presented in Appendix A. (The background UTL was defined as the mean plus two times the standard deviation; see Appendix A).

Tables 4-3 and 4-4 show the comparison of SWMU results to background levels.

The maximum detected concentrations of antimony, barium, cadmium, chromium, copper, lead, and zinc in both surface soil and total soils exceeded the background levels. Therefore, these metals were retained for further evaluation as chemicals of concern in surface and total soils. However, since barium can substitute for calcium, it is believed the high levels of barium may be a naturally-occurring constituent of the caliche (Klein and Hurlbut 1985).

4.3.3 Identification of Chemicals of Concern

Chemicals of concern are compounds that have been released from waste sources at SWMU 31, have been detected in soil at the SWMU, and may be significant contributors to human health or environmental risks. In general, metals detected above background levels and organic compounds other than those shown to be laboratory or field contaminants are considered to be chemicals of concern for risk assessment. Chemicals of concern that do not have EPA-established toxicity factors are not evaluated quantitatively in the risk assessment, but their potential contribution to overall risk is addressed qualitatively.

Tables 4-2a and 4-2b present the analytical results for all chemicals detected in W-C samples for soils. Of these, chemicals of concern were identified as described below.

The concentrations of antimony, barium, cadmium, chromium, copper, lead, and zinc detected in soil exceeded background ranges according to the comparison described in Section 4.3.2. These metals are, therefore, considered as chemicals of concern in soil. Organic contaminants detected in soils were retained as chemicals of concern for risk assessment. Chemicals of concern in surface soil and total soil are listed in Tables 4-5 and 4-6, respectively.

Cobalt, lead, and TPH are listed as chemicals of concern in Tables 4-5 and 4-6, but they do not have EPA-established toxicity factors and, therefore, cannot be evaluated quantitatively in the risk assessment. However, their potential effects on the results of the risk assessment are addressed in Sections 4.3.8 through 4.3.10.

4.3.4 Environmental Fate and Transport

4.3.4.1 General

The environmental fate of chemicals of concern is influenced by the physicochemical properties of each of the chemicals. Physicochemical properties that are generally of primary importance to fate and transport of chemicals in the environment are water solubility, soil adsorption, volatilization, and biodegradation. A more thorough discussion of these properties is provided in Appendix B. Physicochemical properties of the chemicals of concern reported at the SWMUs in this investigation are given in Table B-1.

4.3.4.2 Vadose Zone Fate and Transport Modeling

A partitioning leachate model was used to estimate potential leachate generation from contaminants in the soil at the SWMU and to estimate the transport of the leachate to groundwater. The analytical model, developed at the Idaho National Engineering Laboratory (DOE 1991), describes the mass balance of a contaminant (based on average soil concentrations) in the contaminated soil volume at the SWMU. The DOE model assumes a constant infiltration rate (based on the Hydrologic Evaluation of Landfill Performance [HELP] Model) and accounts for sorption to soils and degradation in the vadose zone. The model conservatively considers dilution of the leachate as it reaches the groundwater to estimate potential groundwater concentrations of chemicals of concern. The input parameters and estimated leachate concentrations are given in Section 4.3.5.2. A complete description of the model is given in Appendix B.

The modeled groundwater concentrations are compared to conservative risk-based concentrations (RBCs) for drinking water (Section 4.3.5.2). Since the RBCs were developed for drinking water (at the tap) and are based on very conservative exposure and health-protective (risk) assumptions, it can be concluded that modeled groundwater concentrations that do not exceed RBCs will pose no significant adverse health risks.

4.3.4.3 Air Modeling

RME air concentrations of volatile and particulate emissions from surface soil and total (surface and subsurface) soil were calculated using RME soil concentrations of chemicals of concern. The results of the air modeling are discussed in Section 4.3.5.3. Air concentrations of VOCs released from soil were estimated using a VF approach developed by Hwang and Falco (1986) and adopted by EPA for use at hazardous waste sites (EPA 1991). Air concentrations of SVOCs that may be bound to airborne particulates (dust) were estimated using a PEF approach developed by Cowherd (1985) and adopted by EPA for use at hazardous waste sites to calculate soil cleanup levels (EPA 1991). Air concentrations were calculated for only those chemicals with inhalation toxicity factors. The methodologies used in the air modeling are discussed in more detail in Appendix B.

The air modeling approach is conservative because it uses default values recommended by EPA for establishing preliminary remediation goals at hazardous waste sites, and it assumes that potential receptors are consistently exposed to air concentrations predicted immediately at the source (i.e., it does not account for dilution in the air during transport from the SWMU source to potential receptors).

4.3.5 Exposure Point Concentrations

4.3.5.1 Soils

Tables 4-7 and 4-8 show the calculation of the average (arithmetic mean) and RME concentrations of organic chemicals and metals of concern in surface soils and total soils respectively at the AGE Maintenance Shop Pad.

In accordance with EPA guidance (EPA 1989d) and as explained in Appendix C, the RME concentration is either the 95 percent UCL on the mean or the maximum concentration detected, whichever is lower. The use of "nondetect" values (U-qualified data) in calculating exposure point concentrations is also explained in Appendix C. Tables 4-9 and 4-8 give the soil concentrations of organic compounds from surface and total soils, respectively which have been adjusted for dermally absorbed fraction. These adjusted concentrations were used for calculating risks from dermal exposures to organic chemicals in soils. The absorbed fraction (from Table C-26 in Appendix C) is the ratio of the quantity of chemical that is absorbed through skin to the quantity that is applied to the skin in soil. As explained in Appendix C, dermal absorption of metals (except mercury) adhered to soil is considered to be insignificant and is not evaluated.

For purposes of risk assessment, surface soil was defined as soils to a depth of 2 feet. Some samples with field identification indicating 2-foot depth (i.e., XXXXX-XXXX-0002) were actually collected from a depth of 1.5 to 3.5 feet. These samples were not considered surface samples but are included in the risk assessment for subsurface soil exposures.

4.3.5.2 Groundwater

A leachate partitioning model was used to evaluate current leaching from the average total soil concentration at SWMU 31. Model results are included in Table 4-11. These modeled concentrations were then compared to EPA Region III tap-water RBCs (EPA 1993b). These concentrations are calculated assuming residential groundwater ingestion and inhalation and are based on an excess cancer risk of 1×10^{-6} or hazard quotient equal to one. Table 4-12 summarizes the comparison of the modeled concentration in groundwater to the conservative tap-water RBCs. No modeled concentrations exceeded the RBCs, so significant risks are not expected from the groundwater pathway. Therefore, the groundwater pathway has been determined to be insignificant and was not evaluated further.

4.3.5.3 Air

RME air concentrations of volatile and particulate emissions from surface soil were calculated using RME concentrations of chemicals of concern. The results of the air modeling are shown in Tables 4-13 and 4-14. RME air concentrations of volatile and particulate emission from total soil were also calculated using RME concentrations of concern. The results of the air modeling from total soil are shown in Tables 4-15 and 4-16.

4.3.6 Exposure Assumptions

The rationale and assumptions concerning potential human exposures considered in the risk assessment are described in Appendix C. Appendix C includes discussions of the intake factors used to quantify chemical intake of SWMU-related contaminants in various environmental media soil and air. Table 4-17 shows a summary of the intake factors used in the exposure assessment. These factors are multiplied by chemical concentrations in soil and air to obtain estimates of chemical intake by each exposure pathway.

4.3.7 Risk Characterization

Chemical intake is combined with chemical-specific toxicity factors to obtain an estimate of health risk. Noncarcinogenic hazards and carcinogenic risks to occupational workers, hypothetical future construction workers, and hypothetical future trespassers were estimated

for all relevant exposure routes and chemicals of concern using the approach and exposure assumptions described in Appendix C. Detailed risk calculations are shown in Appendix C and summarized in Table 4-18. A summary of the results of the risk assessment is given here.

Occupational Exposure

Occupational receptors (Cannon AFB personnel and civilians working routinely on Cannon AFB) were assumed to be exposed (via ingestion, dermal contact, and inhalation) to contaminated surface soil at SWMU 31. Occupational receptors were assumed to be exposed for 2 and 8 hours/day, for 120 and 250 days/year, over 9 and 25 years for the average and RME cases, respectively. These assumptions are very conservative, because there are no occupational receptors routinely exposed to contaminated media at the SWMU. Furthermore, the surface area of the SWMU is small (approximately 200 feet by 60 feet or one-quarter acre), and long-term exposures are not likely to occur there. Therefore, the exposure assumptions overestimate current and future exposure conditions at the SWMU.

The total hazard indexes calculated for noncarcinogenic health effects due to chronic exposures to contaminants in surface soils at SWMU 31 via the dermal contact, inhalation, and ingestion pathways are 0.0002 and 0.03 in the average and RME cases, respectively. Neither hazard index exceeds 1.0, which indicates that no adverse health effects are to be anticipated, even to sensitive individuals, with 25 years of exposure.

The estimated lifetime excess cancer risk under the assumed chronic exposure conditions is 2×10^{-8} under the average exposure case and 5×10^{-6} under the RME case. These levels are within or below the EPA target risk range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) for exposure to chemicals released from hazardous waste sites (EPA 1990; EPA 1991b). Ingestion of benzo(a)pyrene is the primary contributor to the carcinogenic risk estimate. The estimate of risks due to ingestion probably significantly overestimates actual risks, because it is assumed that the occupational worker will daily ingest the RME concentration of benzo(a)pyrene.

Construction Worker Exposure

Future construction workers were assumed to be exposed (via ingestion, dermal contact, and inhalation) to surface and subsurface soils at SWMU 31. Exposures were assumed to occur during excavation activities for 8 hours/day for 20 and 40 days for the average and RME cases, respectively.

The total hazard index calculated for noncarcinogenic health effects due to subchronic exposures to chemicals of concern in soils at SWMU 31 via the dermal contact, inhalation, and ingestion pathways is 0.0001 and 0.001 in the average and RME cases, respectively. Neither hazard index exceeds 1.0, which indicates that no adverse health effects are to be anticipated, even to sensitive individuals.

The estimated lifetime excess cancer risk under the assumed subchronic exposure conditions is 3×10^{-9} in the average case and 6×10^{-8} in the RME case. These levels are below the EPA target risk range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) for exposure to chemicals released from hazardous waste sites (EPA 1990; EPA 1991c), and are so low as to be negligible.

Hypothetical Future Trespasser Exposure

Hypothetical trespassers were assumed to be exposed (via ingestion, dermal contact and inhalation) to surface soil at SWMU 31. Hypothetical trespassers were assumed to be exposed at the SWMU for 2 and 8 hours/day, for 26 and 52 days/year, over 6 years for the average and RME cases, respectively. These assumptions are very conservative, because Cannon AFB is likely to remain a military installation, making access to SWMU 31 by trespassers unlikely.

The total hazard index calculated for noncarcinogenic health effects due to exposures to contaminants in surface soil at SWMU 31 via the dermal contact, ingestion and inhalation pathways is 0.00003 and 0.005 in the average and RME cases, respectively. Neither hazard index exceeds 1.0, which indicates that no adverse health effects are to be anticipated, even to sensitive individuals.

The estimated lifetime excess cancer risk under the assumed exposure conditions is 4×10^{-9} under the average exposure case and 3×10^{-7} under the RME case. These levels are below the EPA target risk range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) for exposure to chemicals released from hazardous waste sites (EPA 1990; EPA 1991b).

4.3.8 Qualitative Assessment of Exposures to Lead

Lead exposures are not addressed in the quantitative risk assessment, because EPA withdrew the RfD for lead in 1989, primarily due to the lack of a discernible threshold dose and the numerous sources of lead in the environment. Current EPA guidance (EPA 1989) suggests a soil lead concentration of 500 mg/kg to 1,000 mg/kg be considered for sites characterized as residential. This level is supported by EPA's Uptake/Biokinetic (UBK) Lead Model which predicts that exposures of children ages 0 to 6 to soils with approximately these levels will not result in blood lead levels that exceed a level of concern established by the Centers for Disease Control.

The maximum lead concentration measured in soils at SWMU 31 was 930 mg/kg detected in surface soil at 03101-0000. Lead was measured at 9 to 78 mg/kg in other surface soil samples at SWMU 31. The mean lead concentration in four surface soil samples was 266 mg/kg. The maximum concentration detected at SWMU 31 is near the high end of the range suggested by EPA for residential soils. However, because the area of potential contamination is very small, because elevated lead concentrations do not appear to be characteristic of soil at the site, because the mean concentration is below EPA's suggested range for long-term residential exposures, and because the maximum value is within the concentration range suggested in EPA guidance, lead detected in soils at SWMU 31 would not be expected to pose a threat to human health.

4.3.9 Qualitative Assessment of TPH Exposures

Petroleum-derived fuel is a complex mixture of hundreds of branched, straight-chain, cyclic, and aromatic carbon compounds, most of which are not particularly toxic. However, a small fraction of fuel constituents are known to have toxic or carcinogenic properties. The primary toxic fuel constituents of concern are BTEX; benzene, because it is carcinogenic, is the chief hazardous constituent of fuels and the chief contributor to risk from exposure. In the RFI,

BTEX and other potentially hazardous fuel constituents (such as naphthalene and pyrene) were analyzed for individually in the soil samples collected at the SWMU and are included in the quantitative risk assessment. Cumulative risks did not exceed levels of concern. It is not likely that other hydrocarbon constituents of TPH, which are relatively innocuous, would add significantly to the resulting estimates of potential health risks.

This can be demonstrated by comparing SWMU concentrations of TPH to RBCs derived using target risk levels, occupational soil ingestion intake factors, and provisional EPA toxicity factors for JP-4 and gasoline (EPA 1992d). (These provisional toxicity values are based on inhalation studies in animals using fresh fuel product. They are most appropriately used for evaluating exposures to fresh fuel spills when analytical results for the toxic constituents of TPH [primarily BTEX] are not available, and when the fuel product is known. The provisional values are under review and subject to revision. RBCs derived from them are used simply as a guide to potential health hazards.)

The toxicity factors and calculation of risk-based concentrations are shown in Table 4-19. Assuming that all the TPH at the SWMU is gasoline is the most conservative approach because its RBC is the lowest, based on evidence of carcinogenicity (probably due to benzene). The risk-based concentration of gasoline for oral exposures to TPH under occupational exposure assumptions is 33,600 mg/kg. The maximum SWMU concentration of TPH is 4,070 mg/kg, well below the conservative RBC.

4.3.10 Uncertainties and Limitations

Throughout the human health risk assessment, conservative assumptions regarding exposure conditions, exposure concentrations, and chemical toxicity and carcinogenicity were used that combine to result in an upper-bound estimate of risk for the SWMU. The conservative features and other uncertainties inherent in the risk assessment process are outlined in Appendix C. The chief uncertainties specific to risk assessment for SWMU 31 and their effect on the results and conclusions of the risk assessment are listed below.

- Only one of the two surface soil samples contained detectable concentrations of PAHs. Occupational risks were calculated based on the concentrations found in that one sample and very conservative estimates of exposure duration

and frequency. These exposure assumptions significantly overstate the likelihood of exposure to the contaminated area. Therefore, the RME risk of 5×10^{-6} could significantly overestimate of actual risk associated with the SWMU.

- Direct physical contact with contaminated soils was assumed to occur routinely for several hours/day, 120 to 250 days a year, for 9 to 25 years. These assumptions overstate current and likely future occupational exposure conditions to soils at this site.

- Dermal absorption of PAHs was not evaluated quantitatively in the risk assessment. EPA guidance (EPA RAGS 1989a) states that it is inappropriate to use the oral slope factor to evaluate the risks associated with dermal exposure to carcinogens, such as benzo(a)pyrene, which can cause skin cancer through a direct action at the point of application. The exclusion of PAHs from quantitative evaluation in the dermal exposure pathway may underestimate the potential human health risk from dermal contact with soils at the SWMU. Because of the low actual exposure potential and because PAHs were detected in only a few samples analyzed, the uncertainty regarding direct contact risk is not likely to affect the conclusions of the risk assessment.

- Chemicals of concern that do not have EPA-established inhalation toxicity factors were not included in the calculation of potential risk from the inhalation pathway. While their exclusion may underestimate the risk at the SWMU, it is unlikely that the total calculated risk will be significantly affected because ingestion and dermal contact, rather than inhalation, are generally the major contributors to the total risk.

- Cobalt was not considered in the quantitative risk assessment, because it does not have an EPA-established toxicity factor; however, an oral RfD is pending. Its exclusion from the quantitative analysis may underestimate risk at the SWMU. However, it is not likely to affect the results or conclusions of the risk assessment relative to the chemicals with known toxic or carcinogenic effects detected at the SWMU.

- The soil surface area at this SWMU is too small to support chronic occupational exposures. Therefore, the exposure assumptions used are likely to significantly overestimate potential magnitude of exposure to contaminated soils and risk at this SWMU.

4.4 ECOLOGICAL RISK ASSESSMENT

4.4.1 Ecological Characterization and Key Receptor (Indicator) Species

SWMU 31, the AGE Maintenance Shop Pad, is located in a small area of poor wildlife habitat quality, within the developed portion of Cannon AFB where existing ground cover is mostly concrete, buildings, and isolated areas of mowed non-native grasses. About 90 percent of the land surface within the immediate vicinity (within 100 feet) of SWMU 31 is concrete paving and Building 186. Mowed grassy areas are located to the northwest, across Torch Boulevard, and to the northeast, where the grass forms a slight drainage channel. The AGE Drainage Ditch begins southeast of the pad. The pad has been actively used since 1971.

The most common species are likely to be birds, such as robin (*Turdus migratorius*), house sparrow (*Passer domesticus*), and the starling (*Sturnus vulgaris*). Seedeaters would be more limited, since the grass is maintained by mowing. Although the house mouse (*Mus musculus*) may occur in the area around the buildings, the grass habitat is probably too small, fragmented, and subject to human disturbance to be used regularly by terrestrial species such as deer mice. Raptors are unlikely to use the area for similar reasons.

Given this assessment, the robin (*Turdus migratorius*) was selected as the key receptor species for the grassy areas near SWMU 31.

4.4.2 Chemicals of Concern

The chemicals of concern (COCs) at SWMU 31 were selected using validated data from six soil samples covering the interval between 0 and 2 feet deep. This interval was selected because most soil-dwelling organisms (e.g. earthworms and deer mice) occupy this zone. Table 4-20 provides a summary of the chemicals detected in the six samples considered for

this ERA. A detailed description of the soil sampling program and chemical analysis and results can be found in the Cannon AFB RFI, Appendix III SWMUs (W-C 1993).

A chemical must have been detected in at least one of the six samples to be considered a possible COC. The following screening criteria were then applied, in the order shown, to determine if a chemical in the soil would be retained as a COC:

- Exceedance of Cannon AFB background soil concentrations
- Exceedance of average concentrations found in southwestern U.S. soils
- Exceedance of the normal range found in U.S. soils (nationwide)

The maximum detected concentration of the six samples was used in the comparison to background criteria. If no background criteria were available for comparison, as was the case for the organic chemicals, the chemicals were retained as COCs. If the maximum detected concentration of a chemical exceeded the local (i.e. Cannon AFB) background concentration, it was then compared to the average concentration found in southwestern U.S. soils. If it exceeded this criteria, it was likely retained as a COC, even if it fell within the normal range found in U.S. soils. This is because the normal U.S. range is widely variable and was included in the screening process primarily as an additional reference. In some cases however, the normal U.S. range was the only screening criteria available. Table 4-21 lists the maximum concentrations detected and shows the screening values used. The chemicals that were retained as COCs at SWMU 31 following the screening process include tetrachloroethene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, carbazole, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, phenanthrene, pyrene, antimony, barium, cadmium, chromium, cobalt, copper, lead, selenium, zinc, and TPH.

4.4.3 Exposure Assessment

Figure 4-4 depicts the exposure pathway flow chart developed for SWMU 31. As the flowchart indicates, chemicals could potentially be released through transport in runoff, infiltration to groundwater, volatilization or wind erosion, and direct contact by ecological receptors. Except for direct contact, these exposure pathways are incomplete or of minor importance for ecological receptors at SWMU 31. Storm water runoff is a potentially

complete but insignificant pathway, because the AGE Drainage Ditch was already addressed as a separate SWMU. Any storm water runoff to grassy areas bordering the pad can be considered as part of direct contact with surface soil for the purposes of this analysis. Ecological receptors are not in contact with groundwater, so this is an incomplete exposure pathway. Volatilization or wind erosion is not considered a significant pathway at this site. Although one of the COCs is a volatile organic compound (VOC), the maximum concentration was about 0.0036 mg/kg, and VOC concentrations of 100 mg/kg or greater in air are generally needed to induce toxic responses in laboratory rats and mice from inhalation (NIOSH 1987). Concentrations in soils would have to be many times greater than this to produce these toxic levels in air, even near the soil surface. Direct contact with subsurface soils (more than two feet deep) is also considered an insignificant or incomplete pathway because of the limited use of deeper soils at this site by wildlife.

Therefore, the only potentially complete and significant exposure pathway is direct contact with contaminated surface soil by species frequenting the SWMU area. Direct contact may include dermal absorption or ingestion. Dermal absorption is not considered a significant exposure route for the receptors at this site because the animals are assumed to be largely protected by their fur or feathers. Receptors at the SWMU may ingest COCs either directly or indirectly. Direct ingestion usually occurs along the food/prey chain from soil adhered to the surface of food or from preening/cleaning or burrowing activities. Indirect ingestion includes ingestion of COCs that have been transferred via food webs.

Figure 4-5 depicts the Conceptual Site Model developed from the exposure pathway analysis, the ecological characterization, and the identification of the key receptor species for SWMU 31. As the figure indicates, the pathway of concern is from surface soil to the robin, via direct and indirect ingestion, with the earthworm identified as a main dietary component of the robin.

4.4.4 Risk Characterization

This section provides a characterization of potential risk to the selected key receptor species (robin) at SWMU 31. For the purposes of this analysis, it was assumed that the robin's diet consists of earthworms and inadvertent consumption of soil. It was also assumed that the concentration of the COCs were the same in the earthworm as in the soil, except for cadmium

and selenium, for which bioaccumulation factors (BAFs) of 4.6 and 12 were used (see Section 7.4.4 (Raptor discussion)). Therefore the analysis consisted of comparing the concentration of COCs in the robin's food (i.e., the chemical concentration in soil) to selected toxicity benchmark dietary levels for those chemicals (see Table 4-22).

This is a somewhat conservative approach, because studies indicate that, for many chemicals, BAFs from soil to earthworm are less than one (Beyer and Stafford 1993). However, this assumption takes into account the soil that would be clinging to the earthworm when consumed by the robin (that is not taken into account by the BAF studies) and also accounts for minor inadvertent soil ingestion by the robin. The benchmark dietary levels were selected as explained in Appendix D, Sections D.3 and D.4; these sections also provide background toxicological information about the COCs. The soil chemical concentration used was the arithmetic mean, as described in Appendix D (Section D.6.).

Table 4-22 lists the COCs for SWMU 31 and provides a comparison between the soil concentration (arithmetic mean) and the benchmark dietary level for the robin. If the soil level exceeds the benchmark level, there is a possibility of risk, as noted in the table. The following discussion addresses those chemicals where a possibility of risk is indicated.

Benzo-a-pyrene (BaP)

The average concentration of BaP at SWMU 31 was 2.3 mg/kg, compared to the benchmark dietary level of 0.02 mg/kg, indicating a potential risk. The 2.3 mg/kg level is above reported BaP soil concentrations for various locations as reported in the literature (see Table A-6) and is higher than BaP levels found at other similar SWMUs at Cannon AFB. However, BaP was detected in only one of three samples, at 2.7 mg/kg; the other two samples were non-detects, and one of those was reported at an assumed value of 4.0 mg/kg because of the high reporting limit of 8.0 mg/kg. Therefore, it is unlikely that the robin is exposed to a level of 2.7 mg/kg in all areas in which it feeds, assuming it does not feed just at the "hot spots" in the SWMU area. Also, the low toxicity benchmark level for BaP is a reflection of BaP's carcinogenic effects through the action of its intermediate metabolites, as opposed to acute toxicity. In most cases, the process of carcinogenesis occurs over a period of many months in experimental animals, and therefore it is questionable if carcinogenesis is an important endpoint for relatively short-lived mammals and birds, such as the robin. Finally, the BaP

found at SWMU 31 may not be completely bioavailable to robins. Goon et al. (1991) showed that BaP that had aged 6 months in soil was only 34 percent to 51 percent orally bioavailable for clayey and sandy soils, relative to BaP administered alone to rats. For all these reasons, it is unlikely that BaP presents an unacceptable risk at SWMU 31.

Benzo(a)anthracene (BaA)

The average concentration in the soil (2.2 mg/kg) slightly exceeds the dietary benchmark level of 2.0 mg/kg. However, Beyer and Stafford (1992) calculated BAFs of less than one for all PAHs from soil to earthworm, specifically a BAF of 0.27 for BaA. Therefore, given this and the low level of BaA detected, along with the fact that the benchmark level reflects a concern primarily for carcinogenicity, which is not a particularly important benchmark for shorter-lived birds, it is unlikely that the BaA at SWMU 31 constitutes a risk to the robin.

Lead

The average concentration of lead at SWMU 31 was 181.63 mg/kg, compared to the benchmark dietary level of 87.5 mg/kg, indicating a potential risk. However, it is unlikely that lead constitutes a risk to the robin at SWMU 31, for several reasons. First, the average soil value is high primarily because of one "hot spot" out of six samples, with lead reported at 930 mg/kg. The remaining five samples are all under the benchmark level. Therefore, it is unlikely that the robin is exposed to high levels of lead in all areas in which it feeds. In addition, the toxicity of lead to wildlife depends on the chemical form in which the lead occurs. Lead in soils at Cannon AFB is probably aged or oxidized, and therefore less toxic or bioavailable than either the lead forms typically used in studies that establish toxicity benchmark values (e.g., lead acetate) or the organolead compounds, that are unstable upon exposure to air and light and typically convert to less toxic lead oxide forms.

TPH

The average concentration of TPH at SWMU 31 was 1391.93 mg/kg, compared to the benchmark dietary level of 241 mg/kg, indicating a potential risk. However, as with lead, TPH levels are very spotty at SWMU 31, with "hot spots" indicated by three samples (ranging from 973 mg/kg to 4070 mg/kg) and two non-detects out of six samples. Also, it is not

certain how much the robin is exposed to fresh TPH mixtures as opposed to aged products. As noted in Appendix D, the toxicity benchmarks for TPH are derived from experiments using fresh fuels, and the BTEX and PAH compounds are the compounds of primary concern in TPH mixtures in setting cleanup levels and characterizing risk. In older spills to surface soils, the volatile BTEX component may not be present or prevalent, and the total TPH value may reflect less toxic constituents. However, PAHs may still be present in older spills, and these may be of concern. At SWMU 31, PAHs were detected, but it appears that the risk related to these is minimal (see BaP and BaA discussion, above).

Cadmium & Selenium

The average concentration of cadmium in earthworms at SWMU 31 was estimated to be 11.87 mg/kg and the average selenium concentration in earthworms was 5.4 mg/kg. These levels of cadmium and selenium, which were calculated using BAFs of 4.6 and 12, respectively, are just slightly above their respective benchmark dietary levels of 10.5 mg/kg and 5 mg/kg for robins. Cadmium was detected at a level of 8.7 and 4.4 mg/kg in 2 of the 6 samples; the cadmium concentration in the remaining 4 samples was below 1. This indicates 2 possible "hot spots" for cadmium. Since the average cadmium concentration in earthworms was only slightly above the benchmark dietary level and it is unlikely robins feed only at the "hot spots", cadmium is unlikely to pose a risk to robins feeding at SWMU 31. Similarly, selenium is unlikely to pose a risk to robins since it was detected in only 2 of 6 samples and the average earthworm concentration is only slightly above the benchmark dietary level for robins. It is also likely that the selenium concentrations in soil at Cannon AFB represent natural sources (see Section 7.4.4).

4.5 SUMMARY AND CONCLUSIONS

4.5.1 Summary

A human health and ecological risk assessment which considered both present and future receptors and all appropriate exposure pathways was completed for this SWMU. Analytical data were collected for soils at the SWMU, and fate and transport modeling was conducted to evaluate the air and groundwater pathways. The results of the risk assessment are summarized here.

- Results of the human health risk assessment (Table 4-18) show that no unacceptable health risks due to chemical releases are expected at the SWMU

- Results of the ecological risk assessment show that no unacceptable ecological risks due to chemical releases are expected at the SWMU

4.5.2 Conclusions

Since no unacceptable human health or ecological risks due to chemical releases are expected from this SWMU, no further action is recommended for this SWMU.

TABLE 4-1

SUMMARY OF ANALYTICAL AND QA/QC SAMPLING
AGE MAINTENANCE SHOP PAD (SWMU NO. 31)
CANNON AFB, NEW MEXICO

Sample Location	Target Interval (ft-bgs)	Sample Identification Number	QA/QC Type	Sample Matrix	Analytical Parameters				Sample Containers		
					VOCs	SVOCs	Metals	TRPH	40 ml VOA vials	4 oz. jars	8 oz. jars
Boring 03101	0 - 0.5	CAN031-0311-0000		Soil		X	X	X			1
	1.5 - 3.5	CAN031-0311-0002		Soil			X	X			1
	4 - 6	CAN031-0311-0004		Soil			X	X			1
	8 - 10	CAN031-0311-0008		Soil	X		X	X			1
Boring 03102	0 - 0.5	CAN031-0312-0000		Soil			X	X			1
	0 - 0.5	CAN031-0312-3161	FD	Soil			X	X			1
	0 - 0.5	CAN031-0312-3101	MRD	Soil			X	X			1
	1.5 - 3.5	CAN031-0312-0002		Soil	X	X	X	X		2	1
	1.5 - 3.5	CAN031-0312-3162	FD	Soil	X	X				2	
	1.5 - 3.5	CAN031-0312-3102	MRD	Soil	X	X				2	
	4 - 6	CAN031-0312-0004		Soil			X	X			1
	8 - 10	CAN031-0312-0008		Soil	X	X	X	X		1	1
	8 - 10	CAN031-0312-6008	MS/MSD	Soil	X	X	X	X		1	2
Boring 03103	0.5-2	CAN031-0313-0000		Soil	X	X	X	X			1
	2 - 4	CAN031-0313-0002		Soil		X	X	X			1
	4 - 6	CAN031-0313-0004		Soil			X	X			1
	8 - 10	CAN031-0313-0008		Soil			X	X			1
Boring 03104	0.5 - 2	CAN031-0314-0000		Soil			X	X			1
	2 - 4	CAN031-0314-0002		Soil	X	X	X	X		2	1
	2 - 4	CAN031-0314-3163	FD	Soil	X	X	X	X		2	1
	2 - 4	CAN031-0314-3103	MRD	Soil	X	X	X	X		2	1
	4 - 6	CAN031-0314-0004		Soil			X	X			1
	8 - 10	CAN031-0314-0008		Soil	X	X	X	X		2	1

TABLE 4-1

SUMMARY OF ANALYTICAL AND QA/QC SAMPLING
AGE MAINTENANCE SHOP PAD (SWMU NO. 31)
CANNON AFB, NEW MEXICO

Sample Location	Target Interval (ft-bgs)	Sample Identification Number	QA/QC Type	Sample Matrix	Analytical Parameters				Sample Containers		
					VOCs	SVOCs	Metals	TRPH	40 ml VOA vials	4 oz. jars	8 oz. jars
Boring 03104, cont.		CAN031-0314-3151	AB	Water	X				2		
		CAN031-0314-3171	RB	Water	X				2		
		CAN031-0314-3181	DW	Water	X				2		
		CAN031-0314-3191	TB	Water	X				1		

AB = Ambient blank
DW = Decontamination water
FB = Field blank
MRD = Missouri River Division
MS/MSD = Matrix spike/matrix spike duplicate
RB = Rinsate blank
TB = Trip blank

See Figure 6-1 for locations of the borings.

TABLE 4-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0311-0000			CAN031-0311-0002			CAN031-0312-0000			CAN031-0312-0002		
LAB SAMPLE NUMBER	0311830016SA			0311830017SA			0311830010SA			0311830011SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Tetrachloroethene										<	5.6	U
Semivolatile Organics (µg/kg)												
Anthracene	600	4100	J							<	370	U
Benzo(a)anthracene	2400	4100	J							<	370	U
Benzo(a)pyrene	2700	4100	J							<	370	U
Benzo(b)fluoranthene	5600	4100								65	370	J
Benzo(g,h,i)perylene	2600	4100	J							<	370	U
Carbazole	500	4100	J							<	370	U
Chrysene	3100	4100	J							<	370	U
Fluoranthene	5600	4100								55	370	J
Indeno(1,2,3-cd)pyrene	2300	4100	J							<	370	U
2-Methylnaphthalene	<	4100	U							45	370	J
Phenanthrene	3200	4100	J							44	370	J
Pyrene	4600	4100								44	370	J
Metals (mg/kg)												
Aluminum	5660	12.5		4160	24.1		4260	10.5		5430	11.2	
Antimony	1.9	7.5	J	<	14.4	U	<	6.3	U	<	6.7	U
Arsenic	3.2	0.62		2.3	0.6		2.4	0.52		2.9	0.56	
Barium	1460	1.2	J	120	2.4	J	166	1	J	201	1.1	J
Beryllium	0.36	0.25		0.26	0.48	J	0.22	0.21		0.27	0.22	
Cadmium	8.7	0.62		<	1.2	U	0.85	0.52		0.63	0.56	
Calcium	6270	25		205000	48.1		48600	20.9		94400	22.3	
Chromium	130	1.2		4.2	2.4		9.9	1	J	8	1.1	J
Cobalt	3.4	1.2		2.3	2.4	J	2.6	1		3.2	1.1	

NOTE: Results presented here are chemicals which were detected at least once in near-surface soils at this SWMU and have passed data review. A complete summary of chemical results are presented in Appendix A of the RFI report.

J = Estimated value below reporting limit or estimated based on data quality criteria.

U = Not detected

Qual=Qualification

RL = Reporting Limit.

TABLE 4-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0311-0000			CAN031-0311-0002			CAN031-0312-0000			CAN031-0312-0002		
LAB SAMPLE NUMBER	0311830016SA			0311830017SA			0311830010SA			0311830011SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Tetrachloroethene										<	5.6	U
Semivolatile Organics (µg/kg)												
Anthracene	600	4100	J							<	370	U
Benzo(a)anthracene	2400	4100	J							<	370	U
Benzo(a)pyrene	2700	4100	J							<	370	U
Benzo(b)fluoranthene	5600	4100								65	370	J
Benzo(g,h,i)perylene	2600	4100	J							<	370	U
Carbazole	500	4100	J							<	370	U
Chrysene	3100	4100	J							<	370	U
Fluoranthene	5600	4100								55	370	J
Indeno(1,2,3-cd)pyrene	2300	4100	J							<	370	U
2-Methylnaphthalene	<	4100	U							45	370	J
Phenanthrene	3200	4100	J							44	370	J
Pyrene	4600	4100								44	370	J
Metals (mg/kg)												
Aluminum	5660	12.5		4160	24.1		4260	10.5		5430	11.2	
Antimony	1.9	7.5	J	<	14.4	U	<	6.3	U	<	6.7	U
Arsenic	3.2	0.62		2.3	0.6		2.4	0.52		2.9	0.56	
Barium	1460	1.2	J	120	2.4	J	166	1	J	201	1.1	J
Beryllium	0.36	0.25		0.26	0.48	J	0.22	0.21		0.27	0.22	
Cadmium	8.7	0.62		<	1.2	U	0.85	0.52		0.63	0.56	
Calcium	6270	25		205000	48.1		48600	20.9		94400	22.3	
Chromium	130	1.2		4.2	2.4		9.9	1	J	8	1.1	J
Cobalt	3.4	1.2		2.3	2.4	J	2.6	1		3.2	1.1	

NOTE: Results presented here are chemicals which were detected at least once in near-surface soils at this SWMU and have passed data review. A complete summary of chemical results are presented in Appendix A of the RFI report.

J = Estimated value below reporting limit or estimated based on data quality criteria.

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RL = Reporting Limit.

TABLE 4-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0311-0000			CAN031-0311-0002			CAN031-0312-0000			CAN031-0312-0002		
LAB SAMPLE NUMBER	0311830016SA			0311830017SA			0311830010SA			0311830011SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Copper	61.4	2.5		2.7	4.8	J	9.3	2.1		10.9	2.2	
Iron	7150	12.5		3290	24.1		5570	10.5		6420	11.2	
Lead	930	125		3.5	1.2		46.9	5.2		22.3	5.6	
Magnesium	1150	25		2450	48.1		1810	20.9		2210	22.3	
Nickel	7.2	5		4.9	9.6	J	5.8	4.2		6.9	4.5	
Potassium	867	625	UJ	666	1200	J	1100	523		954	558	
Selenium	<	1.2	U	<	1.2	UJ	<	1	UJ	<	1.1	UJ
Sodium	<	625		<	1200	U	<	523	U	<	558	U
Vanadium	13.8	1.2		10.4	2.4		13.8	1		17.1	1.1	
Zinc	479	2.5		9.2	4.8		57	2.1		33.5	2.2	
TPH (mg/kg)												
Total Petroleum Hydrocarbons	3180	500		<	48.1	U	973	209		81	44.6	

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TABLE 4-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0313-0000			CAN031-0313-0002			CAN031-0314-0000			CAN031-0314-0002		
LAB SAMPLE NUMBER	0311830002SA			0311830003SA			0311830006SA			0311830008SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Tetrachloroethene	3.6	6.1								<	5.8	U
Semivolatile Organics (µg/kg)												
Anthracene	<	8000	U	<	390	U				<	380	U
Benzo(a)anthracene	<	8000	U	<	390	U				<	380	U
Benzo(a)pyrene	<	8000	U	<	390	U				<	380	U
Benzo(b)fluoranthene	<	8000	U	<	390	U				<	380	U
Benzo(g,h,i)perylene	<	8000	U	<	390	U				<	380	U
Carbazole	<	8000	U	<	390	U				<	380	U
Chrysene	<	8000	U	<	390	U				<	380	U
Fluoranthene	<	8000	U	<	390	U				<	380	U
Indeno(1,2,3-cd)pyrene	<	8000	U	<	390	U				<	380	U
2-Methylnaphthalene	<	8000	U	<	390	U				<	380	U
Phenanthrene	<	8000	U	<	390	U				<	380	U
Pyrene	<	8000	U	<	390	U				<	380	U
Metals (mg/kg)												
Aluminum	6650	12.2		5740	11.7		9430	11.7		6090	11.7	J
Antimony	<	7.3	U	<	7	U	<	7	U	<	7	U
Arsenic	4.4	0.61		2.2	0.59		4.6	0.59		2.6	0.58	
Barium	229	1.2	J	119	1.2	J	104	1.2	J	107	1.2	J
Beryllium	0.25	0.24		0.25	0.23		0.69	0.23		0.34	0.23	
Cadmium	4.4	0.61		<	0.59	U	4200	0.59	U	<	0.58	U
Calcium	42400	24.4		108000	23.4		11.8	23.5		71300	23.3	J
Chromium	24.3	1.2		6	1.2		5.1	1.2		6.4	1.2	
Cobalt	3.5	1.2		3.2	1.2		7.6	1.2		3.2	1.2	

NOTE: Results presented here are chemicals which were detected at least once in near-surface soils at this SWMU and have passed data review. A complete summary of chemical results are presented in Appendix A of the RFI report.

J=Estimated value below reporting limit or estimated based on data quality criteria.

U = Not detected

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RL = Reporting Limit.

TABLE 4-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0313-0000			CAN031-0313-0002			CAN031-0314-0000			CAN031-0314-0002		
LAB SAMPLE NUMBER	0311830002SA			0311830003SA			0311830006SA			0311830008SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Copper	18.8	2.4		4.7	2.3		10700	2.3		5.2	2.3	J
Iron	7950	12.2		5470	11.7		9.4	11.7		6030	11.7	J
Lead	77.7	6.1		4.7	0.59		2130	0.59		6.9	1.2	J
Magnesium	2310	24.4		1940	23.4		9.7	23.5		1760	23.3	
Nickel	6.8	4.9		5.7	4.7		1610	4.7		7	4.7	
Potassium	1550	610		998	586		0.15	587		1110	583	J
Selenium	0.24	1.2	J	<	1.2	UJ	<	1.2	J	0.16	1.2	J
Sodium	193	610	J	<	586	U	21.2	587	U	<	583	U
Vanadium	16.6	1.2		13.1	1.2		29.8	1.2		13.3	1.2	
Zinc	85.8	2.4		12.6	2.3			2.3		13.2	2.3	
TPH (mg/kg)							<					
Total Petroleum Hydrocarbons	4070	488		<	46.9	U		46.9	U	<	46.6	U

NOTE: Results presented here are chemicals which were detected at least once in near-surface soils at this SWMU and have passed data review. A complete summary of chemical results are presented in Appendix A of the RFI report.

J=Estimated value below reporting limit or estimated based on data quality criteria.

U = Not detected

Qual =Qualification

RL = Reporting Limit.

TABLE 4-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0311-0004			CAN031-0311-0008			CAN031-0312-0004			CAN031-0312-0008			CAN031-0313-0004			CAN031-0313-0008		
LAB SAMPLE NUMBER	0311830018SA			0311830001SA			0311830014SA			0311830015SA			0311830004SA			0311830005SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)																		
Aluminum	7690	11.8		3210	11.2		4210	23.5		5820	11.4		4090	23.3		5460	11.4	
Arsenic	2.4	0.59		1.1	0.56		2.2	0.59		2.6	0.57		2.7	0.58		3	0.57	
Barium	81.2	1.2	J	327	1.1	J	273	2.4	J	237	1.1	J	130	2.3	J	411	1.1	J
Beryllium	0.29	0.24		<	0.22	U	<	0.47	U	0.35	0.23		0.24	0.47	J	0.53	0.23	
Calcium	22900	23.6		60300	22.4		217000	47		68100	22.9		142000	46.6		50700	22.8	
Chromium	8.2	1.2		3.8	1.1		6.5	2.4		6.1	1.1		4.9	2.3		6.1	1.1	
Cobalt	4.4	1.2		1.7	1.1		2.4	2.4		3.1	1.1		2.5	2.3		3	1.1	
Copper	5.9	2.4		2.2	2.2		3.6	4.7	J	3.8	2.3		2.7	4.7	J	3.6	2.3	
Iron	8140	11.8		3320	11.2		3930	23.5		5900	11.4		4050	23.3		5580	11.4	
Lead	6.7	1.2		4.5	1.1		5.4	0.59		6.6	0.57		4	0.58		5.8	1.1	
Magnesium	2000	23.6		2200	22.4		3250	47		3970	22.9		2500	46.6		2960	22.8	
Nickel	7.4	4.7		3.6	4.5	J	5.7	9.4	J	6.3	4.6		5.9	9.3	J	6.5	4.6	
Potassium	1450	590		892	560		688	1180		1090	572		762	1170		1140	570	
Selenium	<	1.2	UJ	0.12	1.1	J	<	1.2	UJ	<	1.1	UJ	<	1.2	UJ	<	1.1	UJ
Vanadium	16.4	1.2		11.2	1.1		14	2.4		23.4	1.1		15.4	2.3		22.6	1.1	
Zinc	18.8	2.4		8	2.2	J	9.6	4.7		12.9	2.3		9.8	4.7		12.1	2.3	

NOTE: Results presented here are chemicals which were detected at least once in subsurface soils at this SWMU and have passed data review. A complete summary of chemical results are presented in Appendix A of the RFI report.
J=Estimated value below reporting limit or estimated based on data quality criteria.
U = Not detected RL = Reporting Limit.
Qual= Qualifier

TABLE 4-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 31

LOCATOR	CAN031-0314-0004			CAN031-0314-0008		
LAB SAMPLE NUMBER	0311830009SA			0311830019SA		
COLLECT DATE	09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual
Metals (mg/kg)						
Aluminum	4830	23.5		2160	23.3	
Arsenic	3.1	0.59		1.5	0.58	
Barium	1130	2.4	J	143	2.3	J
Beryllium	<	0.47	U	<	0.47	U
Calcium	156000	47		222000	46.5	
Chromium	4.5	2.4		2.3	2.3	
Cobalt	2.4	2.4		<	2.3	U
Copper	2.5	4.7	J	1.5	4.7	J
Iron	4570	23.5		1680	23.3	
Lead	4.1	0.59		1.9	0.58	
Magnesium	3390	47		2920	46.5	
Nickel	6.2	9.4	J	3.6	9.3	J
Potassium	844	1180	J	<	1160	U
Selenium	<	1.2	UJ	<	1.2	UJ
Vanadium	18.7	2.4		6	2.3	
Zinc	11.9	4.7		5.6	4.7	

NOTE: Results presented here are chemicals which were detected at least once in subsurface soils at this SWMU and have passed data review. A complete summary of chemical results are presented in Appendix A of the RFI report.
J=Estimated value below reporting limit or estimated based on data quality criteria.
U = Not detected RL = Reporting Limit.
Qual= Qualifier

TABLE 4-3

COMPARISON OF MAXIMUM DETECTED METAL CONCENTRATIONS IN SURFACE SOIL TO BACKGROUND(1)
SWMU 31, CANNON AFB
AGE Maintenance Shop Pad

Sample ID	Metal	Maximum detected concentration	Range of background concentrations (2)	Upper tolerance limit (UTL) background concentration(3)	Does maximum detected exceed background	Reported Level in Clovis, NM Region (4)
CAN031-0314-0000	Aluminum	9430	1410 - 11,000	10,540	N	50,000
CAN031-0311-0000	Antimony	1.9	<4.9 - 5.1	*	Y	<1
CAN031-0314-0000	Arsenic	4.6	0.67 - 28	15.5	N	6.5
CAN031-0311-0000	Barium	1460	14.5 - 1200	642	Y	500
CAN031-0314-0000	Beryllium	0.69	0.17 - 0.77	0.73	N	1-2
CAN031-0311-0000	Cadmium	8.7	<0.51 - 4.2	*	Y	---
CAN031-0311-0000	Chromium	130	4 - 15.4	12.5	Y	30
CAN031-0314-0000	Cobalt	5.1	0.85 - 5.3	4.5	N**	3-7
CAN031-0311-0000	Copper	61.4	<2 - 18.4	*	Y	20
CAN031-0311-0000	Lead	930	1.1 - 46	25.8	Y	15
CAN031-0314-0000	Nickel	9.7	1.3 - 9.8	9	N**	15
CAN031-0314-0000	Potassium	1610	354 - 2770	2,572	N	16,000
CAN031-0313-0000	Selenium	0.24	<0.21 - 124	*	N**	0.15-0.30
CAN031-0314-0000	Vanadium	21.2	5.2 - 28.3	25.3	N	30-70
CAN031-0311-0000	Zinc	479	<4.3 - 27.5	21.9	Y	45

(1) All units in mg/kg.
(2) Compiled from data collected by Woodward-Clyde for the RFI and RI (W-C 1992 and W-C 1993) and Walk, Haydel and Associates for the IRP (Walk, Haydel and Associates 1990).
Summarized in "Concentrations of Selected Naturally Occurring Chemical Constituents in Soil and Groundwater at Cannon AFB, NM" (W-C 1993)
(3) Upper Tolerance Limit (UTL) = mean + 2 x standard deviation. See Appendixx A. This is for all practical purposes the same as the 90% upper confidence limit of the 95th percentile where UTL = mean + standard deviation x k, where k=2.02 for n=37 .
(4) USGS 1984
* Data insufficient to calculate UTL of background concentration
** Maximum concentration within or only slightly above Base-wide background range and within naturally occurring levels (USGS 1984); therefore concentration is not considered to exceed background.

TABLE 4-4

COMPARISON OF MAXIMUM DETECTED METAL CONCENTRATIONS IN TOTAL SOILS TO BACKGROUND(1)
SWMU 31, CANNON AFB
AGE Maintenance Shop Pad

Sample ID	Metal	Maximum detected concentration	Range of background concentrations (2)	Upper tolerance limit (UTL) background concentration(3)	Does maximum detected exceed background	Typical Level in Clovis, NM Region (4)
CAN031-0314-0000	Aluminum	9430	1410 - 11,000	10,540	N	50,000
CAN031-0311-0000	Antimony	1.9	<4.9 - 5.1	*	Y	<1
CAN031-0314-0000	Arsenic	4.6	0.67 - 28	15.5	N	6.5
CAN031-0311-0000	Barium	1460	14.5 - 1200	642	Y	500
CAN031-0314-0000	Beryllium	0.69	0.17 - 0.77	0.73	N	1-2
CAN031-0311-0000	Cadmium	8.7	<0.51 - 4.2	*	Y	---
CAN031-0311-0000	Chromium	130	4 - 15.4	12.5	Y	30
CAN031-0314-0000	Cobalt	5.1	0.85 - 5.3	4.5	N**	3-7
CAN031-0311-0000	Copper	61.4	<2 - 18.4	*	Y	20
CAN031-0311-0000	Lead	930	1.1 - 46	25.8	Y	15
CAN031-0314-0000	Nickel	9.7	1.3 - 9.8	9	N**	15
CAN031-0314-0000	Potassium	1610	354 - 2770	2,572	N	16,000
CAN031-0313-0000	Selenium	0.24	<0.21 - 124	*	N**	0.15-0.30
CAN031-0314-0000	Vanadium	21.2	5.2 - 28.3	25.3	N	30-70
CAN031-0311-0000	Zinc	479	<4.3 - 27.5	21.9	Y	45

(1) All units in mg/kg.
(2) Compiled from data collected by Woodward-Clyde for the RFI and RI (W-C 1992 and W-C 1993) and Walk, Haydel and Associates for the IRP (Walk, Haydel and Associates 1990).
Summarized in "Concentrations of Selected Naturally Occurring Chemical Constituents in Soil and Groundwater at Cannon AFB, NM" (W-C 1993)
(3) Upper Tolerance Limit (UTL) = mean + 2 x standard deviation. This is for all practical purposes the same as the 90% upper confidence limit of the 95th percentile where UTL = mean + standard deviation x k, where k=2.02 for n=37 .
(4) USGS 1984
* Data insufficient to calculate UTL of background concentration
** Maximum concentration is within or slightly above Base-wide background range and within naturally-occurring levels (USGS 1984); therefore concentration is not considered to exceed background.

TABLE 4-5

CHEMICALS OF CONCERN IN SURFACE SOIL

Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene*
Carbazole
Chrysene
Fluoranthene
Indeno(1,2,3-cd)pyrene
2-Methylnaphthalene*
Phenanthrene*
Pyrene
Tetrachloroethene
TPH*
Antimony
Barium
Cadmium
Chromium
Copper
Lead*
Zinc

* No EPA-established toxicity factor.

TABLE 4-6

CHEMICALS OF CONCERN IN TOTAL SOIL

Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene*
Carbazole
Chrysene
Fluoranthene
Indeno(1,2,3-cd)pyrene
2-Methylnaphthalene*
Phenanthrene*
Pyrene
Tetrachloroethene
TPH*
Antimony
Barium
Cadmium
Chromium
Copper
Lead*
Zinc

* No EPA-established toxicity factor.

TABLE 4-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	Tetrachloroethene (µg/kg)			Anthracene (µg/kg)			Benzo(a)anthracene (µg/kg)			Benzo(a)pyrene (µg/kg)			Benzo(b)fluoranthene (µg/kg)		
Field ID	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL
CAN031-0311-0000				600	J	4100	2400	J	4100	2700	J	4100	5600		4100
CAN031-0312-0000															
CAN031-0313-0000	3.6	J	6.1		U	8000		U	8000		U	8000	4000	U	8000
CAN031-0314-0000															
Number	1			1			1			1			2		
Minimum detected	3.6			600			2400			2700			5600		
Maximum detected	3.6			600			2400			2700			5600		
Average							2400			2700			4800		
H Statistic															
Standard Deviation															
95% UCL															
RME	3.6			600			2400			2700			5600		

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations have not been calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value result shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 4-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	Carbazole (µg/kg)			Chrysene (µg/kg)			Fluoranthene (µg/kg)			Indeno(1,2,3-cd)pyrene (µg/kg)			Pyrene (µg/kg)		
Field ID	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL
CAN031-0311-0000	500	J	4100	3100	J	4100	5600		4100	2300	J	4100	4600		4100
CAN031-0312-0000															
CAN031-0313-0000		U	8000		U	8000	4000	U	8000		U	8000	4000	U	8000
CAN031-0314-0000															
Number	1			1			2			1			2		
Minimum detected	500			3100			5600			2300			4600		
Maximum detected	500			3100			5600			2300			4600		
Average	500			3100			4800			2300			4300		
H Statistic															
Standard Deviation															
95% UCL															
RME	500			3100			5600			11			4600		

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations have not been calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value result shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 4-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	TPH (mg/kg)				Antimony (mg/kg)			Barium (mg/kg)				Cadmium (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN031-0311-0000	3180	8.065		500	1.9	J	7.5	1460	7.286	J	1.2	8.7	2.163		0.62
CAN031-0312-0000	973	6.880		209		U	6.3	166	5.112	J	1	0.85	-0.163		0.52
CAN031-0313-0000	4070	8.311		488		U	7.3	229	5.434	J	1.2	4.4	1.482		0.61
CAN031-0314-0000	23.45	3.155	U	46.9		U	7	104	4.644	J	1.2	0.299	-1.207	U	0.59
Number	4	4			1			4	4.000			4	4		
Minimum detected	973				1.90			104				0.85			
Maximum detected	4070				1.90			1460				8.70			
Average	2062	6.60			1.90			490	5.62			3.56	0.57		
H Statistic		16.37							8.320				10.642		
Standard Deviation	1882	2.38						649	1.158			3.88	1.53		
95% UCL	5.55E+09	5.55E+09						1.40E+05	1.40E+05			1326	1326		
RME	4070				1.90			1460				8.70			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations have not been calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value result shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 4-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	Chromium (mg/kg)				Copper (mg/kg)				Lead (mg/kg)				Zinc (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN031-0311-0000	130	4.868		1.2	61.4	4.117		2.5	930	6.835		125	479	6.172		2.5
CAN031-0312-0000	9.9	2.293		1	9.3	2.23		2.1	46.9	3.848		5.2	57	4.043		2.1
CAN031-0313-0000	24.3	3.190		1.2	18.8	2.934		2.4	77.7	4.353		6.1	85.8	4.452		2.4
CAN031-0314-0000	11.8	2.468		1.2	7.6	2.028		2.3	9.4	2.241		0.59	29.8	3.395		2.3
Number	4	4			4	4			4	4			4	4		
Minimum detected	9.9				7.60				9.40				29.8			
Maximum detected	130				61.4				930				479			
Average	44.0	3.20			24.3	2.83			266	4.32			163	4.52		
H Statistic		8.32				6.244				13.29				8.32		
Standard Deviation	57.69	1.17			25.24	0.94			444	1.90			212	1.19		
95% UCL	1277	1277			1.88E+02	188			2.12E+06	2.12E+06			4973	4973		
RME	130				61				930				479			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations have not been calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value result shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 4-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
TOTAL SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	Tetrachloroethene (µg/kg)				Anthracene (µg/kg)				Benzo(a)anthracene (µg/kg)				Benzo(a)pyrene (µg/kg)			
Field ID	Result	log Result	Qual	RL	Result	log Result	Qual	RL	Result	log Result	Qual	RL	Result	log Result	Qual	RL
CAN031-0311-0000					600	6.397	J	4100	2400	7.783	J	4100	2700	7.901	J	4100
CAN031-0311-0002																
CAN031-0311-0004																
CAN031-0311-0008	2.8	1.030	U	5.6												
CAN031-0312-0000																
CAN031-0312-0002	2.8	1.030	U	5.6	185	5.220	U	370	185	5.220	U	370	185	5.220	U	370
CAN031-0312-0004																
CAN031-0312-0008	2.85	1.047	U	5.7	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380
CAN031-0313-0000	3.6	1.281	J	6.1			U	8000	4000	8.294	U	8000	4000	8.294	U	8000
CAN031-0313-0002					195	5.273	U	390	195	5.273	U	390	195	5.273	U	390
CAN031-0313-0004																
CAN031-0313-0008																
CAN031-0314-0000																
CAN031-0314-0002	2.9	1.065	U	5.8	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380
CAN031-0314-0004																
Number	5	5			5	5			6	6			6	6		
Minimum detected	3.6				600				2400				2700			
Maximum detected	3.6				600				2400				2700			
Average	2.99	1.09			272	5.48			1193	6.18			1243	6.20		
H Statistic		1.921			2.5	2.5				4.802			5.184	5.184		
Standard Deviation	0.34	0.11			183.4	0.51			1635	1.45			1683	1.48		
95% UCL	3.32	3.32			519	519			31115	31115			44964	44964		
RME	3.32				519				2400				2700			

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected.
95% UCL concentrations have not been calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Nondetect. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 4-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
TOTAL SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	Benzo(b)fluoranthene (µg/kg)				Carbazole (µg/kg)				Chrysene (µg/kg)				Fluoranthene (µg/kg)			
Field ID	Result	log Result	Qual	RL	Result	log Result	Qual	RL	Result	log Result	Qual	RL	Result	log Result	Qual	RL
CAN031-0311-0000	5600	8.631		4100	500	6.215	J	4100	3100	8.039	J	4100	5600	8.631		4100
CAN031-0311-0002																
CAN031-0311-0004																
CAN031-0311-0008																
CAN031-0312-0000																
CAN031-0312-0002	65	4.174	J	370	185	5.220	U	370	185	5.220	U	370	55	4.007	J	370
CAN031-0312-0004																
CAN031-0312-0008	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380
CAN031-0313-0000	4000	8.294	U	8000			U	8000	4000	8.294	U	8000	4000	8.294	U	8000
CAN031-0313-0002	195	5.273	U	390	195	5.273	U	390	195	5.273	U	390	195	5.273	U	390
CAN031-0313-0004																
CAN031-0313-0008																
CAN031-0314-0000																
CAN031-0314-0002	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380
CAN031-0314-0004																
Number	6	6			5	5			6	6			6	6		
Minimum detected	65				500				3100				55			
Maximum detected	5600				500				3100				5600			
Average	1707	6.14			242	5.44			1310	6.22			1705	6.12		
H Statistic		5.184				2.318				5.184				5.96		
Standard Deviation	2449	1.85			138.7	0.43			1758	1.51			2451	1.88		
95% UCL	1.86E+05	1.86E+05			418	418			52097	52097			4.04E+05	4.04E+05		
RME	5600				418				3100				5600			

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected.
95% UCL concentrations have not been calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Nondetect. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 4-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
TOTAL SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	Indeno(1,2,3-cd)pyrene (µg/kg)				Pyrene (µg/kg)				TPH (mg/kg)				Antimony (mg/kg)		
Field ID	Result	log Result	Qual	RL	Result	log Result	Qual	RL	Result	log Result	Qual	RL	Result	Qual	RL
CAN031-0311-0000	2300	7.741	J	4100	4600	8.434		4100	3180	8.065		500	1.9	J	7.5
CAN031-0311-0002									24.05	3.180	U	48.1		U	14.4
CAN031-0311-0004									23.6	3.161	U	47.2		U	7.1
CAN031-0311-0008									22.4	3.109	U	44.8		U	6.7
CAN031-0312-0000									973	6.880		209		U	6.3
CAN031-0312-0002	185	5.220	U	370	44	3.784	J	370	81	4.394		44.6		U	6.7
CAN031-0312-0004									23.5	3.157	U	47		U	14.1
CAN031-0312-0008	190	5.247	U	380	190	5.247	U	380	22.9	3.131	U	45.8		U	6.9
CAN031-0313-0000	4000	8.294	U	8000	4000	8.294	U	8000	4070	8.311		488		U	7.3
CAN031-0313-0002	195	5.273	U	390	195	5.273	U	390	23.45	3.155	U	46.9		U	7
CAN031-0313-0004									23.3	3.148	U	46.6		U	14
CAN031-0313-0008									22.8	3.127	U	45.6		U	6.8
CAN031-0314-0000									23.45	3.155	U	46.9		U	7
CAN031-0314-0002	190	5.247	U	380	190	5.247	U	380	23.3	3.148	U	46.6		U	7
CAN031-0314-0004									23.5	3.157	U	47		U	14.1
Number	6	6			6	6			15	15			1		
Minimum detected	2300				44				81				1.9		
Maximum detected	2300				4600				4070				1.9		
Average	1177	6.17			1537	6.05			571	4.15			1.9		
H Statistic		4.802				5.96				4.222					
Standard Deviation	1620	1.44			2150	1.88			1275	1.91					
95% UCL	29874	29874			3.78E+05	3.78E+05			3424	3424					
RME	2300				4600				3424				1.90		

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected.
95% UCL concentrations have not been calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Nondetect. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 4-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
TOTAL SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	Barium (mg/kg)				Cadmium (mg/kg)				Chromium (.mg/kg)				Copper (mg/kg)			
Field ID	Result	log Result	Qual	RL	Result	log Result	Qual	RL	Result	log Result	Qual	RL	Result	log Result	Qual	RL
CAN031-0311-0000	1460	7.286	J	1.2	8.7	2.163		0.62	130	4.868		1.2	61.4	4.117		2.5
CAN031-0311-0002	120	4.787	J	2.4	0.6	-0.511	U	1.2	4.2	1.435		2.4	2.7	0.993	J	4.8
CAN031-0311-0004	81.2	4.397	J	1.2	0.295	-1.221	U	0.59	8.2	2.104		1.2	5.9	1.775		2.4
CAN031-0311-0008	327	5.790	J	1.1	0.28	-1.273	U	0.56	3.8	1.335		1.1	2.2	0.788		2.2
CAN031-0312-0000	166	5.112	J	1	0.85	-0.163		0.52	9.9	2.293		1	9.3	2.230		2.1
CAN031-0312-0002	201	5.303	J	1.1	0.63	-0.462		0.56	8	2.079		1.1	10.9	2.389		2.2
CAN031-0312-0004	273	5.609	J	2.4	0.6	-0.511	U	1.2	6.5	1.872		2.4	3.6	1.281	J	4.7
CAN031-0312-0008	237	5.468	J	1.1	0.285	-1.255	U	0.57	6.1	1.808		1.1	3.8	1.335		2.3
CAN031-0313-0000	229	5.434	J	1.2	4.4	1.482		0.61	24.3	3.190		1.2	18.8	2.934		2.4
CAN031-0313-0002	119	4.779	J	1.2	0.295	-1.221	U	0.59	6	1.792		1.2	4.7	1.548		2.3
CAN031-0313-0004	130	4.868	J	2.3	0.6	-0.511	U	1.2	4.9	1.589		2.3	2.7	0.993	J	4.7
CAN031-0313-0008	411	6.019	J	1.1	0.285	-1.255	U	0.57	6.1	1.808		1.1	3.6	1.281		2.3
CAN031-0314-0000	104	4.644	J	1.2	0.295	-1.221	U	0.59	11.8	2.468		1.2	7.6	2.028		2.3
CAN031-0314-0002	107	4.673	J	1.2	0.29	-1.238	U	0.58	6.4	1.856		1.2	5.2	1.649	J	2.3
CAN031-0314-0004	1130	7.030	J	2.4	0.6	-0.511	U	1.2	4.5	1.504		2.4	2.5	0.916	J	4.7
Number	15	15			15	15			15	15			15	15		
Minimum detected	81.2				0.63				2.30				1.50			
Maximum detected	1460				8.7				130				61.4			
Average	340	5.41			1.27	-0.51			16.0	2.13			9.66	1.75		
H Statistic		2.489				2.713				2.621				2.621		
Standard Deviation	403.5	0.85			2.30	1.03			31.92	0.89			14.97	0.89		
95% UCL	564	564			2.16	2.16			23.3	23.3			16.0	16.0		
RME	564				2.16				23.3				16.0			

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected.
95% UCL concentrations have not been calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Nondetect. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 4-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
TOTAL SOILS AT AGE MAINTENANCE SHOP PAD (SWMU 31)

	Lead (mg/kg)				Zinc (mg/kg)			
Field ID	Result	log Result	Qual	RL	Result	log Result	Qual	RL
CAN031-0311-0000	930	6.835		125	479	6.172		2.5
CAN031-0311-0002	3.5	1.253		1.2	9.2	2.219		4.8
CAN031-0311-0004	6.7	1.902		1.2	18.8	2.934		2.4
CAN031-0311-0008	4.5	1.504		1.1	8	2.079		2.2
CAN031-0312-0000	46.9	3.848		5.2	57	4.043		2.1
CAN031-0312-0002	22.3	3.105		5.6	33.5	3.512		2.2
CAN031-0312-0004	5.4	1.686		0.59	9.6	2.262		4.7
CAN031-0312-0008	6.6	1.887		0.57	12.9	2.557		2.3
CAN031-0313-0000	77.7	4.353		6.1	85.8	4.452		2.4
CAN031-0313-0002	4.7	1.548		0.59	12.6	2.534		2.3
CAN031-0313-0004	4	1.386		0.58	9.8	2.282		4.7
CAN031-0313-0008	5.8	1.758		1.1	12.1	2.493		2.3
CAN031-0314-0000	9.4	2.241		0.59	29.8	3.395		2.3
CAN031-0314-0002	6.9	1.932	J	1.2	13.2	2.580		2.3
CAN031-0314-0004	4.1	1.411		0.59	11.9	2.477		4.7
Number	15	15			15	15		
Minimum detected	1.90				5.60			
Maximum detected	930				479			
Average	75.9	2.44			53.5	3.07		
H Statistic		3.787				2.899		
Standard Deviation	237.2	1.53			119.7	1.11		
95% UCL	173	173			93.9	93.9		
RME	173				93.9			

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected.
95% UCL concentrations have not been calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Nondetect. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 4-9
SOIL CONCENTRATIONS
ADJUSTED FOR DERMAL ABSORPTION
SURFACE SOIL
SWMU 31

	Average Concentration (mg/kg)	RME Concentration (mg/kg)	Absorbed Fraction (1)	Adjusted Average Concentration(2) (mg/kg)	Adjusted RME Concentration(3) (mg/kg)
Anthracene	0.60	0.60	0.1	0.06	0.06
Benzo(a)anthracene	2.40	2.40	0.1	0.24	0.24
Benzo(a)pyrene	2.70	2.70	0.1	0.27	0.27
Benzo(b)fluoranthene	4.80	5.60	0.1	0.48	0.56
Carbazole	0.50	0.50	0.1	0.05	0.05
Chrysene	3.10	3.10	0.1	0.31	0.31
Fluoranthene	4.80	5.60	0.1	0.48	0.56
Indeno(1,2,3-cd)pyrene	2.30	2.30	0.1	0.23	0.23
Pyrene	4.30	4.60	0.1	0.43	0.46
Tetrachloroethene	0.0036	0.0036	0.03	0.0001	0.0001

(1) Absorbed fraction from Table C-25, Appendix C.

(2) Adjusted average concentration = average concentration x absorbed fraction

(3) Adjusted RME concentration = RME concentration x absorbed fraction

TABLE 4-10
SOIL CONCENTRATIONS
ADJUSTED FOR DERMAL ABSORPTION
TOTAL SOIL
SWMU 31

	Average Concentration (mg/kg)	RME Concentration (mg/kg)	Absorbed Fraction (1)	Adjusted Average Concentration(2) (mg/kg)	Adjusted RME Concentration(3) (mg/kg)
Anthracene	0.26	0.43	0.1	0.026	0.043
Benzo(a)anthracene	1.10	2.40	0.1	0.11	0.24
Benzo(a)pyrene	1.10	2.70	0.1	0.11	0.27
Benzo(b)fluoranthene	1.50	5.60	0.1	0.15	0.56
Carbozole	0.24	0.36	0.1	0.024	0.036
Chrysene	1.10	3.10	0.1	0.11	0.31
Fluoranthene	1.50	5.60	0.1	0.15	0.56
Indeno(1,2,3-cd)pyrene	1.10	2.30	0.1	0.11	0.23
Pyrene	1.30	4.60	0.1	0.13	0.46
Tetrachloroethene	0.003	0.003	0.03	9.00E-05	9.00E-05

(1) Absorbed fraction from Table C-25, Appendix C.

(2) Adjusted average concentration = average concentration x absorbed fraction

(3) Adjusted RME concentration = RME concentration x absorbed fraction

TABLE 4-11
VADOSE ZONE FATE AND TRANSPORT MODELING FROM TOTAL SOILS AT AGE 31

	t (y)	Cs (ug/kg)	Co (g/m^3)	L (m)	W (m)	T (m)	VWC (L/L)	foc	Koc (ml/g)	Kd (ml/g)	Soil Half Life (y)	P (g/cm^3)	I (m/y)	H (m)	TOT (y)
Anthracene	0	258.33	4.13E-01	60	200	2.439	0.15	0.003	16000	48	1.26	1.6	0.015	76.829	394133
Antimony	0	1900	3.04E+00	60	200	2.439	0.15	0.003	NA	3981	NA	1.6	0.015	76.829	32625435
Barium	0	327390	5.24E+02	60	200	2.439	0.15	0.003	NA	50	NA	1.6	0.015	76.829	410523
Benzo(a)anthracene	0	1050	1.68E+00	60	200	2.439	0.15	0.003	1400000	4200	1.86	1.6	0.015	76.829	34420160
Benzo(a)pyrene	0	1092.86	1.75E+00	60	200	2.439	0.15	0.003	6500000	19500	1.45	1.6	0.015	76.829	159805088
Benzo(b)fluoraanthene	0	1490	2.38E+00	60	200	2.439	0.15	0.003	550000	1650	1.67	1.6	0.015	76.829	13522672
Cadmium	0	1230	1.97E+00	60	200	2.439	0.15	0.003	NA	7	NA	1.6	0.015	76.829	58134
Carbazole	0	241.67	3.87E-01	60	200	2.439	0.15	0.003	5100	15.3	0.2	1.6	0.015	76.829	126153
Chromium	0	15190	2.43E+01	60	200	2.439	0.15	0.003	NA	40	NA	1.6	0.015	76.829	328572
Chrysene	0	1150	1.84E+00	60	200	2.439	0.15	0.003	250000	750	2.72	1.6	0.015	76.829	6147088
Copper	0	9150	1.46E+01	60	200	2.439	0.15	0.003	NA	20	NA	1.6	0.015	76.829	164670
Fluoranthene	0	1488.57	2.38E+00	60	200	2.439	0.15	0.003	1380	4.14	1.21	1.6	0.015	76.829	34696
Indeno(1,2,3-c)pyrene	0	1035.71	1.66E+00	60	200	2.439	0.15	0.003	31000000	93000	2	1.6	0.015	76.829	762144448
Lead	0	71280	1.14E+02	60	200	2.439	0.15	0.003	NA	100	NA	1.6	0.015	76.829	820278
Pyrene	0	1344.14	2.15E+00	60	200	2.439	0.15	0.003	38000	114	5.2	1.6	0.015	76.829	935009
Tetrachloroethene	0	2.98	4.77E-03	60	200	2.439	0.15	0.003	269	0.807	1	1.6	0.015	76.829	7382
Zinc	0	50550	8.09E+01	60	200	2.439	0.15	0.003	NA	20	NA	1.6	0.015	76.829	164670

t = Time where leachate concentration is estimated
Cs = Concentration of chemical in source soil
(average concentration from Table 5-8)
Co = Concentration of chemical in source soil (calculated)
L = Length of site in direction of groundwater flow
W = Width of site perpendicular to groundwater flow
T = Thickness of source area
VWC = Volumetric water content of soil
foc = Fraction of organic carbon
Koc = Organic carbon partition coefficient
TOT = Total vadose zone transit time
Kd = Soil/water partition coefficient (values estimated as
Koc*foc or from INEL (1991) study, if available)
P = bulk density of soil
I = Infiltration rate

H = Depth to groundwater (approx. 79.3 m) - depth of contaminated area
Rd = Retardation factor
Leach Rate = Leaching-rate constant
Qo = Present mass of chemical in source soil
Q(t) = Mass of contaminant in soil at time of leachate concentration prediction
qc = Yearly flux of chemical from source soil in leachate
Cl(1) = Concentration of chemical in leachate leaving source soil
Cl(2) = Concentration of chemical in leachate entering groundwater considering degradation in vadose zone
i = Groundwater hydraulic gradient
b = Mixing thickness in aquifer (equal to screen length)
Qw = Groundwater volumetric flow rate through cross section defined by WP and b
Ql = Volumetric flow rate of leachate
Cw(2) = Concentration of chemical in groundwater considering degradation and dilution
(Note: concentrations shown as 0.00E+00 are less than 1.00E-300 µg/L)
Soil half-life (from the Soil Chemistry of Hazardous Materials [1988]) =
time required for one-half the amount of chemical to be degraded in soil.

TABLE 4-11
VADOSE ZONE FATE AND TRANSPORT MODELING FROM TOTAL SOILS AT AGE 31

	Rd	Leach Rate (y^-1)	Qo (g)	Q(t) (g)	qc (g/y)	Cl(1) (ug/l)	Cl(2) (ug/l)	K (m/s)	i (m/m)	b (m)	Qw (m^3/y)	Ql (m^3/yr)	Cw (ug/l)
Anthracene	5.13E+02	7.99E-05	1.21E+04	1.21E+04	9.67E-01	5.37E+00	0.00E+00	2.00E-04	0.0019	10	23967	180	0.00E+00
Antimony	4.25E+04	9.66E-07	8.90E+04	8.90E+04	8.59E-02	4.77E-01	4.77E-01	2.00E-04	0.0019	10	23967	180	3.56E-03
Barium	5.34E+02	7.67E-05	1.53E+07	1.53E+07	1.18E+03	6.54E+03	6.54E+03	2.00E-04	0.0019	10	23967	180	4.87E+01
Benzo(a)anthracene	4.48E+04	9.15E-07	4.92E+04	4.92E+04	4.50E-02	2.50E-01	0.00E+00	2.00E-04	0.0019	10	23967	180	0.00E+00
Benzo(a)pyrene	2.08E+05	1.97E-07	5.12E+04	5.12E+04	1.01E-02	5.60E-02	0.00E+00	2.00E-04	0.0019	10	23967	180	0.00E+00
Benzo(b)fluoraanthene	1.76E+04	2.33E-06	6.98E+04	6.98E+04	1.63E-01	9.03E-01	0.00E+00	2.00E-04	0.0019	10	23967	180	0.00E+00
Cadmium	7.57E+01	5.42E-04	5.76E+04	5.76E+04	3.12E+01	1.73E+02	1.73E+02	2.00E-04	0.0019	10	23967	180	1.29E+00
Carbazole	1.64E+02	2.50E-04	1.13E+04	1.13E+04	2.83E+00	1.57E+01	0.00E+00	2.00E-04	0.0019	10	23967	180	0.00E+00
Chromium	4.28E+02	9.59E-05	7.11E+05	7.11E+05	6.82E+01	3.79E+02	3.79E+02	2.00E-04	0.0019	10	23967	180	2.82E+00
Chrysene	8.00E+03	5.12E-06	5.39E+04	5.39E+04	2.76E-01	1.53E+00	0.00E+00	2.00E-04	0.0019	10	23967	180	0.00E+00
Copper	2.14E+02	1.91E-04	4.28E+05	4.28E+05	8.20E+01	4.55E+02	4.55E+02	2.00E-04	0.0019	10	23967	180	3.39E+00
Fluoranthene	4.52E+01	9.08E-04	6.97E+04	6.97E+04	6.33E+01	3.52E+02	0.00E+00	2.00E-04	0.0019	10	23967	180	0.00E+00
Indeno(1,2,3-c)pyrene	9.92E+05	4.13E-08	4.85E+04	4.85E+04	2.00E-03	1.11E-02	0.00E+00	2.00E-04	0.0019	10	23967	180	0.00E+00
Lead	1.07E+03	3.84E-05	3.34E+06	3.34E+06	1.28E+02	7.12E+02	7.12E+02	2.00E-04	0.0019	10	23967	180	5.31E+00
Pyrene	1.22E+03	3.37E-05	6.29E+04	6.29E+04	2.12E+00	1.18E+01	1.18E+01	2.00E-04	0.0019	10	23967	180	8.78E-02
Tetrachloroethene	9.61E+00	4.27E-03	1.40E+02	1.40E+02	5.96E-01	3.31E+00	3.31E+00	2.00E-04	0.0019	10	23967	180	2.47E-02
Zinc	2.14E+02	1.91E-04	2.37E+06	2.37E+06	4.53E+02	2.52E+03	2.52E+03	2.00E-04	0.0019	10	23967	180	1.88E+01

t = Time where leachate concentration is estimated
Cs = Concentration of chemical in source soil
(average concentration from Table 5-8)
Co = Concentration of chemical in source soil (calculated)
L = Length of site in direction of groundwater flow
W = Width of site perpendicular to groundwater flow
T = Thickness of source area
VWC = Volumetric water content of soil
foc = Fraction of organic carbon
Koc = Organic carbon partition coefficient
TOT = Total vadose zone transit time
Kd = Soil/water partition coefficient (values estimated as
Koc*foc or from INEL (1991) study, if available)
P = bulk density of soil
I = Infiltration rate

H = Depth to groundwater (approx. 79.3 m) - depth of contaminated area
Rd = Retardation factor
Leach Rate = Leaching-rate constant
Qo = Present mass of chemical in source soil
Q(t) = Mass of contaminant in soil at time of leachate concentration prediction
qc = Yearly flux of chemical from source soil in leachate
Cl(1) = Concentration of chemical in leachate leaving source soil
Cl(2) = Concentration of chemical in leachate entering groundwater considering degradation in vado
i = Groundwater hydraulic gradient
b = Mixing thickness in aquifer (equal to screen length)
Qw = Groundwater volumetric flow rate through cross section defined by WP and b
Ql = Volumetric flow rate of leachate
Cw(2) = Concentration of chemical in groundwater considering degradation and dilution
(Note: concentrations shown as 0.00E+00 are less than 1.00E-300 µg/L)
Soil half-life (from the Soil Chemistry of Hazardous Materials [1988]) =
time required for one-half the amount of chemical to be degraded in soil.

TABLE 4-12

COMPARISON OF MODELED GROUNDWATER CONCENTRATIONS TO RBCs(1)

	Cw(2) (ug/l)	Tap Water RBC (1) (µg/L)	Does modeled concentration exceed RBC?
Anthracene	0	11000	No
Antimony	3.56E-03	15	No
Barium	4.87E+01	2600	No
Benzo(a)anthracene	0	0.092	No
Benzo(a)pyrene	0	0.0092	No
Benzo(b)fluoranthene	0	0.092	No
Cadmium	1.29E+00	18	No
Carbazole	0	3.4	No
Chromium	2.82E+00	37000	No
Chrysene	0	9.2	No
Copper	3.39E+00	1400	No
Fluoranthene	0	1500	No
Indeno(1,2,3-C)pyrene	0	0.092	No
Lead	5.31E+00	15 (3)	No
Pyrene	8.78E-02	1100	No
Tetrachloroethene	2.47E-02	1.1	No
Zinc	1.88E+01	11000	No

(1) RBC is the EPA Region III risk based concentration for residential tap water ingestion and inhalation.
(2) Cw is the modeled groundwater concentration as defined in Table 4-11.
(3) No Region III RBC is available for lead. Value is the action level defined in the May 1993 issue of Drinking water regulation and health advisories (EPA 1993).
The modeled concentration, zero is a value less than 1E-300.

TABLE 4-13
RME AIR CONCENTRATIONS OF VOLATILE COMPOUNDS FROM SURFACE SOILS AT SWMU 31

	ps (g/cm3)	alpha (cm2/s)	LS (m)	V (m/s)	DH (m)	A (cm2)	T (s)	Dei (cm2/s)	E (unitless)	Di cm2/s)
Tetrachlorethene	2.65	1.60E-03	45	2.25	2	20250000	7.90E+08	5.55E-02	0.35	0.07852

Method and default values from EPA (1991b) Risk Assessment Guidance for Superfund: Part B.
The method and equation are discussed in detail in Appendix B.
ps = soil density
alpha = (Dei*E)/(E+(ps(1-E)/Kas))
LS = Length of the SWMU in direction of wind (default value)
V = Wind velocity (default value)
DH = Diffusion height; height of box into which volatilization occurs (default value)
A = Surface area of SWMU (default value: 45m x 45m)
Time = Time of exposure (25 years; equivalent to default RME occupational exposure period)
Dei = Effective diffusivity (Di * E^0.33)
E = True soil porosity (default value)
Di = Molecular diffusivity (EPA 1988) Superfund Exposure Assessment Manual
Koc = organic carbon partition coefficient (from Appendix A, Table A-1)
H = Henry's Law constant (from Appendix A, Table A-1)
Kd = Soil/water partitioning coefficient (Koc * OC)
OC = Organic carbon fraction in soil (0.02 default value)
Kas = Soil/air partition coefficient (H/Kd * 41)
VF = Volatilization Factor = (LS x V x DH/A) + (3.14 alpha x T)^0.5/(2 x Dei x E x Kas x 0.001 kg/g)
Csoil = RME concentration of compound in soil (Table 4-7)
Cair = RME concentration of compound in air (Csoil/VF)

TABLE 4-13
RME AIR CONCENTRATIONS OF VOLATILE COMPOUNDS FROM SURFACE SOILS AT SWMU 31

	Koc (ml/g)	H (atm-m3/mol)	Kd (cm3/g)	Kas g soil/cm3 air)	VF (m3/kg)	C soil (mg/kg)	C air (mg/m3)
Tetrachlorethene	364	2.59E-02	7.28E+00	1.46E-01	3.51E+03	0.004	1.03E-06

Method and default values from EPA (1991b) Risk Assessment Guidance for Superfund: Part B.
The method and equation are discussed in detail in Appendix B.
ps = soil density
alpha = (Dei*E)/(E+(ps(1-E)/Kas))
LS = Length of the SWMU in direction of wind (default value)
V = Wind velocity (default value)
DH = Diffusion height; height of box into which volatilization occurs (default value)
A = Surface area of SWMU (default value: 45m x 45m)
Time = Time of exposure (25 years; equivalent to default RME occupational exposure period)
Dei = Effective diffusivity (Di * E^0.33)
E = True soil porosity (default value)
Di = Molecular diffusivity (EPA 1988) Superfund Exposure Assessment Manual
Koc = organic carbon partition coefficient (from Appendix A, Table A-1)
H = Henry's Law constant (from Appendix A, Table A-1)
Kd = Soil/water partitioning coefficient (Koc * OC)
OC = Organic carbon fraction in soil (0.02 default value)
Kas = Soil/air partition coefficient (H/Kd * 41)
VF = Volatilization Factor = (LS x V x DH/A) + (3.14 alpha x T)^0.5/(2 x Dei x E x Kas x 0.001 kg/g)
Csoil = RME concentration of compound in soil (Table 4-7)
Cair = RME concentration of compound in air (Csoil/VF)

TABLE 4-14
RME AIR CONCENTRATIONS OF PARTICULATE-BOUND CHEMICALS FROM SURFACE SOILS AT SWMU 31

	RME Soil Concentration (mg/kg)	PEF (m3/kg)	Air Concentration (mg/m3)
Barium	1460	4.63E+09	3.15E-07
Benzo(a)anthracene	2.40	4.63E+09	5.18E-10
Benzo(a)pyrene	2.70	4.63E+09	5.83E-10
Benzo(b)fluoranthene	5.60	4.63E+09	1.21E-09
Cadmium	8.70	4.63E+09	1.88E-09
Chromium	130	4.63E+09	2.81E-08
Chrysene	3.10	4.63E+09	6.70E-10
Indeno(1,2,3-cd)pyrene	2.30	4.63E+09	4.97E-10

RME Soil Concentration from Table 4-7

PEF = Particulate Emission Factor default value from EPA (1991b)

Air Concentration = Soil concentration/PEF

Note: Chemicals of concern that do not have EPA-established inhalation toxicity factors were not included in this table.

TABLE 4-15
RME AIR CONCENTRATIONS OF VOLATILE COMPOUNDS FROM TOTAL SOILS AT SWMU 31

	ps (g/cm3)	alpha (cm2/s)	LS (m)	V (m/s)	DH (m)	A (cm2)	T (s)	Dei (cm2/s)	E (unitless)	Di cm2/s)
Tetrachlorethene	2.65	1.60E-03	45	2.25	2	20250000	7.90E+08	5.55E-02	0.35	0.07852

Method and default values from EPA (1991b) Risk Assessment Guidance for Superfund: Part B.
The method and equation are discussed in detail in Appendix B.
ps = soil density
alpha = (Dei*E)/(E+(ps(1-E)/Kas))
LS = Length of the SWMU in direction of wind (default value)
V = Wind velocity (default value)
DH = Diffusion height; height of box into which volatilization occurs (default value)
A = Surface area of SWMU (default value: 45m x 45m)
Time = Time of exposure (25 years; equivalent to default RME occupational exposure period)
Dei = Effective diffusivity (Di * E^0.33)
E = True soil porosity (default value)
Di = Molecular diffusivity (EPA 1988) Superfund Exposure Assessment Manual
Koc = organic carbon partition coefficient (from Appendix A, Table A-1)
H = Henry's Law constant (Appendix A, Table A-1)
Kd = Soil/water partitioning coefficient (Koc * OC)
OC = Organic carbon fraction in soil (0.02 default value)
Kas = Soil/air partition coefficient (H/Kd * 41)
VF = Volatilization Factor = (LS x V x DH/A) + (3.14 alpha x T)^0.5/(2 x Dei x E x Kas x 0.001 kg/g)
Csoil = RME concentration of compound in soil (Table 4-8)
Cair = RME concentration of compound in air (Csoil/VF)

TABLE 4-15
RME AIR CONCENTRATIONS OF VOLATILE COMPOUNDS FROM TOTAL SOILS AT SWMU 31

	Koc (ml/g)	H (atm-m3/mol)	Kd (cm3/g)	Kas g soil/cm3 air)	VF (m3/kg)	C soil (mg/kg)	C air (mg/m3)
Tetrachlorethene	364	2.59E-02	7.28E+00	1.46E-01	3.51E+03	0.003	9.20E-07

Method and default values from EPA (1991b) Risk Assessment Guidance for Superfund: Part B.
The method and equation are discussed in detail in Appendix B.
ps = soil density
alpha = (Dei*E)/(E+(ps(1-E)/Kas))
LS = Length of the SWMU in direction of wind (default value)
V = Wind velocity (default value)
DH = Diffusion height; height of box into which volatilization occurs (default value)
A = Surface area of SWMU (default value: 45m x 45m)
Time = Time of exposure (25 years; equivalent to default RME occupational exposure period)
Dei = Effective diffusivity (Di * E^0.33)
E = True soil porosity (default value)
Di = Molecular diffusivity (EPA 1988) Superfund Exposure Assessment Manual
Koc = organic carbon partition coefficient (from Appendix A, Table A-1)
H = Henry's Law constant (Appendix A, Table A-1)
Kd = Soil/water partitioning coefficient (Koc * OC)
OC = Organic carbon fraction in soil (0.02 default value)
Kas = Soil/air partition coefficient (H/Kd * 41)
VF = Volatilization Factor = (LS x V x DH/A) + (3.14 alpha x T)^0.5/(2 x Dei x E x Kas x 0.001 kg/g)
Csoil = RME concentration of compound in soil (Table 4-8)
Cair = RME concentration of compound in air (Csoil/VF)

TABLE 4-16
RME AIR CONCENTRATIONS OF PARTICULATE-BOUND CHEMICALS FROM TOTAL SOILS AT SWMU 31

	RME Soil Concentration (mg/kg)	PEF (m3/kg)	Air Concentration (mg/m3)
Barium	522	4.63E+09	1.13E-07
Benzo(a)anthracene	2.40	4.63E+09	5.18E-10
Benzo(a)pyrene	2.70	4.63E+09	5.83E-10
Benzo(b)fluoranthene	5.60	4.63E+09	1.21E-09
Cadmium	1.98	4.63E+09	4.28E-10
Chromium	22.0	4.63E+09	4.76E-09
Chrysene	3.10	4.63E+09	6.70E-10
Indeno(1,2,3-cd)pyrene	2.30	4.63E+09	4.97E-10

RME Soil Concentration from Table 4-8

PEF = Particulate Emission Factor default value from EPA (1991b)

Air Concentration = Soil concentration/PEF

TABLE 4-17

SUMMARY OF INTAKE FACTORS[1]

Occupational (Base Workers)	Average	RME
Dermal Contact with Soil (kg/kg-d)		
Noncarcinogenic	4.70×10^{-7}	2.69×10^{-5}
Carcinogenic	6.04×10^{-8}	9.61×10^{-6}
Soil Ingestion (kg/kg-d)		
Noncarcinogenic	5.87×10^{-9}	4.89×10^{-7}
Carcinogenic	7.55×10^{-10}	1.75×10^{-7}
Inhalation (m^3/kg-d)		
Noncarcinogenic	1.08×10^{-2}	1.96×10^{-1}
Carcinogenic	1.39×10^{-3}	6.99×10^{-2}
Construction Workers	**Average**	**RME**
Dermal Contact with Soil (kg/kg-d)		
Noncarcinogenic	3.13×10^{-7}	4.70×10^{-6}
Carcinogenic	4.47×10^{-9}	6.71×10^{-8}
Soil Ingestion (kg/kg-d)		
Noncarcinogenic	1.96×10^{-8}	1.57×10^{-7}
Carcinogenic	2.80×10^{-10}	2.24×10^{-9}
Inhalation (m^3/kg-d)		
Noncarcinogenic	7.20×10^{-3}	3.13×10^{-2}
Carcinogenic	1.03×10^{-4}	4.47×10^{-4}
Trespasser	**Average**	**RME**
Dermal Contact Soil (kg/kg-d)		
Noncarcinogenic	1.40×10^{-7}	1.48×10^{-5}
Carcinogenic	1.20×10^{-8}	1.27×10^{-6}
Soil Ingestion (kg/kg-d		
Noncarcinogenic	1.75×10^{-9}	1.40×10^{-7}
Carcinogenic	1.50×10^{-10}	1.20×10^{-8}
Inhalation (m^3/k-d)		
Noncarcinogenic	3.21×10^{-3}	5.59×10^{-2}
Carcinogenic	2.75×10^{-4}	4.79×10^{-3}

[1] Exposure assumptions and intake factor calculations are shown in Tables C-1 through C-22 (Appendix C). Intake factors are multiplied by exposure point concentrations of chemicals of concern to estimate daily chemical intake in terms of mg chemical per kilogram body weight per day (mg/kg-d).

TABLE 4-18

SUMMARY OF HUMAN HEALTH RISKS AT SWMU 31

Receptor/Pathway	Average Exposure			Reasonable Maximum Exposure		
	Cancer Risk	Subchronic H.I.	Chronic H.I.	Cancer Risk	Subchronic H.I.	Chronic H.I.
Occupational Worker (Surface Soil)						
-- Dermal Contact	6×10^{-11}		5×10^{-9}	1×10^{-8}		3×10^{-7}
-- Ingestion	2×10^{-8}		2×10^{-4}	5×10^{-6}		3×10^{-2}
-- Inhalation of VOCs	3×10^{-12}		0.00	1×10^{-10}		0.00
-- Inhalation of Particulates	2×10^{-9}		2×10^{-5}	8×10^{-8}		4×10^{-4}
	2×10^{-8}		2×10^{-4}	3×10^{-6}		3×10^{-2}
Construction Worker (Total Soil)						
-- Dermal Contact	2×10^{-12}	3×10^{-10}		5×10^{-11}	4×10^{-9}	
-- Ingestion	3×10^{-9}	1×10^{-4}		6×10^{-8}	1×10^{-3}	
-- Inhalation of VOCs	2×10^{-13}	0.00		7×10^{-13}	0.00	
-- Inhalation of Particulates	2×10^{-11}	6×10^{-7}		9×10^{-11}	3×10^{-6}	
	3×10^{-9}	1×10^{-4}		6×10^{-8}	1×10^{-3}	
Trespasser						
-- Dermal Contact	1×10^{-11}	1×10^{-10}		1×10^{-9}	1×10^{-8}	
-- Ingestion	4×10^{-9}	3×10^{-5}		3×10^{-7}	5×10^{-3}	
-- Inhalation of VOCs	5×10^{-13}	0.00		8×10^{-12}	0.00	
-- Inhalation of Particulates	3×10^{10}	7×10^{-7}		6×10^{-9}	1×10^{-5}	
	4×10^{-9}	3×10^{-5}		3×10^{-7}	5×10^{-3}	

Note: Apparent inconsistencies in summation of risks are due to rounding of risk values. See Appendix C for nonrounded risk values.

TABLE 4-19

RISK-BASED CONCENTRATIONS (RBCs) FOR TPH IN SOIL[1]

Noncarcinogenic

Fuel	Oral RfD[2] mg/kg-d	RME Intake Factor[3] kg/kg-d	HI	Soil RBC[4] mg/kg
JP4	0.08	4.90E-07	1	163265
Unl. gasoline	0.2	4.90E-07	1	408163

Carcinogenic

Fuel	Oral SF[2] 1/(mg/kg-d)	RME Intake Factor[3] kg/kg-d	Target Cancer Risk Level	Soil RBC[4] mg/kg
Unl. gasoline	1.70E-03	1.75E-07	1.00E-05	33613

[1] RBCs are based on occupational soil ingestion exposures

[2] RFDs and SFs from EPA 1992. Risk Assessment Issue Paper for Oral Systemic and Carcinogenic Toxicity for Multiple Fuels. From Joan S. Dollarhide, Superfund Health Risk Technical Support Center to Carol Sweeney, USEPA, Region X, March 24. The oral toxicity factors are based on extrapolation from inhalation studies. They are under review and subject to revision.

[3] IFs for occupational soil ingestion from Table C-2.

[4] Noncarcinogenic RBC = RFD x HI/IF Carcinogenic RBC = Risk Level/(IF x SF)

TABLE 4-20

SUMMARY OF CHEMICALS REPORTED IN SURFACE SOILS* AT SWMU 31
CANNON AFB
(mg/kg)

Chemical	CAN031-0311-0000	CAN031-0311-0002	CAN031-0312-0000	CAN031-0312-0002	CAN031-0313-0000	CAN031-0314 0000	N	Arithmetic Mean	95% UCL	Maximum
Volatile Organics										
Tetrachloroethene				0.0028 U	0.0036		2	0.0032	0.0050	0.0036
Semivolatile Organics										
Anthracene	0.6 J			0.185 U	4 U		3	1.60	4.48	4
Benzo(a)anthracene	2.4 J			0.185 U	4 U		3	2.20	4.83	4
Benzo(a)pyrene	2.7 J			0.185 U	4 U		3	2.30	4.96	4
Benzo(b)fluoranthene	5.6			0.065 J	4 U		3	3.22	7.14	5.6
Benzo(g,h,i)perylene	2.6 J			0.185 U	4 U		3	2.26	4.92	4
Carbazole	0.5 J			0.185 U	4 U		3	1.56	4.48	4
Chrysene	3.1 J			0.185 U	4 U		3	2.43	5.17	4
Fluoranthene	5.6			0.055 J	4 U		3	3.22	7.15	5.6
Ideno(1,2,3-cd)pyrene	2.3 J			0.185 U	4 U		3	2.16	4.79	4
2-Methylnaphthalene	2.05 U			0.045 J	4 U		3	2.03	4.75	4
Phenanthrene	3.2 J			0.044 J	4 U		3	2.41	5.29	4
Pyrene	4.6			0.044 J	4 U		3	2.88	6.29	4.6
Metals										
Aluminum	5660	4160	4260	5430	6650	9430	6	5931.67	7396.03	9430
Antimony	1.9 J	7.2 U	3.2 U	3.4 U	3.7 U	4 U	6	3.90	5.23	7.2
Arsenic	3.2	2.3	2.4	2.9	4.4	4.6	6	3.30	4.04	4.6
Barium	1460 J	120 J	166 J	201 J	229 J	104 J	6	380.00	778.90	1460
Beryllium	0.36	0.26 J	0.22	0.27	0.25	0.69	6	0.34	0.47	0.69
Cadmium	8.7	0.6 U	0.85	0.63	4.4	0.3 U	6	2.58	5.11	8.7

TABLE 4-20

SUMMARY OF CHEMICALS REPORTED IN SURFACE SOILS* AT SWMU 31
CANNON AFB
(mg/kg)

Chemical	CAN031-0311-0000	CAN031-0311-0002	CAN031-0312-0000	CAN031-0312-0002	CAN031-0313-0000	CAN031-0314 0000	N	Arithmetic Mean	95% UCL	Maximum
Calcium	6270	205000	48600	94400	42400	4200	6	66811.67	123377.65	205000
Chromium	130	4.2	9.9 J	8 J	24.3	11.8	6	31.37	68.01	130
Cobalt	3.4	2.3 J	2.6	3.2	3.5	5.1	6	3.35	4.08	5.1
Copper	61.4	2.7 J	9.3	10.9	18.8	7.6	6	18.45	34.73	61.4
Iron	7150	3290	5570	6420	7950	10700	6	6846.67	8704.99	10700
Lead	930	3.5	46.9	22.3	77.7	9.4	6	181.63	457.71	930
Magnesium	1150	2450	1810	2210	2310	2130	6	2010.00	2365.03	2450
Nickel	7.2	4.9 J	5.8	6.9	6.8	9.7	6	6.88	8.10	9.7
Potassium	867	666 J	1100	954	1550	1610	6	1124.50	1410.05	1610
Selenium	0.6 UJ	0.6 UJ	0.5 UJ	0.6 UJ	0.24 J	0.15 J	6	0.45	0.60	0.6
Sodium	313 U	600 U	262 U	279 U	193 J	294 U	6	323.50	429.82	600
Vanadium	13.8	10.4	13.8	17.1	16.6	21.2	6	15.48	18.25	21.2
Zinc	479	9.2	57	33.5	85.8	29.8	6	115.72	250.81	479
TPH										
Total Petroleum Hydrocarbons	3180	24.1 U	973	81	4070	23.5 U	6	1391.93	1391.93	4070

* Between 0 and 2 feet deep

J Estimated value below reporting limit or established based on data quality criteria.

U Non-detect, value shown i s one-half the reporting limit

TABLE 4-21

CHEMICALS OF CONCERN IN SOILS SWMU 31
CANNON AFB
(mg/kg)

Chemicals	Maximum Concentration	UTL Cannon Background Concentrations(1)	Levels in Southwestern U.S. Soils(2)	Normal Range In U.S. Soils (3)	Retained as a COC?
Volatile Organics					
Tetrachloroethene	0.0036	---	---	---	Y
Semivolatile Organics					
Anthracene	4	---	---	---	Y
Benzo(a)anthracene	4	---	---	---	Y
Benzo(a)pyrene	4	---	---	---	Y
Benzo(b)fluoranthene	5.6	---	---	---	Y
Benzo(g,h,i)perylene	4	---	---	---	Y
Carbazole	4	---	---	---	Y
Chrysene	4	---	---	---	Y
Fluoranthene	5.6	---	---	---	Y
Ideno(1,2,3-cd)pyrene	4	---	---	---	Y
2-Methylnaphthalene	4	---	---	---	Y
Phenanthrene	4	---	---	---	Y
Pyrene	4.6	---	---	---	Y
Metals					
Aluminum	9430	10540	5000	700 - 100000	N
Antimony	7.2	*	<1	0.2 - 10	Y
Arsenic	4.6	15.5	6.5	1.0 - 40	N
Barium	1460	642	500	10 - 5,000	Y
Beryllium	0.69	0.73	1 - 2	<1 - 15	N
Cadmium	8.7	*	---	0.01 - 2.0	Y
Calcium	205000	186400	---	---	N**
Chromium	130	12.5	30	5 -1,500	Y
Cobalt	5.1	4.5	3 - 7	0.5 - 65	Y
Copper	61.4	*	20	1 - 700	Y
Iron	10700	8720	15000	100 - 100000	N
Lead	930	25.8	15	10 - 700	Y
Magnesium	2450	11790	---	---	N**
Nickel	9.7	9	15	2 - 750	N
Potassium	1610	2572	---	---	N**
Selenium	0.6	*	0.3	<0.1 - 4.3	Y
Sodium	600	*	---	---	N**
Vanadium	21.2	25.3	---	---	N
Zinc	479	21.9	45	<5 - 2900	Y
Total Petroleum - Hydrocarbons	4070	---	---	---	Y

(1) Upper Tolerance Limit (UTL) of the mean = mean + 2 x standard deviation. This is for all practical purposes the same as the 90% upper confidence limit of the 95th percentile where UTL = mean + standard deviation x k, where k = 2.02 for n = 37
(2) USGS (1984)
(3) Values mainly from Bowen (1979). Values for copper, lead, selenium, and zinc from USGS (1984).
* Data insufficient to calculate UTL of background concentration.
** Essential nutrient natural to soils. Not expected to be of concern compared to other COCs.
Y = Yes
N = No
--- = Not available

TABLE 4-22

RISK CHARACTERIZATION SUMMARY - SWMU 31

Chemical	Sample Number CAN031-0311-0000	CAN031-0311-0002	CAN031-0312-0000	CAN031-0312-0002	CAN031-0313-0000	CAN031-0314 0000	N	Arithmetic Mean mg/kg	Robin Benchmark Dietary Level mg/kg	Risk?
Volatile Organics										
Tetrachloroethene				0.0028 U	0.0036		2	0.0032	500	--
Semivolatile Organics										
Anthracene	0.6 J			0.185 U	4 U		3	1.60	5000	--
Benzo(a)anthracene	2.4 J			0.185 U	4 U		3	2.20	2	Possible (slight)
Benzo(a)pyrene	2.7 J			0.185 U	4 U		3	2.30	0.02	Possible
Benzo(b)fluoranthene	5.6			0.065 J	4 U		3	3.22	40	--
Benzo(g,h,i)perylene	2.6 J			0.185 U	4 U		3	2.26	375	--
Carbazole	0.5 J			0.185 U	4 U		3	1.56	250	--
Chrysene	3.1 J			0.185 U	4 U		3	2.43	375	--
Fluoranthene	5.6			0.055 J	4 U		3	3.22	625	--
Ideno(1,2,3-cd)pyrene	2.3 J			0.185 U	4 U		3	2.16	72	--
2-Methylnaphthalene	2.05 U			0.045 J	4 U		3	2.03	375	--
Phenanthrene	3.2 J			0.044 J	4 U		3	2.41	150	--
Pyrene	4.6			0.044 J	4 U		3	2.88	395	--
Metals										
Antimony	1.9 J	7.2 U	3.2 U	3.4 U	3.7 U	4 U	6	3.90	16.5	--
Barium	1460 J	120 J	166 J	201 J	229 J	104 J	6	380.00	1250	--
Cadmium	8.7	0.6 U	0.85	0.63	4.4	0.3 U	6	11.87**	10.5	Possible (slight)
Chromium	130	4.2	9.9 J	8 J	24.3	11.8	6	31.37	87.5 (VI)	--
Cobalt	3.4	2.3 J	2.6	3.2	3.5	5.1	6	3.35	10	--
Copper	61.4	2.7 J	9.3	10.9	18.8	7.6	6	18.45	260	--
Lead	930	3.5	46.9	22.3	77.7	9.4	6	181.63	87.5	Possible
Selenium	0.6 UJ	0.6 UJ	0.5 UJ	0.6 UJ	0.24 J	0.15 J	6	5.4**	5	Possible (slight)
Zinc	479	9.2	57	33.5	85.8	29.8	6	115.72	875	--
TPH										
Total Petroleum Hydrocar	3180	24.1 U	973	81	4070	23.5 U	6	1391.93	241	Possible

* Between 0 and 2 feet deep

**Mean soil concentration multiplied by BAF of 4.6 for Cd and 12 for Se.

J Estimated value below reporting limit or established based on data quality criteria

U Non-detect, value shown is one-half the reporting limit

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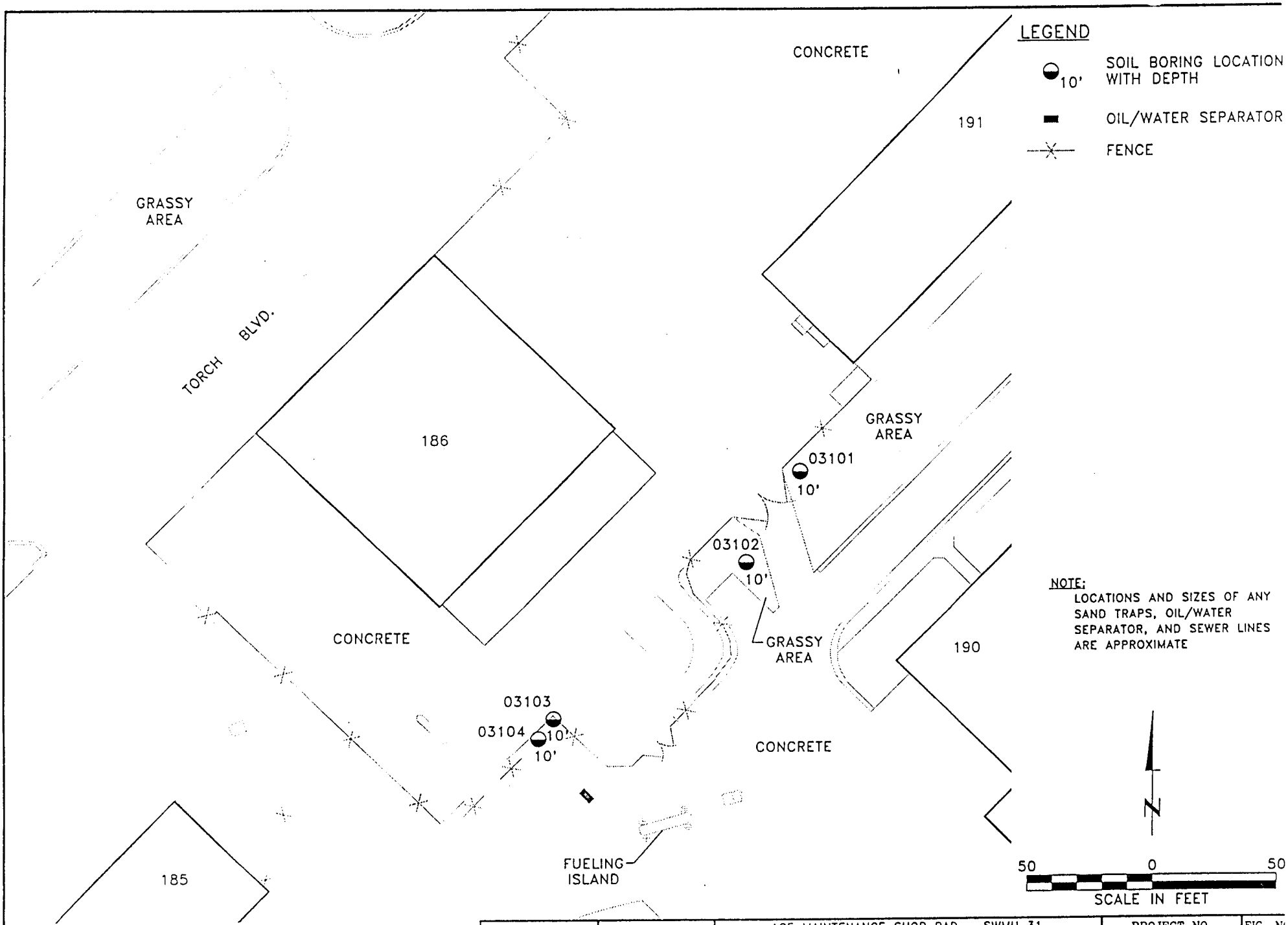
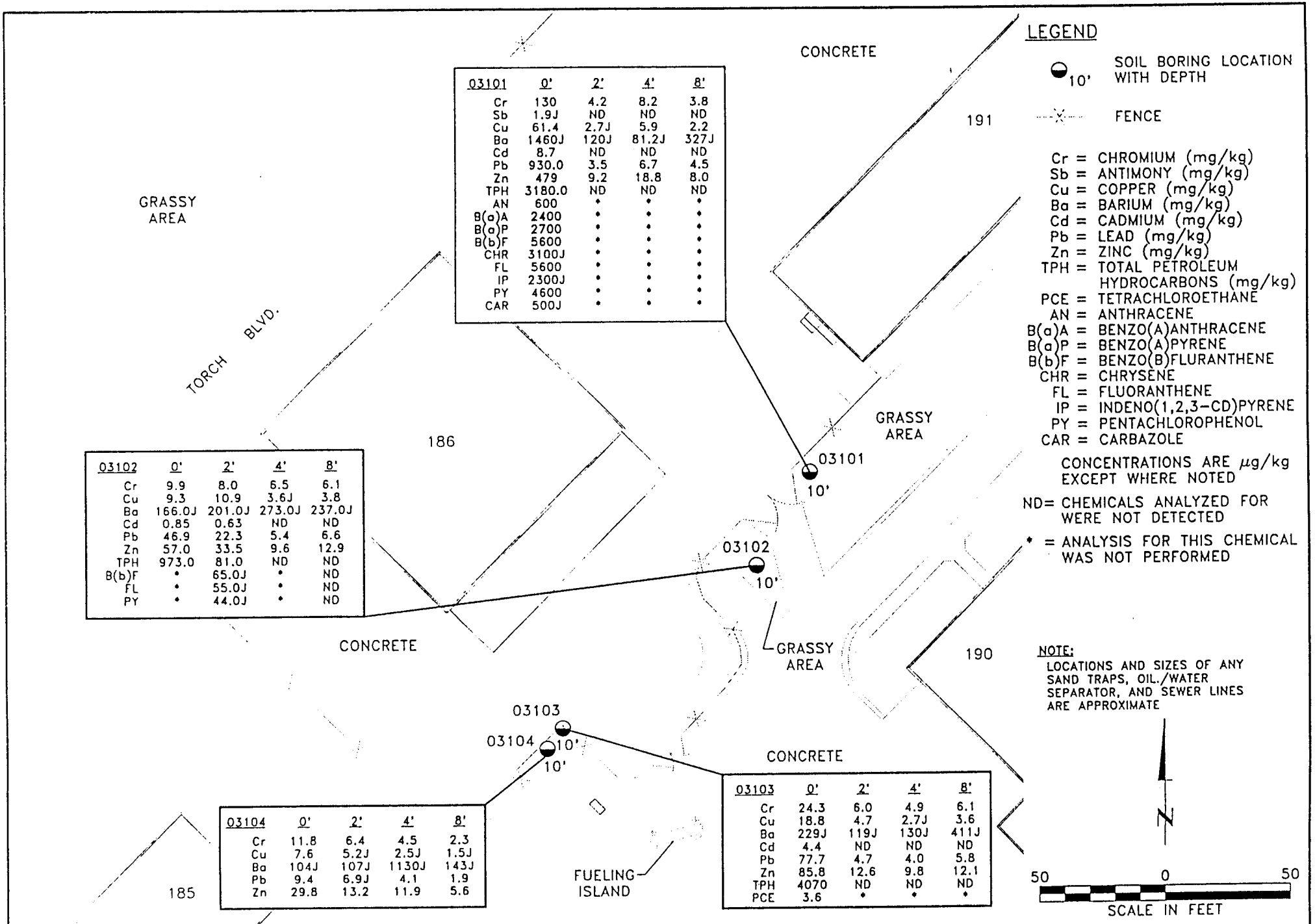


SOURCE: CANNON AFB CAD FILES AND CANNON AFB RFI FIELD SAMPLING PLAN.

DRN BY: SCR	DATE: 08/16/93	AGE MAINTENANCE SHOP PAD – SWMU 31 SITE MAP AND BORING LOCATIONS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. C3M11W
CHK'D BY: .	REVISION: 0		FIG. N 4-1

CAD FILE: C3M11WC .G V=HITS 02/15/1994 15:01



03101	0'	2'	4'	8'
Cr	130	4.2	8.2	3.8
Sb	1.9J	ND	ND	ND
Cu	61.4	2.7J	5.9	2.2
Ba	1460J	120J	81.2J	327J
Cd	8.7	ND	ND	ND
Pb	930.0	3.5	6.7	4.5
Zn	479	9.2	18.8	8.0
TPH	3180.0	ND	ND	ND
AN	600	*	*	*
B(a)A	2400	*	*	*
B(a)P	2700	*	*	*
B(b)F	5600	*	*	*
CHR	3100J	*	*	*
FL	5600	*	*	*
IP	2300J	*	*	*
PY	4600	*	*	*
CAR	500J	*	*	*

03102	0'	2'	4'	8'
Cr	9.9	8.0	6.5	6.1
Cu	9.3	10.9	3.6J	3.8
Ba	166.0J	201.0J	273.0J	237.0J
Cd	0.85	0.63	ND	ND
Pb	46.9	22.3	5.4	6.6
Zn	57.0	33.5	9.6	12.9
TPH	973.0	81.0	ND	ND
B(b)F	*	65.0J	*	ND
FL	*	55.0J	*	ND
PY	*	44.0J	*	ND

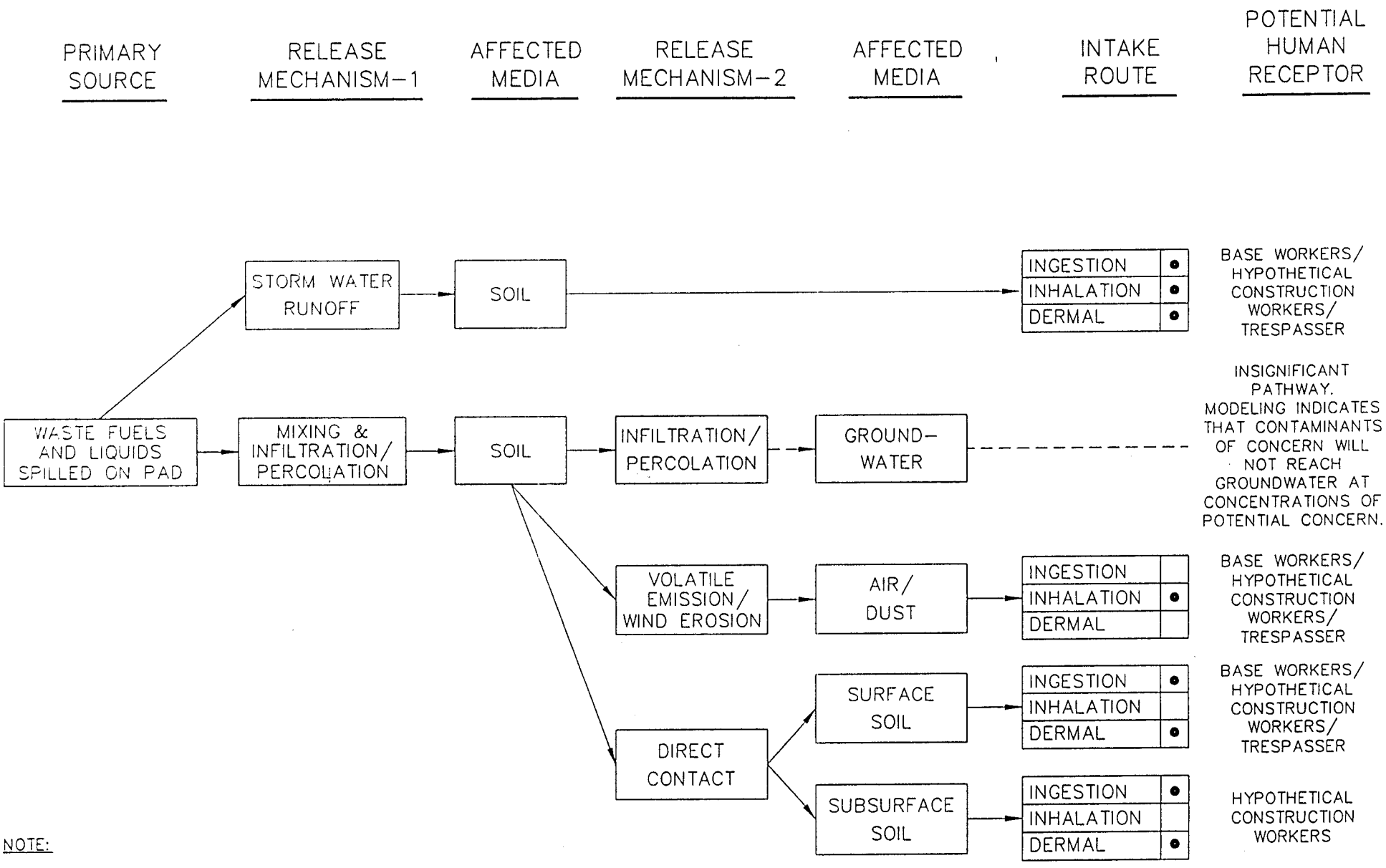
03103	0'	2'	4'	8'
Cr	24.3	6.0	4.9	6.1
Cu	18.8	4.7	2.7J	3.6
Ba	229J	119J	130J	411J
Cd	4.4	ND	ND	ND
Pb	77.7	4.7	4.0	5.8
Zn	85.8	12.6	9.8	12.1
TPH	4070	ND	ND	ND
PCE	3.6	*	*	*

03104	0'	2'	4'	8'
Cr	11.8	6.4	4.5	2.3
Cu	7.6	5.2J	2.5J	1.5J
Ba	104J	107J	1130J	143J
Pb	9.4	6.9J	4.1	1.9
Zn	29.8	13.2	11.9	5.6

SOURCE: CANNON AFB CAD FILES AND CANNON AFB RFI FIELD SAMPLING PLAN.

DRN BY: CJG	DATE: 01/04/93	AGE MAINTENANCE SHOP PAD – SWMU 31 CHEMICAL CONCENTRATIONS DETECTED IN SOIL CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO.	FIG. NO.
CHK'D BY: .	REVISION: 0		C3M11W	4-2

CAD FILE: C3M11W. DWG V=MAINTENANCE 01/17/1994 11:46



NOTE:

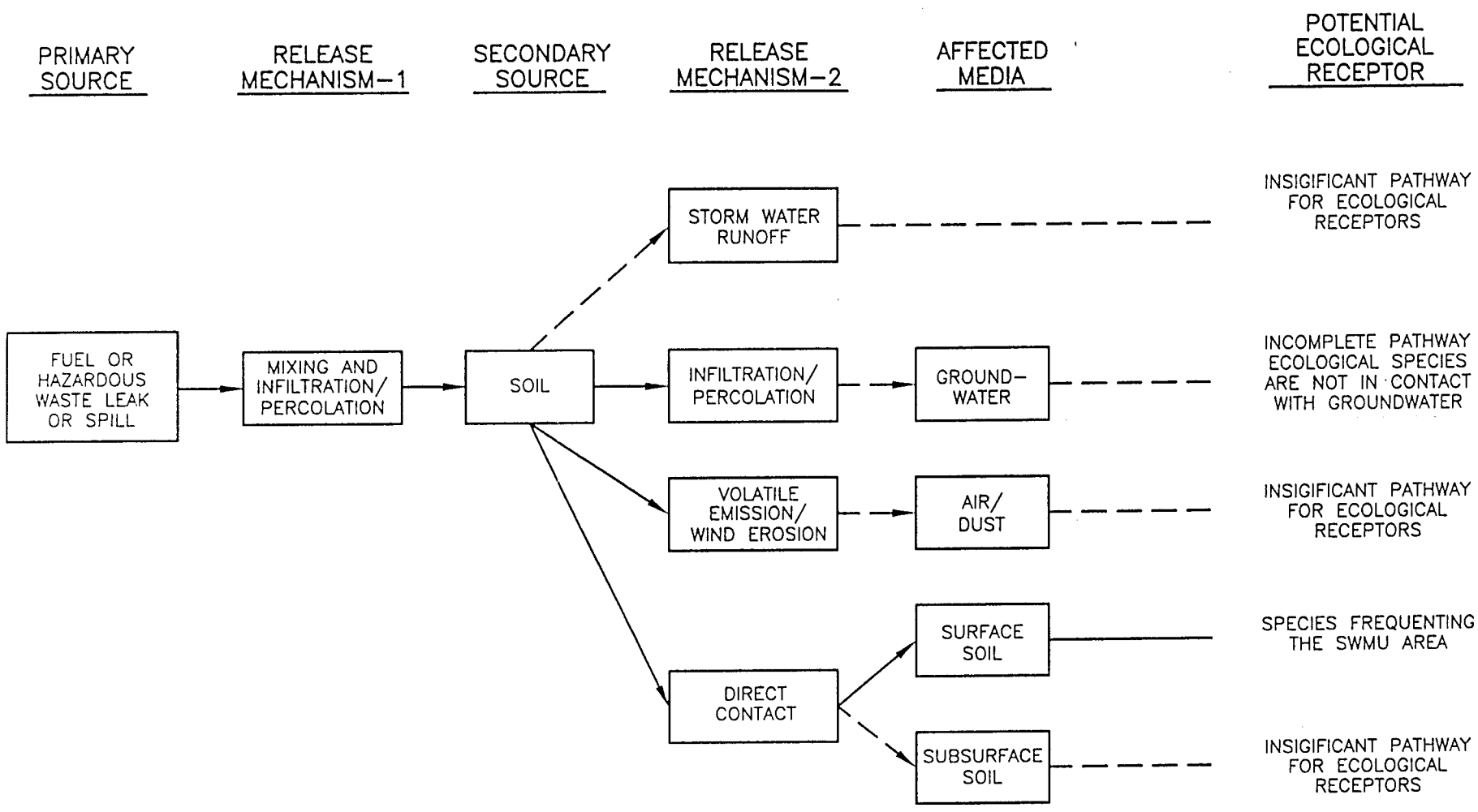
SOLID LINES REPRESENT POTENTIALLY COMPLETE PATHWAYS

DASHED LINES REPRESENT INCOMPLETE OR INSIGNIFICANT PATHWAYS

ONLY FUTURE USE EXPOSURES WILL BE CONSIDERED FOR SOILS PRESENTLY COVERED BY PAVEMENT

DRN BY JWB	DATE 08/19/93	EXPOSURE PATHWAY FLOW CHART AGE MAINTENANCE SHOP PAD SWMU - 31 CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. C3M11W
CHK'D BY .	REVISIONS: 0		FIG. NO. 4-3

C3M11W22.DWG -SWMU-31 02/15/1994 8:00

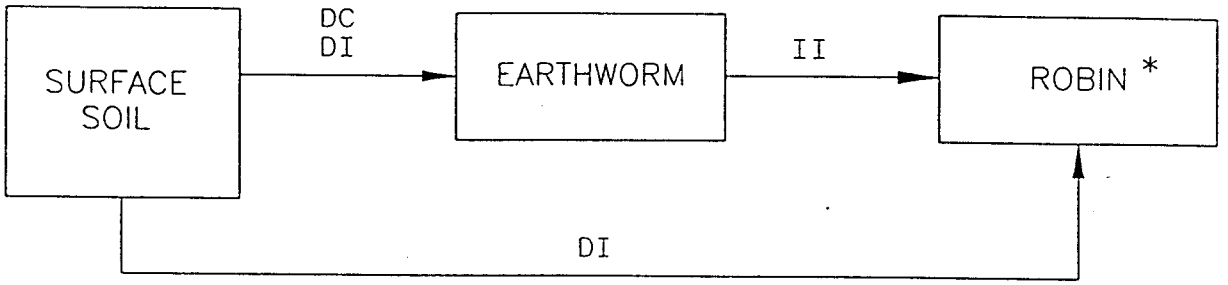


NOTES:

SOLID LINES REPRESENT POTENTIALLY COMPLETE AND SIGNIFICANT PATHWAYS

DASHED LINES REPRESENT INCOMPLETE OR INSIGNIFICANT PATHWAYS

DRN BY NVD	DATE 12/30/93	EXPOSURE PATHWAY FLOW CHART FOR SWMU 31 ECOLOGICAL RECEPTORS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. C3M11W	FIG. NO. 4-4
CHK'D BY	REVISIONS: 0			



DC = DIRECT CONTACT

DI = DIRECT INGESTION

II = INDIRECT INGESTION
(i.e. SECONDARY, TERTIARY CONSUMPTION)

* = KEY RECEPTOR SPECIES

DRN BY NVD	DATE 12/30/93	CONCEPTUAL SITE MODEL SWMU 31	PROJECT NO.	FIG. NO.
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SAND TRAP AND LEACH FIELDS AT THE PETROLEUM, OIL, AND LUBRICANTS (POL) WASH RACK - SWMU NO. 127

10.1 SITE BACKGROUND

10.1.1 Site Description

This SWMU is a 135-gallon concrete sand trap and leach field that receives wash water from the POL refueling truck wash rack at Facility 4095 (Figure 10-1). The sand trap measures 2.5 feet by 4.5 feet in plan and extends about 3.5 feet below the pavement. This unit has been active since 1977. Drainage from the wash rack flows into the sand trap and an oil/water separator (OWS). (The OWS was installed in the early 1990s. It is a three-compartment steel tank, with clean-out access for each compartment. Site inspection showed no evidence of leaks or spills, and the OWS is not part of the SWMU 127 investigation.) Water from the OWS is discharged to a leach field to the east of the OWS, and oil collected in the OWS is periodically removed by pumping. The surface of the leach field is grass-covered and essentially flat with no discernable gradient, and the area around and west of the sand trap (wash rock) is paved with asphalt.

10.1.2 Site History

The sand trap received wash water from fuel truck cleaning operations. Historically, this wastewater was discharged directly to a leach field located approximately 60-feet northeast of the wash rack. The leach field ceased to function in the late 1980s. An OWS enclosed in a concrete vault was installed in May 1991 to recover petroleum products which may be released during wash rack operations. The OWS discharges wastewater to a new leach field which was installed approximately 20 feet northeast of the original. The original leach field remains in place, but is bypassed and not used.

10.1.3 Current Use

The wash rack sand trap continues to receive heavy use. The wastewater from the recently installed OWS discharges to the new leach field located northeast of the former leach field and oils recovered are temporarily stored in the separator for future recycling.

10.2 SUMMARY OF RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATIONS

10.2.1 Physical Investigation

The objective of soil sampling at the wash rack sand trap and the associated leach fields was to evaluate whether or not a release of SWMU-related chemicals that could pose a significant risk to human health or the environment has occurred from the sand trap or the two leach fields.

A total of eight borings were installed (boring locations are shown on Figure 10-1). Two 10-foot borings were drilled through holes cut in the concrete wash rack to sample the soil below the pad. Soil samples were collected at the 0.5- to 2-foot, 2- to 4-foot, 4- to 6-foot, and 8- to 10-foot depth intervals to characterize the vertical distribution of possible contaminants. Minor visual and olfactory indications of contamination, probably attributable to spillage of JP-4 jet fuel on the wash rack, was found in soils directly below the concrete pad.

One 60-foot boring was drilled adjacent to the OWS and five 60-foot borings were drilled within the new and abandoned leach fields. Samples were collected at the surface and at the 1.5- to 3.5-foot, 4- to 6-foot, 8- to 10-foot, 18- to 20-foot, 28- to 30-foot, 38- to 40-foot, 48- to 50-foot, and 58- to 60-foot depth intervals to characterize the vertical distribution of possible leachate contaminants percolating into the soil. At Boring 12708, located in the new leach field, odors were encountered indicating subsurface contamination beyond the wash rack.

Target analytes for all borings include VOCs, SVOCs, metals, and TRPH. Surficial samples were collected directly under the concrete wash rack and approximately at the 0.2- to 0.5-foot depth interval in areas of plant cover to provide surface soil data for risk assessment purposes.

10.2.2 Chemical Investigation

Sixty-two soil samples (not counting QC samples) were collected from the eight borings. Sampling and analyses performed are summarized in Table 10-1. Summaries of the analytical results for these soil samples is provided in Table 10-2a (near-surface) and Table 10-26 (subsurface soil). The tables provide results for analytes that were detected at least once in each sample group (near-surface and subsurface). Complete analytical summary results are provided in the QCSR (Appendix A of the RFI report).

10.2.3 Data Assessment

The quality of the analytical data was evaluated in the RFI report, and the data were deemed to be of adequate quality to meet the objectives of the RFI. There were no data quality issues affecting usability of the data for risk assessment.

10.2.4 Nature and Extent of Contamination

There was no visible evidence of spills or leaks in the vicinity. Minor petroleum staining was observed in the upper two feet of soil around the sand trap and in a few of the samples from Boring 12708 in the leach field; otherwise no physical evidence of contamination was encountered during sampling. The chemical test results show low levels of organic contamination, including PAHs and TPH predominantly in the shallow samples. The primary contamination detected at the SWMU includes PAHs which were detected at significant concentrations in six of eight surface soil samples. The surface soil sample at Boring 12705 had the highest PAH concentration including benzo(a)pyrene at 8,600 μg/kg. PAH concentrations in the other surface samples were approximately an order of magnitude lower. PAHs were not detected in subsurface soil samples indicating that they are not being transported vertically. Only very low concentrations of VOCs were detected (e.g., toluene was detected at a maximum concentration of 18 μg/kg at a depth of 8 feet). VOCs were not found at significant concentrations in the deeper samples indicating that vertical transport is not occurring. Maximum metals concentrations detected at the SWMU include copper at 54.9 mg/kg, barium at 971 mg/kg, and lead at 48.2 mg/kg.

10.3 HUMAN HEALTH RISK ASSESSMENT

10.3.1 Exposure Pathway Flow Chart

Figure 10-3 shows the exposure pathway flow chart of chemical sources and potential human exposure pathways for OWS 4095. In the flow chart potentially complete exposure pathways are indicated with solid lines; incomplete or insignificant pathways are indicated with broken lines.

The primary sources are waste fluids (e.g., wash water containing fuels, oils, and solvents) that were discharged to the sand trap and leach fields. Chemicals from the primary source may be released to other media that may in turn act as secondary sources of chemical release or exposure. Mixing and infiltration of the wastes to soil is shown as a primary chemical release mechanism. Chemicals in soils may infiltrate/percolate through the soil and be released to groundwater, be released to the air via volatile emissions or wind erosion, or result in exposure via direct contact (e.g., dermal contact or incidental ingestion). Storm water runoff is not considered to be a significant pathway for human exposures, because the SWMU covers only a small area, surface spills are not likely to be significant, and no developed drainageways are present near the SWMU.

As shown on the flow chart, surface soils may provide exposures to Base workers (occupational exposures), hypothetical future construction workers, and hypothetical future trespassers. Air emissions (volatile and particulates) from surface soil may also provide exposures to Base workers, construction workers, and trespassers. Subsurface soils and air emissions from subsurface soil (i.e., during excavation) may provide exposures to construction workers. Construction workers are unlikely to encounter soils at depths greater than 20 feet; however, to be conservative, exposures will be evaluated to contaminants at all depths of the borings. Groundwater is used for domestic purposes on and off Base. In order to assess potential impacts to public health via groundwater pathways, fate and transport modeling was conducted to determine if contaminants of concern in soils at the SWMU could reach groundwater at concentrations of concern. Results of the fate and transport modeling (Section 10.3.5.2) indicate that contaminants will not reach groundwater at concentrations of potential concern. Therefore, this pathway was not evaluated further.

In summary, potential complete human exposure pathways evaluated in the risk assessment are:

Occupational Workers

- Ingestion of and dermal contact with surface soil
- Inhalation of volatile emissions and airborne particulate matter from surface soil

Hypothetical Construction Workers

- Ingestion of and dermal contact with surface and subsurface soil
- Inhalation of volatile emissions and airborne particulate matter from surface and subsurface soil

Hypothetical Future Trespassers

- Ingestion of and dermal contact with surface soils
- Inhalation of volatile emissions and airborne particulate matter from surface soils

10.3.2 Comparison of Metals Concentrations to Background

Metals are natural constituents of soils. Therefore, SWMU concentrations of metals of potential concern were evaluated to assess whether they exceeded background levels. Metals that occur in concentrations within background levels are not considered SWMU-related chemicals of concern, and are not evaluated further.

Background levels were detected by the upper tolerance limit (UTL) of concentrations from 37 background soil samples collected at Cannon AFB and by literature values for regional soils (USGS 1984). The background data and calculation of UTLs are presented in Appendix A. (The background UTL was defined as the mean plus two times the standard deviation; see Appendix A.)

Results of the comparison of metals concentrations in soil for SWMU 127 to background levels are given in Tables 10-3 and 10-4. A summary of the results of the comparison is presented here.

The maximum concentrations of antimony, cadmium, copper, lead, mercury, silver, and zinc in surface soil exceeded the UTL of the background data. The maximum detected concentrations of antimony, barium, cadmium, copper, lead, mercury, silver, thallium, and zinc in total soils exceeded the UTL of the background data. Therefore, these metals were retained for further evaluation as potential chemicals of concern in surface and total soils.

Antimony and mercury were only detected in one of 62 samples (<2 percent), and thallium was detected in two of 62 samples (3 percent). This rate of exceedance of the 95 percent UTL of the background population is expected; therefore, these metals are probably within naturally-occurring levels. However, to be conservative, they are evaluated in the risk assessment as chemicals of concern.

10.3.3 Identification of Chemicals of Concern

Chemicals of concern are compounds that have been released from waste sources at SWMU 127, have been detected in soil at the SWMU, and may be significant contributors to human health or environmental risks. In general, metals detected above background levels and organic compounds other than those shown to be laboratory or field contaminants are considered to be chemicals of concern for risk assessment. Chemicals of concern that do not have EPA-established toxicity factors are not evaluated quantitatively in the risk assessment, but their potential contribution to overall risk is addressed qualitatively.

Tables 10-2a and 10-2b present the analytical results for all chemicals detected in W-C samples for soils. Of these, chemicals of concern were identified as described below.

The concentrations of several metals detected in surface and subsurface soil exceeded background ranges according to the comparison described in Section 10.3.2. These metals are, therefore, considered as chemicals of concern in soil. The compounds 1,1,1-trichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, 1,2-dichloroethene, 2-butanone, benzene, carbon tetrachloride, chlorobenzene, ethylbenzene, and tetrachloroethene were reported in fewer than 5 percent of the total soil samples, were only reported at concentrations below reporting limits, and were only detected at depth. Therefore, these compounds are not considered to be characteristic of the site, are not likely to pose a significant risk, and thus are not considered to be chemicals of concern at this SWMU. Other organic contaminants detected in soils were retained as chemicals of concern

for risk assessment. Chemicals of concern in surface soil and total soil are listed in Tables 10-5 and 10-6, respectively. Benzo(g,h,i)perylene, 2-methylnaphthalene, phenanthrene, aluminum, cobalt, lead, and TPH, listed in Tables 10-5 and 10-6 as chemicals of concern, do not have EPA-established toxicity factors and, therefore, cannot be evaluated quantitatively in the risk assessment. However, their potential effects on the results of the risk assessment are addressed in Sections 10.3.8 through 10.3.10.

10.3.4 Environmental Fate and Transport

10.3.4.1 General

The environmental fate of chemicals of concern is influenced by the physicochemical properties of each of the chemicals. Physicochemical properties that are generally of primary importance to fate and transport of chemicals in the environment are: water solubility, soil adsorption, volatilization, and biodegradation. A more thorough discussion of these properties is provided in Appendix B. Physicochemical properties of the chemicals of concern reported at the SWMUs in this investigation are given in Table B-1.

10.3.4.2 Vadose Zone Fate and Transport Modeling

A partitioning leachate model was used to estimate potential leachate generation from contaminants in the soil at the SWMU and to estimate the transport of the leachate to groundwater. The analytical model, developed at the Idaho National Engineering Laboratory (DOE 1991), describes the mass balance of a contaminant (based on average soil concentrations) in the contaminated soil volume at the SWMU. The DOE model assumes a constant infiltration rate (based on the Hydrologic Evaluation of Landfill Performance [HELP] Model) and accounts for sorption to soils and degradation in the vadose zone. The model conservatively considers dilution of the leachate as it reaches the groundwater to estimate potential groundwater concentrations of SWMU-related chemicals of concern. The input parameters and estimated leachate concentrations are given in Section 10.3.5.2. A complete description of the model is given in Appendix B.

The modeled groundwater concentrations are compared to conservative risk-based concentrations (RBCs) for drinking water (Section 10.3.5.2). Since the RBCs were developed for drinking water (at the tap) and were based on conservative exposure and health-protective (risk) assumptions, it

can be concluded that modeled groundwater concentrations that do not exceed RBCs will pose no significant adverse health risk.

10.3.4.3 Air Modeling

RME air concentrations of volatile and particulate emissions from surface soil and total (surface and subsurface) soil were calculated using RME soil concentrations of chemicals of concern. The results of the air modeling are given in Section 10.3.5.3. Air concentrations of VOCs released from soil were estimated using a VF approach developed by Hwang and Falco (1986) and adopted by EPA for use at hazardous waste sites (EPA 1991). Air concentrations of SVOCs that may be bound to airborne particulates (dust) were estimated using a PEF approach developed by Cowherd (1985) and adopted by EPA for use at hazardous waste sites to calculate soil cleanup levels (EPA 1991). Air concentrations were calculated for only those chemicals with inhalation toxicity factors which were evaluated quantitatively in the risk assessment. The methodologies used in the air modeling are discussed in more detail in Appendix B.

The air modeling approach is conservative because it uses default values recommended by EPA for establishing preliminary remediation goals at hazardous waste sites, and it assumes that potential receptors are consistently exposed to air concentrations predicted immediately at the source (i.e., it does not account for dilution in the air during transport from the SWMU source to potential receptors).

10.3.5 Exposure Point Concentrations

10.3.5.1 Soils

Tables 10-7 and 10-8 show the calculation of the average (arithmetic mean) and RME concentrations of organic chemicals and metals of concern in surface soils and total soils, respectively, at OWS 4095.

In accordance with EPA guidance (EPA 1989d) and as explained in Appendix C, the RME concentration is either the 95 percent UCL on the mean or the maximum concentration detected, whichever is lower. The use lf "nondetect" values (U-qualified data) in calculating exposure point concentrations is also explained in Appendix C. Tables 10-9 and 10-10 give the soil concentrations

of organic compounds from surface and total soils, respectively, which have been adjusted for dermally absorbed fraction. These adjusted concentrations were used for calculating risks from dermal exposures to organic chemicals in soils The absorbed fraction (from Table C-26, Appendix C) is the ratio of the quantity of chemical that is absorbed through skin to the quantity that is applied to the skin in soils. As explained in Appendix C, dermal absorption of metals (except mercury) adhered to soil is considered to be insignificant and is not evaluated.

Surface soil was defined as soils to a depth of 2 feet. Some samples with field identification indicating 2-foot depth (i.e., were actually taken from depths of 1.5 to 3.5 feet). These samples were not considered surface samples, but are included in the risk assessment for subsurface soil exposure.

10.3.5.2 Groundwater

A leachate partitioning model was used to evaluate current leaching from the average total soil concentration at SWMU 127. A more detailed description of the groundwater modeling approach is provided in Appendix B. Model results are included in Table 10-11. These modeled concentrations were then compared to EPA Region III tap water risk-based concentrations (RBCs) (EPA 1993b). These concentrations are calculated assuming residential groundwater ingestion and inhalation and are based on an excess cancer risk of 1×10^{-6} or hazard quotient equal to one. Table 10-12 summarizes the comparison of the modeled concentration in groundwater to the conservative tap water RBCs. No modeled concentrations exceeded the RBCs, so significant risks are not expected from the groundwater pathway. Therefore, the groundwater pathway has been determined to be insignificant and was not further evaluated.

10.3.5.3 Air

RME air concentrations of volatile and particulate emissions from surface soil and total soil were calculated using RME concentrations of chemicals of concern. The results of the air modeling from surface soil are shown in Tables 10-13 and 10-14. The results of the air modeling from total soil are shown in Tables 10-15 and 10-16.

10.3.6 Exposure Assumptions

The rationale and assumptions concerning potential human exposures considered in the risk assessment are described in Appendix C. Appendix C includes discussions of the exposure assumptions and intake factors used to quantify chemical intake of SWMU-related contaminants in soil and air. Table 10-17 shows a summary of the intake factors used in the exposure assessment. These factors are multiplied by chemical concentrations in soil and air to obtain estimates of chemical intake by each exposure pathway.

10.3.7 Risk Characterization

Chemical intake is combined with chemical-specific toxicity factors to obtain an estimate of health risk. Noncarcinogenic hazards and carcinogenic risks to occupational workers, hypothetical future construction workers, and hypothetical future trespassers were estimated for all relevant exposure routes and chemicals of concern using the approach and exposure assumptions described in Appendix C. Detailed risk calculations are shown in Appendix C and summarized in Table 10-18. A summary of the results of the risk assessment is given here.

Occupational Exposure

Occupational receptors (Cannon AFB personnel and civilians working routinely on Cannon AFB) were assumed to be exposed (via ingestion, dermal contact, and inhalation) to surface soils at SWMU 127. Occupational receptors were assumed to be exposed for two 8 hour/days, for 120 and 250 days/year, over 9 and 25 years for the average and RME cases, respectively. These assumptions are very conservative because there are no occupational receptors routinely working outdoors at the SWMU for the assumed durations. Furthermore, the surface area of the SWMU is small (approximately 180 feet by 70 feet or one-third acre), and long-term exposures are not likely to occur there. Therefore, the exposure assumptions overestimate current and future exposure conditions at the SWMU.

The total hazard index calculated for noncarcinogenic health effects due to chronic exposures to contaminants in surface soils at SWMU 127 via the dermal contact, inhalation, and ingestion pathways is 0.00007 and 0.007 in the average and RME cases, respectively. Neither hazard index

exceeds 1.0, which indicates that no adverse health effects are to be anticipated, even to sensitive individuals, with 25 years of exposure.

The estimated lifetime excess cancer risk for the assumed chronic exposure conditions is 1×10^{-8} for the average exposure case and 2×10^{-5} for the RME case. These levels are within or below the EPA target risk range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000) for exposure to chemicals released from hazardous waste sites (EPA 1990; EPA 1991b). Ingestion of PAHs is the primary contributor to the carcinogenic risk estimate. The RME estimate of risks due to ingestion probably significantly overestimates actual risks because it is based on the maximum concentrations of several PAHs. From Table 10-7, it can be seen that PAHs are detected in relatively high concentrations (up to 17 mg/kg) in only one of eight surface soil samples. Furthermore, it can be seen from Figure 10-1 that this contaminated area occupies only a small area of the SWMU and that it would be very unlikely that a worker would be exposed consistently to this area of maximum PAH concentrations. Therefore, the use of these maximum PAH concentrations significantly overestimates potential health risks, and the 1×10^{-8} cancer risk estimate based on the average surface soil concentrations (which correspond to exposures that might reasonably be expected across the SWMU) is a much more appropriate guide to expected risks at this SWMU.

Construction Worker Exposure

Future construction workers were assumed to be exposed (via ingestion, dermal contact, and inhalation) to surface and subsurface soils at SWMU 127. Exposures were assumed to occur during construction activities for 8 hours/day for 20 and 40 days for the average and RME cases, respectively.

The total hazard index calculated for noncarcinogenic health effects due to subchronic exposures to chemicals of concern in soils at SWMU 127 via the dermal contact, inhalation, and ingestion pathways is 0.0003 and 0.003 in the average and RME cases, respectively. Neither hazard index exceeds 1.0, which indicates that no adverse health effects are to be anticipated even to sensitive individuals.

The estimated lifetime excess cancer risk for the assumed subchronic exposure conditions is 2×10^{-9} in the average case and 2×10^{-8} in the RME case. These levels are well below the EPA target risk range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) for exposure to chemicals released from

hazardous waste sites (EPA 1990; EPA 1991b) and show that risks for this exposure scenario are negligible.

Trespasser Exposure

Hypothetical trespassers were assumed to be exposed via ingestion, dermal contact, and inhalation) to surface soils at SWMU 127. Trespassers were assumed to be exposed for 26 and 52 days/year over a period of 6 years for the average and RME cases, respectively.

The total hazard index calculated for noncarcinogenic health effects due to subchronic exposures to contaminants in surface soils at SWMU 127 via the dermal contact, inhalation, and ingestion pathways is 0.00002 and 0.002 in the average and RME cases, respectively. Neither hazard index exceeds 1.0, which indicates that no adverse health effects are to be anticipated, even to sensitive individuals.

The estimated lifetime excess cancer risk for the assumed subchronic exposure conditions 2×10^{-9} for the average exposure case and 1×10^{-6} for the RME case. The estimated risk for the average case is with the EPA target risk range of 1×10^{-6} and 1×10^{-4} for exposure to chemicals released from hazardous waste sites (EPA 1990; 1991b). The RME estimate of risk probably significantly overestimates actual risks because it is based on the maximum concentrations of several PAHs. From Table 10-7, it can be seen that PAH concentrations are elevated in one of eight (1275-0000) surface soil samples. Furthermore, it can be seen from Figure 10-1 that this contaminated area occupies only a small area of the SWMU and that it would be very unlikely that a receptor would be exposed consistently to this area of maximum PAH concentrations. Therefore, the use of these maximum PAH concentrations probably significantly overestimate potential health risks, and the risk estimate based on the average concentrations (which correspond to exposures that might reasonably be expected across the SWMU) is a much more appropriate value for this SWMU.

Qualitative Assessment of Exposures to Lead

Lead exposures are not addressed in the quantitative risk assessment because EPA withdrew the RfD for lead in 1989, primarily due to the lack of discernible threshold dose and the numerous sources of lead in the environment. Current EPA guidance (EPA 1989) suggests a soil lead concentration of 500 mg/kg to 1,000 mg/kg be considered for sites characterized as residential.

These levels are supported by EPA's Uptake Biokinetic (UBK) Lead Model which predicts that exposures of children ages 0 to 6 to soils with approximately these levels will not result in blood lead levels that exceed a level of concern established by the Centers of Disease Control.

The maximum lead concentration measured in soils at SWMU 127 was 48.2 mg/kg. This is well below the acceptable level for residential soils, and it can be concluded that lead detected in soils at SWMU 127 would not be expected to pose a threat to human health.

Qualitative Assessment of TPH Exposures

Petroleum-derived fuel is a complex mixture of hundreds of branched, straight-chain, cyclic, and aromatic carbon compounds, most of which are not particularly toxic. However, a small fraction of fuel constituents are known to have toxic or carcinogenic properties. The primary toxic fuel constituents of concern are BTEX; benzene, because it is carcinogenic, is the chief hazardous constituent of fuels and the chief contributor to risk from exposure. In this RFI, BTEX and other potentially hazardous fuel constituents (such as naphthalene and pyrene) were analyzed for individually in the soil samples collected at the SWMU and included in the quantitative risk assessment. Cumulative risks did not exceed levels of concern. It is not likely that other hydrocarbon constituents of TPH, which are relatively innocuous, would add significantly to the resulting estimates of potential health risks.

This can be demonstrated by comparing SWMU concentrations of TPH to RBCs derived using target risk levels, occupational soil ingestion intake factors, and provisional EPA toxicity factors for JP-4 and gasoline (EPA 1992d). (These provisional toxicity values are based on inhalation studies in animals using fresh fuel product. They are most appropriately used for evaluating exposures to fresh fuel spills when analytical results for the toxic constituents of TPH [primarily BTEX] are not available, and when the fuel product is known. The provisional toxicity values are under review and subject to revision. The RBCs derived from them are used only as a guide to potential health hazards.)

The toxicity factors and calculation of risk-based concentrations are shown in Table 10-19. Assuming that all the TPH at the SWMU is gasoline is the most conservative approach because its RBC is the lowest, based on evidence of carcinogenicity (probably due to benzene). The risk-based concentration of gasoline for oral exposures to TPH under occupational exposure assumptions is

33,600 mg/kg. The maximum SWMU concentration of TPH is 344 mg/kg, well below the conservative RBC.

10.3.8 Uncertainties and Limitations

Throughout the human health risk assessment, conservative assumptions regarding exposure conditions, exposure concentrations, and chemical toxicity and carcinogenicity were used that combine to result in an upper-bound estimate of risk for the SWMU. The conservative features and other uncertainties inherent in the risk assessment process are outlined in Appendix C. The chief uncertainties specific to risk assessment for SWMU 127 and their effect on the results and conclusions of the risk assessment are listed below.

- A single surface soil sample contained the maximum concentrations of all of the PAHs detected. Most PAHs were detected at levels 1 or 2 orders of magnitude lower in the other samples. Risks were calculated based on RME concentrations equivalent to the maximum concentrations detected in the one sample and an assumed 25-year exposure duration, including daily contact. These exposure assumptions significantly overstate the likelihood of exposure to the contaminated area. Therefore, the RME risk of 2×10^{-5} is probably a significant overestimate of actual risk associated with exposure to soils at the SWMU.

- Direct physical contact with contaminated soils was assumed to occur routinely for several hours/day, 9 to 12 months of the year, for 9 to 25 years. These assumptions overstate current and likely future exposure conditions to soils at this site.

- Benzo(g,h,i)perylene, 2-methylnaphthalene and phenanthrene were not considered in the quantitative risk assessment because they do not have EPA-established toxicity factors. Their exclusion from the quantitative analysis may underestimate risk at the SWMU. However, it is not likely to affect the results or conclusions of the risk assessment relative to the chemicals with known toxic or carcinogenic effects detected at the SWMU.

- Dermal absorption of PAHs was not evaluated quantitatively in the risk assessment. EPA guidance (EPA RAGS 1989a) states that it is inappropriate to use the oral

slope factor to evaluate the risks associated with dermal exposure to carcinogens such as benzo(a)pyrene, which cause skin cancer through a direct action at the point of application. The exclusion of this exposure pathway from the risk assessment may underestimate the potential human health risk at the SWMU.

- Chemicals of concern that do not have EPA-established inhalation toxicity factors were not included in the calculation of potential risk from the inhalation pathway. While their exclusion may underestimate the risk at the SWMU, it is unlikely that the total calculated risk will be significantly affected, because ingestion and dermal contact, rather than inhalation, are generally the major contributors to the total risk.

- The surface area of this SWMU is only one-third acre, and the long-term daily exposures are not likely to be confined to an industrial area this small. Therefore, the exposure assumptions used significantly overestimate actual exposures to contaminated soils and associated risk at this SWMU.

10.4 ECOLOGICAL RISK ASSESSMENT

10.4.1 Ecological Characterization and Key Receptor (Indicator) Species

SWMU 127, the Sand Trap and associated leach fields at the POL Washrack, is located in a small area of poor wildlife habitat quality, within the developed portion of Cannon AFB where existing ground cover is mostly asphalt paving, roadway, and an area of mowed non-native grasses. About 60 percent of the land surface within the immediate vicinity (within 100 feet) of SWMU 127 is asphalt or concrete paving and Building 223. The mowed grassy area is located immediately above and surrounding the leach field, and extends to the northwest and south. This grassy area is more extensive than the more isolated grassy strips associated with other OWS-type SWMUs at Cannon AFB, but is still surrounded by development. The sandtrap continues to be actively used.

The most common species are likely to be birds, such as robin (*Turdus migratorius*), house sparrow (*Passer domesticus*), and the starling (*Sturnus vulgaris*). Seedeaters would be more limited, since the grass is maintained by mowing. Although the house mouse (*Mus musculus*) may occur in the area around the buildings, the grass habitat is probably too small and subject to human disturbance

to be used regularly by terrestrial species such as deer mice. Raptors are unlikely to use the area for similar reasons.

Given this assessment, the robin (*Turdus migratorius*) was selected as the key receptor species for the grassy area around SWMU 127.

10.4.2 Chemicals of Concern

The chemicals of concern (COCs) at SWMU 127 were selected using validated data from fourteen soil samples covering the interval between 0 and 2 feet deep. This interval was selected because most soil-dwelling organisms (e.g. earthworms and deer mice) occur in this zone. Table 10-20 provides a summary of the chemicals detected in the fourteen samples considered for this ERA. A detailed description of the soil sampling program and chemical analysis and results can be found in the Cannon AFB RFI, Appendix III SWMUs (W-C 1993).

A chemical must have been detected in at least one of the fourteen samples to be considered a possible COC. The following screening criteria were then applied, in the order shown, to determine if a chemical in the soil would be retained as a COC:

- Exceedance of Cannon AFB background soil concentrations
- Exceedance of average concentrations found in southwestern U.S. soils
- Exceedance of the normal range found in U.S. soils (nationwide)

The maximum detected concentration of the fourteen samples was used in the comparison to background criteria. If no background criteria were available for comparison, as was the case for the organic chemicals, the chemicals were retained as COCs. If the maximum detected concentration of a chemical exceeded the local (i.e. Cannon AFB) background concentration, it was then compared to the average concentration found in southwestern U.S. soils. If it exceeded this criteria, it was likely retained as a COC, even if it fell within the normal range found in U.S. soils. This is because the normal U.S. range is widely variable and was included in the screening process primarily as an additional reference. In some cases however, the normal U.S. range was the only screening criteria available. Table 10-21 lists the maximum concentrations detected and shows the screening values used. The chemicals that were retained as COCs following the screening process are 1,2-dichloroethane, 1,2-dichloropropane, toluene, xylenes, acenaphthene, anthracene,

benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, carbazole, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, phenanthrene, pyrene, aluminum, antimony, cadmium, copper, lead, selenium, silver, thallium, and TPH.

10.4.3 Exposure Assessment

Figure 10-4 depicts the exposure pathway flow chart developed for SWMU 127. As the flowchart indicates, chemicals could potentially be released through transport in runoff, infiltration to groundwater, volatilization or wind erosion, and direct contact by ecological receptors. Except for direct contact, these exposure pathways are incomplete or of minor importance for ecological receptors. Storm water runoff is a potentially complete but insignificant pathway, because the source of chemicals is below ground and any spillage during servicing would involve a relatively small area of level terrain. Ecological receptors are not in contact with groundwater, so this is an incomplete exposure pathway. Volatilization or wind erosion is not considered a significant pathway at this site. Although one of the COCs is a volatile organic compound (VOC), the maximum concentrations were equal or less than 0.015 mg/kg, and VOC concentrations of 100 mg/kg or greater in air are generally needed to induce toxic responses in laboratory rats and mice from inhalation (NIOSH 1987). Concentrations in soils would have to be many times greater than this to produce these toxic levels in air, even near the soil surface. Direct contact with subsurface soils (more than two feet deep) is also considered an insignificant or incomplete pathway because of the limited use of deeper soils at this site by wildlife.

Therefore, the only potentially complete and significant exposure pathway is direct contact with contaminated surface soil by species frequenting the SWMU area. Direct contact may include dermal absorption or ingestion. Dermal absorption is not considered a significant exposure route for the receptors at this site because the animals are assumed to be largely protected by their fur or feathers. Receptors at the SWMU may ingest COCs either directly or indirectly. Direct ingestion usually occurs along the food/prey chain from soil adhered to the surface of food or from preening/cleaning or burrowing activities. Indirect ingestion includes ingestion of COCs that have been transferred via food webs.

Figure 10-5 depicts the Conceptual Site Model developed from the exposure pathway analysis, the ecological characterization, and the identification of the key receptor species for SWMU 127. As the figure indicates, the pathway of concern is from surface soil to the robin, via direct and indirect

ingestion, with the earthworm identified as a main dietary component of the robin.

10.4.4 Risk Characterization

This section provides a characterization of potential risk to the selected key receptor species (robin) at SWMU 127. For the purposes of this analysis, it was assumed that the robin's diet consists of earthworms and inadvertent consumption of soil. It was also assumed that the concentration of the COCs were the same in the earthworm as in the soil, except for cadmium and selenium, for which bioaccumulation factors of 4.6 and 12 were used (see Section 7.4.4). Therefore the analysis consisted of comparing the concentration of COCs in the robin's food (i.e., the chemical concentration in soil) to selected toxicity benchmark dietary levels for those chemicals (see Table 10-22).

This is a somewhat conservative approach, because studies indicate that, for many chemicals, BAFs from soil to earthworm are less than one (Beyer and Stafford 1993). However, this assumption takes into account the soil that would be clinging to the earthworm when consumed by the robin (that is not taken into account by the BAF studies) and also accounts for minor inadvertent soil ingestion by the robin. The benchmark dietary levels were selected as explained in Appendix D, Section D.3 and D.4; these sections also provide background toxicological information about the COCs. The soil chemical concentration used was the arithmetic mean, as described in Appendix D (Section D.6.).

Table 10-22 lists the COCs for SWMU 127 and provides a comparison between the soil concentration (arithmetic mean) and the benchmark dietary level for the robin. If the soil level exceeds the benchmark level, there is a possibility of risk, as noted in the table. The following discussion addresses those chemicals where a possibility of risk is indicated.

Benzo-a-pyrene (BaP)

The average concentration of BaP at SWMU 127 was 1.159 mg/kg, compared to the benchmark dietary level of 0.02 mg/kg, indicating a potential risk. The 1.159 mg/kg level is above reported BaP concentrations for various locations, as reported in the literature, but within the range reported for "rural soils" by ATSDR (1990) (see Table A-6). BaP was detected in six of nine samples; the other three samples were non-detects. Also, there was one "hot spot" at 8.6 mg/kg; the other

detects were in the 0.1-0.2 mg/kg range. Therefore, it is unlikely that the robin is exposed to a level of 1.159 mg/kg in all areas in which it feeds, assuming it does not feed just at the "hot spots" in the SWMU area. Also, the low toxicity benchmark for BaP is a reflection of BaP's carcinogenic effects through the action of its intermediate metabolites, as opposed to acute toxicity. In most cases, the process of carcinogenesis occurs over a period of many months in experimental animals, and therefore it is questionable if carcinogenesis is an important endpoint for relatively short-lived mammals and birds, such as the robin. Finally, the BaP found at SWMU 127 may not be completely bioavailable to robins. Goon et al. (1991) showed that BaP that had aged 6 months in soil was only 34 percent to 51 percent orally bioavailable for clayey and sandy soils, relative to BaP administered alone to rats. For these reasons, it is unlikely that BaP presents an unacceptable risk at SWMU 127.

Aluminum

The average concentration of aluminum at SWMU 127 was 8267 mg/kg, compared to the benchmark toxicity level of 1500 mg/kg, indicating a potential risk. However, it is unlikely that aluminum from SWMU 127 constitutes a risk to the robin, because the background concentration of aluminum in the soils at Cannon AFB is high (UTL=10,540 mg/kg), and the maximum concentration found at SWMU 127 was only slightly higher this background level (11,600 mg/kg). Normal range for aluminum in U.S. soils can vary from 700-100,000 mg/kg (see Table 10-21). It is unlikely that SWMU 127 is the source of the high aluminum, it is also likely that much of the aluminum found in the soil is present as insoluble salts (oxides and phosphates), which are not toxic (NAS 1980). Therefore, it is expected that the wildlife in this area is not at risk from the naturally high aluminum soils.

10.5 SUMMARY AND CONCLUSIONS

10.5.1 Summary

A human health and ecological risk assessment which considered both present and future receptors and all appropriate exposure pathways was completed for this SWMU. Analytical data were collected for soils at this SWMU, and fate and transport modeling was conducted to evaluate the air and groundwater pathways. The results of the risk assessment are summarized here.

- Results of the human health risk assessment (Table 10-18) show that no unacceptable health risks due to chemical releases are expected at the SWMU.

- Results of the ecological risk assessment show that no unacceptable ecological risks due to chemical releases are expected at the SWMU.

10.5.2 Conclusions

Since no unacceptable human health or ecological risks due to chemical releases are expected from this SWMU, no further action is recommended for this SWMU.

10.5.2 Conclusions

Since no unacceptable human health or ecological risks due to chemical releases are expected from this SWMU, no further action is recommended for this SWMU.

TABLE 10-1

SUMMARY OF ANALYTICAL AND QA/QC SAMPLING
SAND TRAP AT POL WASH RACK (SWMU NO. 127)
CANNON AFB, NEW MEXICO

Sample Location	Target Interval (ft-bgs)	Sample Identification Number	QA/QC Type	Sample Matrix	Analytical Parameters				Sample Containers		
					VOCs	SVOCs	Metals	TRPH	40 ml VOA vials	4 oz. jars	8 oz. jars
Boring 12701	0.5 - 2	CAN127-1271-0000		Soil	X	X	X	X		2	1
	2 - 4	CAN127-1271-0002		Soil	X		X	X		2	1
	4 - 6	CAN127-1271-0004		Soil	X	X	X	X		2	1
	4 - 6	CAN127-1271-6004	MS/MSD	Soil	X	X	X	X		2	2
	8 - 10	CAN127-1271-0008		Soil	X		X	X		2	1
Boring 12702	0.5 - 2	CAN127-1272-0000		Soil	X	X	X	X		2	1
	0.5 - 2	CAN127-1272-1261	FD	Soil	X	X	X	X		2	1
	0.5 - 2	CAN127-1272-1201	MRD	Soil	X	X	X	X		2	1
	2 - 4	CAN127-1272-0002		Soil	X	X	X	X		2	1
	4 - 6	CAN127-1272-0004		Soil	X		X	X		2	1
	4 - 6	CAN127-1272-1262	FD	Soil	X		X	X		2	1
	4 - 6	CAN127-1272-1202	MRD	Soil	X	X	X	X		2	1
	8 - 10	CAN127-1272-0008		Soil	X		X	X		2	1
		CAN127-1272-1251	AB	Water	X				2		
		CAN127-1272-1271	RB	Water	X				2		
		CAN127-1272-1281	DW	Water	X				2		
		CAN127-1272-1291	TB	Water	X				2		
Boring 12703	0 - 0.5	CAN127-1273-0000		Soil	X	X	X	X		2	1
	1.5 - 3.5	CAN127-1273-0002		Soil	X		X	X		2	1
	4 - 6	CAN127-1273-0004		Soil	X		X	X		2	1
	8 - 10	CAN127-1273-0008		Soil	X	X	X	X		2	1
	8 - 10	CAN127-1273-6008	MS/MSD	Soil	X	X	X	X		2	2
	18 - 20	CAN127-1273-0018		Soil	X		X	X		2	1
	28 - 30	CAN127-1273-0028		Soil	X		X	X		2	1
	38 - 40	CAN127-1273-0038		Soil	X		X	X		2	1
	48 - 50	CAN127-1273-0048		Soil	X		X	X		2	1
	58 - 60	CAN127-1273-0058		Soil	X		X	X		2	1

TABLE 10-1

SUMMARY OF ANALYTICAL AND QA/QC SAMPLING
SAND TRAP AT POL WASH RACK (SWMU NO. 127)
CANNON AFB, NEW MEXICO

Sample Location	Target Interval (ft-bgs)	Sample Identification Number	QA/QC Type	Sample Matrix	Analytical Parameters				Sample Containers		
					VOCs	SVOCs	Metals	TRPH	40 ml VOA vials	4 oz. jars	8 oz. jars
Boring 12704	0 - 0.5	CAN127-1274-0000		Soil	X	X	X	X		2	1
	0 - 0.5	CAN127-1274-1263	FD	Soil	X		X	X		2	1
	0 - 0.5	CAN127-1274-1203	MRD	Soil	X	X	X	X		2	1
	1.5 - 3.5	CAN127-1274-0002		Soil	X		X	X		2	1
	4 - 6	CAN127-1274-0004		Soil	X		X	X		2	1
	8 - 10	CAN127-1274-0008		Soil	X		X	X		2	1
	18 - 20	CAN127-1274-0018		Soil	X		X	X		2	1
	28 - 30	CAN127-1274-0028		Soil	X		X	X		2	1
	38 - 40	CAN127-1274-0038		Soil	X		X	X		2	1
	48 - 50	CAN127-1274-0048		Soil	X	X	X	X		2	1
	58 - 60	CAN127-1274-0058		Soil	X		X	X		2	1
Boring 12705	0 - 0.5	CAN127-1275-0000		Soil	X	X	X	X		2	1
	1.5 - 3.5	CAN127-1275-0002		Soil	X	X	X	X		2	1
	1.5 - 3.5	CAN127-1275-6002	MS/MSD SVOC only	Soil		X					1
	4 - 6	CAN127-1275-0004		Soil	X		X	X		2	1
	8 - 10	CAN127-1275-0008		Soil	X		X	X		2	1
	8 - 10	CAN127-1275-6008	MS/MSD	Soil	X		X	X		2	2
	18 - 20	CAN127-1275-0018		Soil	X		X	X		2	1
	28 - 30	CAN127-1275-0028		Soil	X		X	X		2	1
	38 - 40	CAN127-1275-0038		Soil	X		X	X		2	1
	48 - 50	CAN127-1275-0048		Soil	X		X	X		2	1
	58 - 60	CAN127-1275-0058		Soil	X		X	X		2	1
Boring 12706	0 - 0.5	CAN127-1276-0000		Soil	X	X	X	X		2	1
	1.5 - 3.5	CAN127-1276-0002		Soil	X		X	X		2	1
	4 - 6	CAN127-1276-0004		Soil	X		X	X		2	1
	8 - 10	CAN127-1276-0008		Soil	X		X	X		2	1
	18 - 20	CAN127-1276-0018		Soil	X	X	X	X		2	1
	28 - 30	CAN127-1276-0028		Soil	X		X	X		2	1
	38 - 40	CAN127-1276-0038		Soil	X		X	X		2	1

TABLE 10-1

SUMMARY OF ANALYTICAL AND QA/QC SAMPLING
SAND TRAP AT POL WASH RACK (SWMU NO. 127)
CANNON AFB, NEW MEXICO

Sample Location	Target Interval (ft-bgs)	Sample Identification Number	QA/QC Type	Sample Matrix	Analytical Parameters				Sample Containers		
					VOCs	SVOCs	Metals	TRPH	40 ml VOA vials	4 oz. jars	8 oz. jars
Boring 12706	48 - 50	CAN127-1276-0048		Soil	X		X	X		2	1
cont.	58 - 60	CAN127-1276-0058		Soil	X		X	X		2	1
Boring 12707	0 - 0.5	CAN127-1277-0000		Soil	X	X	X	X		2	1
	1.5 - 3.5	CAN127-1277-0002		Soil	X		X	X		2	1
	4 - 6	CAN127-1277-0004		Soil	X		X	X		2	1
	8 - 10	CAN127-1277-0008		Soil	X	X	X	X		2	1
	8 - 10	CAN127-1277-6008	MS/MSD	Soil	X	X	X	X		2	2
	18 - 20	CAN127-1277-0018		Soil	X		X	X		2	1
	28 - 30	CAN127-1277-0028		Soil	X		X	X		2	1
	38 - 40	CAN127-1277-0038		Soil	X		X	X		2	1
	48 - 50	CAN127-1277-0048		Soil	X		X	X		2	1
	58 - 60	CAN127-1277-0058		Soil	X		X	X		2	1
Boring 12708	0 - 0.5	CAN127-1278-0000		Soil	X	X	X	X		2	1
	1.5 - 3.5	CAN127-1278-0002		Soil	X		X	X		2	1
	4 - 6	CAN127-1278-0004		Soil	X		X	X		2	1
	8 - 10	CAN127-1278-0008		Soil	X	X	X	X		2	1
	8 - 10	CAN127-1278-1264	FD	Soil	X	X	X	X		2	1
	18 - 20	CAN127-1278-0018		Soil	X		X	X		2	1
	28 - 30	CAN127-1278-0028		Soil	X		X	X		2	1
	38 - 40	CAN127-1278-0038		Soil	X		X	X		2	1
	48 - 50	CAN127-1278-0048		Soil	X		X	X		2	1
	58 - 60	CAN127-1278-0058		Soil	X		X	X		2	1

AB = Ambient Blank
DW = Decontamination Water
FD = Field duplicate
MRD = Missouri River Division
MS/MSD = Matrix spike/matrix spike duplicate
RB = Rinsate blank
TB = Trip blank
See Figure 16-1 for locations of the borings.

TABLE 10-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1271-0000			CAN127-1271-0002			CAN127-1272-0000			CAN127-1272-0002			CAN127-1273-0000			CAN127-1273-0002		
LAB SAMPLE NUMBER	0313740003SA			0313740004SA			0313740007SA			0313740008SA			0312160001SA			0312160002SA		
COLLECT DATE	09/23/93			09/23/93			09/23/93			09/23/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
1,2-Dichloroethane	<	5.8	U	<	5.8	U	<	5.8	U	<	6	U	<	5.2	U	<	5.5	U
1,2-Dichloropropane	<	5.8	U	<	5.8	U	<	5.8	U	<	6	U	<	5.2	U	<	5.5	U
Toluene	<	5.8	U	<	5.8	U	<	5.8	U	<	6	U	12	5.2		<	5.5	U
Xylenes (total)	<	5.8	U	<	5.8	U	<	5.8	U	<	6	U	3.4	5.2	J	<	5.5	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	380	U				<	380	U	<	400	U	<	350	U			
Anthracene	<	380	U				<	380	U	<	400	U	48	350	J			
Benzo(a)anthracene	<	380	U				<	380	U	<	400	U	510	350				
Benzo(a)pyrene	<	380	U				<	380	U	<	400	U	550	350				
Benzo(b)fluoranthene	<	380	U				<	380	U	<	400	U	960	350				
Benzo(g,h,i)perylene	<	380	U				<	380	U	<	400	U	470	350				
Carbazole	<	380	U				<	380	U	<	400	U	46	350	J			
Chrysene	<	380	U				<	380	U	<	400	U	720	350				
Fluoranthene	<	380	U				<	380	U	<	400	U	1500	350				
Fluorene	<	380	U				<	380	U	<	400	U	<	350	U			
Indeno(1,2,3-cd)pyrene	<	380	U				<	380	U	<	400	U	390	350				
2-Methylnaphthalene	<	380	U				<	380	U	<	400	U	<	350	U			
Phenanthrene	<	380	U				<	380	U	<	400	U	570	350				
Pyrene	<	380	U				<	380	U	<	400	U	1400	350				
Metals (mg/kg)																		
Aluminum	9270	11.5		3830	23.1		7220	11.6		3110	60.5		7650	10.5		11600	10.9	
Antimony	<	6.9	U	<	13.8	U	<	6.9	U	<	36.3	U	<	6.3	U	<	6.5	U
Arsenic	2	0.58		2.1	0.58		1.9	0.58		1.6	0.6		2.2	0.52		2.4	0.55	
Barium	91.7	1.2		971	2.3		91.9	1.2		206	6		115	1		99	1.1	
Beryllium	0.67	0.23		0.33	0.46	J	0.53	0.23		<	1.2	U	0.46	0.21		0.7	0.22	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. QUAL=Qualification
U = Not detected. RL = Reporting Limit.

TABLE 10-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1271-0000			CAN127-1271-0002			CAN127-1272-0000			CAN127-1272-0002			CAN127-1273-0000			CAN127-1273-0002		
LAB SAMPLE NUMBER	0313740003SA			0313740004SA			0313740007SA			0313740008SA			0312160001SA			0312160002SA		
COLLECT DATE	09/23/93			09/23/93			09/23/93			09/23/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Cadmium	<	0.58	UJ	3	1.2		1.1	0.58		4.2	3		<	0.52	U	<	0.55	U
Calcium	19200	23.1	J	191000	46.1		56900	23.1		247000	121		10300	20.9		14000	21.8	
Chromium	9.9	1.2		4.5	2.3		7.3	1.2		7	6		16.9	1		10.3	1.1	
Cobalt	4.5	1.2		2.5	2.3		3.7	1.2		<	6	U	3.4	1		4.8	1.1	
Copper	8.9	2.3		2.8	4.6	J	7.3	2.3		2.6	12.1	J	6.8	2.1		7.9	2.2	
Iron	8610	11.5		3350	23.1		6380	11.6		2760	60.5		7770	10.5		10500	10.9	
Lead	7.3	0.58		2.7	2.9	J	4.4	2.9		1.6	6	J	30.8	10.5		8	1.1	
Magnesium	2030	23.1		2690	46.1		1890	23.1		2930	121		1570	20.9		2360	21.8	
Manganese	179	1.2		46.9	2.3		138	1.2		37.4	6		166	1		206	1.1	
Mercury	<	0.12	U	<	0.12	U	<	0.12	U	<	0.12	U	<	0.1	U	<	0.11	U
Nickel	10.4	4.6		5.8	9.2	J	8	4.6		5.1	24.2	J	7	4.2		11.4	4.4	
Potassium	1680	577		744	1150	J	1410	579		468	3020	J	1910	523		2400	545	
Selenium	<	1.2	UJ	<	1.2	UJ	<	1.2	UJ	<	1.2	UJ	<	0.52	UJ	<	1.1	UJ
Silver	0.69	1.2	J	1.1	2.3	J	0.68	1.2	J	3.6	6	J	<	1	U	<	1.1	U
Thallium	<	2.3	U	<	1.2	UJ	<	1.2	UJ	<	1.2	UJ	<	0.52	U	0.13	0.55	J
Vanadium	17.9	1.2		14.8	2.3		14.2	1.2		12.4	6		17.6	1		21.4	1.1	
Zinc	21.9	2.3		12.3	4.6		17.4	2.3		6.3	12.1	J	25.4	2.1		24.4	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	46.1	U	<	46.1	U	93.2	46.3		48.7	48.4		66.8	41.9		<	43.6	U
Water Quality (percent)																		
Water	13	0.1		13	0.1		14	0.1		17	0.1		4.5	0.1		8.3	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. QUAL=Qualification
U = Not detected. RL = Reporting Limit.

TABLE 10-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1274-0000			CAN127-1274-0002			CAN127-1275-0000			CAN127-1275-0002			CAN127-1276-0000			CAN127-1276-0002		
LAB SAMPLE NUMBER	0312770001SA			0312770002SA			0312770011SA			0312770012SA			0312160012SA			0312160013SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
1,2-Dichloroethane	<	5.5	U	<	5.5	U	<	5.2	U	<	5.8	U	1.9	5.2	J	<	5.4	U
1,2-Dichloropropane	<	5.5	U	<	5.5	U	4.6	5.2	J	<	5.8	U	<	5.2	U	<	5.4	U
Toluene	2.3	5.5	J	2.8	5.5	J	5.2	5.2		<	5.8	U	15	5.2		<	5.4	U
Xylenes (total)	1.5	5.5	J	<	5.5	U	<	5.2	U	<	5.8	U	12	5.2		<	5.4	U
Semivolatile Organics (µg/kg)																		
Acenaphthene	<	370	U				150	1400	J	<	380	U	<	340	U			
Anthracene	<	370	U				<	1400	U	<	380	U	<	340	U			
Benzo(a)anthracene	83	370	J				8000	1400		<	380	U	160	340	J			
Benzo(a)pyrene	120	370	J				8600	1400		<	380	U	230	340	J			
Benzo(b)fluoranthene	270	370	J				17000	1400		<	380	U	410	340				
Benzo(g,h,i)perylene	72	370	J				5100	1400		<	380	U	190	340	J			
Carbazole	<	370	U				1500	1400		<	380	U	<	340	U			
Chrysene	210	370	J				14000	1400		<	380	U	300	340	J			
Fluoranthene	300	370	J				17000	1400		<	380	U	570	340				
Fluorene	<	370	U				290	1400	J	<	380	U	<	340	U			
Indeno(1,2,3-cd)pyrene	68	370	J				5100	1400		<	380	U	160	340	J			
2-Methylnaphthalene	<	370	U				<	1400	U	<	380	U	<	340	U			
Phenanthrene	120	370	J				8100	1400		<	380	U	210	340	J			
Pyrene	230	370	J				17000	1400		<	380	U	550	340				
Metals (mg/kg)																		
Aluminum	7490	11.1		9560	11		6530	10.5		8570	23		7170	10.4		11400	10.8	
Antimony	<	6.6	U	<	6.6	U	7.8	6.3		<	13.8	U	<	6.2	U	<	6.5	U
Arsenic	2.9	0.55		2.3	0.55		2.1	0.52		2.1	0.58		2	0.52		2.4	0.54	
Barium	125	1.1	J	75.7	1.1	J	245	1	J	104	2.3	J	74.3	1		105	1.1	
Beryllium	0.82	0.22		0.83	0.22		0.45	0.21		0.65	0.46		0.43	0.21		0.7	0.22	

(1) Results presented here are
A complete summary of chemical results are presented in Appendix A.
J = Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. QUAL=Qualification
U = Not detected. RL = Reporting Limit.

TABLE 10-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1274-0000			CAN127-1274-0002			CAN127-1275-0000			CAN127-1275-0002			CAN127-1276-0000			CAN127-1276-0002		
LAB SAMPLE NUMBER	0312770001SA			0312770002SA			0312770011SA			0312770012SA			0312160012SA			0312160013SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Cadmium	0.49	0.55	J	<	0.55	U	0.53	0.52		<	1.2	U	<	0.52	U	<	0.54	U
Calcium	7210	22.2		4820	22		45300	21		106000	46.1		6630	20.8		4740	21.6	
Chromium	9.4	1.1		10	1.1		15.3	1		5.8	2.3		9.9	1		9.3	1.1	
Cobalt	5.3	1.1		5.2	1.1		2.8	1		4.3	2.3		2.9	1		4.9	1.1	
Copper	8.5	2.2		8	2.2		25.9	2.1		5.9	4.6		6.3	2.1		8.4	2.2	
Iron	8420	11.1		9250	11		7650	10.5		7920	23		5990	10.4		8990	10.8	
Lead	12.6	2.8		8.4	0.55		29.2	5.2		6.7	0.58		48.2	10.4		9.2	1.1	
Magnesium	1800	22.2		2180	22		1850	21		2640	46.1		1300	20.8		2510	21.6	
Manganese	246	1.1		213	1.1		332	1		127	2.3		141	1		218	1.1	
Mercury	<	0.11	U	<	0.11	U	<	0.1	U	<	0.12	U	<	0.1	U	<	0.11	U
Nickel	9.5	4.4		12.4	4.4		6.8	4.2		10.1	9.2		6.2	4.2		10.5	4.3	
Potassium	1390	554		1760	550		1180	524		1550	1150		2060	519		2520	540	
Selenium	0.27	0.55	J	<	0.55	UJ	<	0.52	UJ	<	1.2	UJ	<	0.52	UJ	<	0.54	UJ
Silver	<	1.1	U	<	1.1	U	<	1	U	<	2.3	U	<	1	U	<	1.1	U
Thallium	<	0.55	U	<	0.55	U	<	0.52	U	<	0.58	UJ	<	0.52	U	0.14	0.54	J
Vanadium	23	1.1		19.2	1.1		16.5	1		15.8	2.3		12.9	1		17.7	1.1	
Zinc	20.4	2.2		21.7	2.2		38.5	2.1		18	4.6		25.3	2.1		24	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	253	44.3	J	<	44	U	344	83.9		<	46.1	U	80.5	41.6		<	43.2	U
Water Quality (percent)																		
Water	9.7	0.1		9.1	0.1		4.6	0.1		13	0.1		3.8	0.1		7.4	0.1	

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U = Not detected. RL = Reporting Limit.

TABLE 10-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1277-0000			CAN127-1277-0002			CAN127-1278-0000			CAN127-1278-0002		
LAB SAMPLE NUMBER	0311840009SA			0311840010SA			0311840001SA			0311840002SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
1,2-Dichloroethane	<	5.3	U	<	5.4	U	<	5.3	U	<	5.4	U
1,2-Dichloropropane	<	5.3	U	<	5.4	U	<	5.3	U	<	5.4	U
Toluene	5.5	5.3	J	3.8	5.4	J	<	5.3	U	<	5.4	U
Xylenes (total)	5.9	5.3		1.5	5.4	J	<	5.3	U	<	5.4	U
Semivolatile Organics (µg/kg)												
Acenaphthene	<	350	U				<	1400	U			
Anthracene	<	350	U				<	1400	U			
Benzo(a)anthracene	190	350	J				150	1400	J			
Benzo(a)pyrene	180	350	J				180	1400	J			
Benzo(b)fluoranthene	390	350					380	1400	J			
Benzo(g,h,i)perylene	91	350	J				<	1400	U			
Carbazole	<	350	U				<	1400	U			
Chrysene	240	350	J				260	1400	J			
Fluoranthene	470	350					440	1400	J			
Fluorene	<	350	U				<	1400	U			
Indeno(1,2,3-cd)pyrene	93	350	J				<	1400	U			
2-Methylnaphthalene	250	350	J				<	1400	U			
Phenanthrene	190	350	J				190	1400	J			
Pyrene	440	350					360	1400	J			
Metals (mg/kg)												
Aluminum	5640	10.5		8800	10.8		6790	10.5		8050	10.9	
Antimony	<	6.3	U	<	6.5	U	<	6.3	U	<	6.5	U
Arsenic	2.2	0.53		2.8	0.54		2.3	0.53		2.6	1.1	
Barium	84.1	1.1		102	1.1		83.8	1.1		79.4	1.1	
Beryllium	0.49	0.21		0.72	0.22		0.45	0.21		0.68	0.22	

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R = Rejected value. QUAL=Qualification
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TABLE 10-2a
SUMMARY OF CHEMICALS REPORTED FOR NEAR SURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1277-0000			CAN127-1277-0002			CAN127-1278-0000			CAN127-1278-0002		
LAB SAMPLE NUMBER	0311840009SA			0311840010SA			0311840001SA			0311840002SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Cadmium	<	0.53	U	<	0.54	U	<	0.53	U	<	0.54	U
Calcium	18200	21		16700	21.6		5730	21.1		43500	21.8	
Chromium	9.9	1.1		9.5	1.1		11.3	1.1		8.8	1.1	
Cobalt	3.4	1.1		4.8	1.1		3.3	1.1		4.4	1.1	
Copper	7.1	2.1		9.9	2.2		7.3	2.1		9.1	2.2	
Iron	6260	10.5		8960	10.8		7060	10.5		7800	10.9	
Lead	43.2	5.3		9.2	1.1		42.4	5.3		7.5	0.54	
Magnesium	1340	21		2270	21.6		1220	21.1		2300	21.8	
Manganese	154	1.1		189	1.1		151	1.1		168	1.1	
Mercury	<	0.11	U	<	0.11	U	0.11	0.11		<	0.11	U
Nickel	6.6	4.2		10.4	4.3		6.9	4.2		9.8	4.4	
Potassium	1540	526		1760	539		1630	527		1650	545	
Selenium	<	0.53	UJ	<	1.1	UJ	<	0.53	U	<	1.1	UJ
Silver	0.43	1.1	J	0.47	1.1	J	0.53	1.1	J	0.45	1.1	J
Thallium	<	0.53	U	<	0.54	U	<	0.53	U	<	0.54	U
Vanadium	14.6	1.1		18.6	1.1		14.6	1.1		16.9	1.1	
Zinc	24.1	2.1		21	2.2		22.1	2.1		19.4	2.2	
TPH (mg/kg)												
Total Petroleum Hydrocarbons	44.1	42.1		<	43.1	U	<	42.2	U	<	43.6	U
Water Quality (percent)												
Water	4.9	0.1		7.2	0.1		5.2	0.1		8.2	0.1	

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R = Rejected value. QUAL=Qualification
U = Nondetected value. RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1271-0004			CAN127-1271-0008			CAN127-1272-0004			CAN127-1272-0008			CAN127-1273-0004			CAN127-1273-0008		
LAB SAMPLE NUMBER	0313740005SA			0313740006SA			0313740009SA			0313740010SA			0312160004SA			0312160003SA		
COLLECT DATE	09/23/93			09/23/93			09/23/93			09/23/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
2-Butanone (MEK)	<	12	U	<	11	U	<	12	U	<	12	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Chlorobenzene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
1,1-Dichloroethene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
1,2-Dichloroethene (total)	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
1,2-Dichloropropane	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Ethylbenzene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Tetrachloroethene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Toluene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
1,1,1-Trichloroethane	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Trichloroethene	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Xylenes (total)	<	5.8	U	<	5.7	U	<	5.9	U	<	5.9	U	<	5.5	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate	110	380	J													<	360	U
Metals (mg/kg)																		
Aluminum	5370	23.1	J	4000	22.8		4240	58.8		4180	23.8		7780	21.8		4420	11	
Arsenic	2.2	0.58	J	1.1	0.57		1.3	0.59		1.1	0.59		2.3	0.55		1.5	0.55	
Barium	285	2.3		163	2.3		435	5.9		98.4	2.4		255	2.2		93.9	1.1	
Beryllium	0.46	0.46		0.28	0.46	J	<	1.2	U	0.34	0.48	J	0.35	0.44	J	0.3	0.22	
Cadmium	2.1	1.2		2	1.1		2.9	2.9		1.8	1.2		<	1.1	U	<	0.55	U
Calcium	137000	46.2		132000	45.7		248000	118		148000	47.5		135000	43.7		85200	22	
Chromium	6	2.3	J	3.5	2.3		<	5.9	U	3.9	2.4		4	2.2		3.4	1.1	
Cobalt	2.9	2.3	J	1.8	2.3	J	<	5.9	U	1.3	2.4	J	3.6	2.2		2	1.1	
Copper	5	4.6	J	2.2	4.6	J	1.9	11.8	J	2.2	4.8	J	5.2	4.4		2.6	2.2	

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TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1271-0004			CAN127-1271-0008			CAN127-1272-0004			CAN127-1272-0008			CAN127-1273-0004			CAN127-1273-0008		
LAB SAMPLE NUMBER	0313740005SA			0313740006SA			0313740009SA			0313740010SA			0312160004SA			0312160003SA		
COLLECT DATE	09/23/93			09/23/93			09/23/93			09/23/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	4940	23.1	J	3360	22.8		3180	58.8		3210	23.8		6370	21.8		3360	11	
Lead	3.2	1.2		2.5	2.9	J	2.4	2.9	J	2.4	3	J	4.2	0.55		3.2	0.55	
Magnesium	2830	46.2		3330	45.7		4110	118		3370	47.5		3270	43.7		2570	22	
Manganese	69.6	2.3	J	41.4	2.3		43.9	5.9		42.5	2.4		93	2.2		55.8	1.1	
Nickel	7.4	9.2	J	5.2	9.1	J	<	23.5	U	5.2	9.5	J	8.3	8.7	J	4.5	4.4	
Potassium	1010	1160	J	999	1140	J	695	2940	J	1060	1190	J	1740	1090		1270	549	
Silver	1.2	2.3	J	0.84	2.3	J	2.6	5.9	J	1.4	2.4	J	<	2.2	U	<	1.1	U
Vanadium	19.8	2.3	J	11.8	2.3		11.3	5.9		11.2	2.4		17.9	2.2		12.4	1.1	
Zinc	11.8	4.6	J	10	4.6		11.2	11.8	J	9.9	4.8		15.8	4.4		9	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	46.6	46.2		48.6	45.7		50.1	47.1		<	47.5	U	<	43.7	U	<	43.9	U
Water Quality (percent)																		
Water	14	0.1		12	0.1		15	0.1		16	0.1		8.5	0.1		8.9	0.1	

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TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1273-0018			CAN127-1273-0028			CAN127-1273-0038			CAN127-1273-0048			CAN127-1273-0058			CAN127-1274-0004		
LAB SAMPLE NUMBER	0312160005SA			0312160006SA			0312160007SA			0312160008SA			0312160009SA			0312770003SA		
COLLECT DATE	09/13/93			09/13/93			09/13/93			09/13/93			09/13/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Chlorobenzene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
1,1-Dichloroethene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
1,2-Dichloroethene (total)	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
1,2-Dichloropropane	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Ethylbenzene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Tetrachloroethene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Toluene	3.5	5.6	J	<	5.5	U	<	5.5	U	<	5.5	U	1.2	5.4	J	<	5.5	U
1,1,1-Trichloroethane	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Trichloroethene	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Xylenes (total)	<	5.6	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.4	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate																		
Metals (mg/kg)																		
Aluminum	5740	22.4		6020	11.1		6610	11.1		5830	11		3840	10.7		3650	22.1	
Arsenic	1.2	0.56		1.3	0.55		1.7	0.55		1.3	0.55		1.1	0.54		2.5	0.55	
Barium	110	2.2		137	1.1		61.9	1.1		106	1.1		12.9	1.1		517	2.2	
Beryllium	0.24	0.45	J	0.23	0.22		0.29	0.22		0.17	0.22	J	0.16	0.21	J	0.4	0.44	J
Cadmium	<	1.1	U	<	0.55	U	<	0.55	U	<	0.55	U	<	0.54	U	<	1.1	U
Calcium	135000	44.8		77500	22.1		50100	22.1		45000	21.9		6730	21.4		149000	44.1	
Chromium	2.8	2.2		2.9	1.1		6.3	1.1		6.2	1.1		3.3	1.1		2.3	2.2	
Cobalt	2.4	2.2		1.2	1.1		1.9	1.1		1.4	1.1		1.4	1.1		2.7	2.2	
Copper	2.3	4.5	J	2	2.2	J	2.2	2.2		1.5	2.2	J	1.3	2.1	J	2.5	4.4	J

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U = Not detected RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1273-0018			CAN127-1273-0028			CAN127-1273-0038			CAN127-1273-0048			CAN127-1273-0058			CAN127-1274-0004		
LAB SAMPLE NUMBER	0312160005SA			0312160006SA			0312160007SA			0312160008SA			0312160009SA			0312770003SA		
COLLECT DATE	09/13/93			09/13/93			09/13/93			09/13/93			09/13/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	4290	22.4		3310	11.1		4680	11.1		4100	11		3020	10.7		3780	22.1	
Lead	4	0.56		3.1	2.8		2.9	0.55		2.3	0.55		1.6	0.54		4.6	0.55	
Magnesium	5250	44.8		6820	22.1		6550	22.1		4660	21.9		2630	21.4		2630	44.1	
Manganese	60.9	2.2		30.5	1.1		58.6	1.1		45.9	1.1		28.7	1.1		62	2.2	
Nickel	5.2	9	J	3.6	4.4	J	4.3	4.4	J	3.7	4.4	J	2.8	4.3	J	6	8.8	J
Potassium	1910	1120		1530	553		1730	553		1470	548		957	535		741	1100	J
Silver	<	2.2	U	<	1.1	U	<	1.1	U	<	1.1	U	<	1.1	U	<	2.2	U
Vanadium	11.2	2.2		13.7	1.1		17.8	1.1		14.6	1.1		13	1.1		15.8	2.2	
Zinc	11.2	4.5		9.8	2.2		11.3	2.2		9.3	2.2		6.8	2.1		8.7	4.4	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	44.8	U	<	44.2	U	<	44.2	U	<	43.9	U	<	42.8	U	<	44.1	U
Water Quality (percent)																		
Water	11	0.1		9.6	0.1		9.6	0.1		8.8	0.1		6.6	0.1		9.3	0.1	

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J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Not detected RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1274-0008			CAN127-1274-0018			CAN127-1274-0028			CAN127-1274-0038			CAN127-1274-0048			CAN127-1274-0058		
LAB SAMPLE NUMBER	0312770004SA			0312770005SA			0312770007SA			0312770008SA			0312770009SA			0312770010SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/14/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Chlorobenzene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
1,1-Dichloroethene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
1,2-Dichloroethene (total)	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
1,2-Dichloropropane	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	5.7	5.5		13	5.4	
Ethylbenzene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Tetrachloroethene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Toluene	<	5.7	U	<	5.5	U	<	5.6	U	2	5.6	J	3.3	5.5	J	1.6	5.4	J
1,1,1-Trichloroethane	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Trichloroethene	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Xylenes (total)	<	5.7	U	<	5.5	U	<	5.6	U	<	5.6	U	<	5.5	U	<	5.4	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate													<	360	U			
Metals (mg/kg)																		
Aluminum	3730	22.7		6270	11		4710	22.3		4730	11.2		4870	11		3310	10.8	
Arsenic	1.1	0.57		2.1	0.55		1.3	0.56		1.1	0.56		1.3	0.55		1	0.54	
Barium	100	2.3	J	68.2	1.1	J	74.4	2.2	J	42.6	1.1	J	56.1	1.1	J	17.1	1.1	J
Beryllium	0.35	0.45	J	0.39	0.22		0.26	0.45	J	0.29	0.22		0.22	0.22		0.18	0.22	J
Cadmium	<	1.1	U	<	0.55	U	<	1.1	U	<	0.56	U	<	0.55	U	<	0.54	U
Calcium	154000	45.3		71700	22		102000	44.7		61000	22.4		38100	22		16100	21.6	
Chromium	<	2.3	U	5	1.1		1.9	2.2	J	4.8	1.1		4.8	1.1		3.3	1.1	
Cobalt	2	2.3	J	2.6	1.1		2	2.2	J	1.3	1.1		1.5	1.1		1.5	1.1	
Copper	1.1	4.5	J	3	2.2		1.3	4.5	J	1.3	2.2	J	1.2	2.2	J	1.1	2.2	J

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J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Not detected RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1274-0008			CAN127-1274-0018			CAN127-1274-0028			CAN127-1274-0038			CAN127-1274-0048			CAN127-1274-0058		
LAB SAMPLE NUMBER	0312770004SA			0312770005SA			0312770007SA			0312770008SA			0312770009SA			0312770010SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/14/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	3260	22.7		5510	11		3450	22.3		3820	11.2		4150	11		3750	10.8	
Lead	3.2	0.57		4.4	1.1		2.9	0.56		2.4	0.56		2.3	0.55		2	0.54	
Magnesium	3390	45.3		3810	22		4490	44.7		5530	22.4		4410	22		3450	21.6	
Manganese	47.8	2.3		78.7	1.1		39.4	2.2		37.9	1.1		56.9	1.1		48.6	1.1	
Nickel	5.3	9.1	J	5.7	4.4		5.6	8.9	J	4	4.5	J	3.7	4.4	J	3.5	4.3	J
Potassium	874	1130	J	1740	550		910	1120	J	856	561		951	549		562	539	
Silver	<	2.3	U	<	1.1	U	<	2.2	U	<	1.1	U	<	1.1	U	<	1.1	U
Vanadium	10.4	2.3		20.1	1.1		15.8	2.2		18.3	1.1		17.3	1.1		16.2	1.1	
Zinc	7.2	4.5		11.1	2.2		7.1	4.5		8.6	2.2		9.2	2.2		6.1	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	45.3	U	<	44	U	<	44.7	U	<	44.9	U	<	43.9	U	<	43.1	U
Water Quality (percent)																		
Water	12	0.1		9.1	0.1		10	0.1		11	0.1		9	0.1		7.3	0.1	

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TABLE 10-2b

SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1275-0004			CAN127-1275-0008			CAN127-1275-0018			CAN127-1275-0028			CAN127-1275-0038			CAN127-1275-0048		
LAB SAMPLE NUMBER	0312770013SA			0312770014SA			0312770015SA			0312770016SA			0312770017SA			0312770018SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/14/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.7	U	<	5.8	U	1.2	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
2-Butanone (MEK)	<	11	U	<	12	U	<	12	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.7	U	<	5.8	U	2.7	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Chlorobenzene	<	5.7	U	<	5.8	U	1.3	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
1,1-Dichloroethene	<	5.7	U	<	5.8	U	1.9	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
1,2-Dichloroethene (total)	<	5.7	U	<	5.8	U	1.3	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
1,2-Dichloropropane	<	5.7	U	<	5.8	U	<	5.8	U	<	5.6	U	7.7	5.5		<	5.6	U
Ethylbenzene	<	5.7	U	<	5.8	U	1.3	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Tetrachloroethene	<	5.7	U	<	5.8	U	2.9	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Toluene	5.4	5.7	J	18	5.8		6.2	5.8		<	5.6	U	7.2	5.5		12	5.6	
1,1,1-Trichloroethane	<	5.7	U	<	5.8	U	1.8	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Trichloroethene	<	5.7	U	<	5.8	U	2.3	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Xylenes (total)	<	5.7	U	<	5.8	U	2.4	5.8	J	<	5.6	U	<	5.5	U	<	5.6	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate																		
Metals (mg/kg)																		
Aluminum	5030	57.2		3630	23.3		10100	57.7		4470	22.5		4860	11.1		4570	11.1	
Arsenic	1.5	0.57		1.3	0.58		1.7	0.58		1	0.56		1	0.55		1.1	0.56	
Barium	435	5.7	J	167	2.3	J	445	5.8	J	65.4	2.2	J	148	1.1	J	36.6	1.1	J
Beryllium	<	1.1	U	0.28	0.47	J	<	1.2	U	0.27	0.45	J	0.33	0.22		0.29	0.22	
Cadmium	<	2.9	U	<	1.2	U	<	2.9	U	<	1.1	U	<	0.55	U	<	0.56	U
Calcium	238000	114		181000	46.6		238000	115		150000	44.9		58900	22.1		76300	22.3	
Chromium	<	5.7	U	<	2.3	U	<	5.8	U	2.1	2.2	J	4.3	1.1		3.4	1.1	
Cobalt	<	5.7	U	2.4	2.3		<	5.8	U	1.5	2.2	J	1.6	1.1		1.5	1.1	
Copper	<	11.4	U	1.8	4.7	J	3.2	11.5	J	1.7	4.5	J	2.7	2.2		1.9	2.2	J

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TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1275-0004			CAN127-1275-0008			CAN127-1275-0018			CAN127-1275-0028			CAN127-1275-0038			CAN127-1275-0048		
LAB SAMPLE NUMBER	0312770013SA			0312770014SA			0312770015SA			0312770016SA			0312770017SA			0312770018SA		
COLLECT DATE	09/14/93			09/14/93			09/14/93			09/14/93			09/14/93			09/14/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	4210	57.2		3300	23.3		5960	57.7		3200	22.5		3900	11.1		3770	11.1	
Lead	3	0.57		2.7	0.58		3.1	0.58		1.7	0.56		1.9	0.55		2.2	0.56	
Magnesium	3940	114		3590	46.6		11900	115		4840	44.9		5590	22.1		5470	22.3	
Manganese	51.4	5.7		34	2.3		46.4	5.8		28	2.2		42.1	1.1		43.1	1.1	
Nickel	<	22.9	U	6.1	9.3	J	7.9	23.1	J	3.5	9	J	4.7	4.4		3.3	4.5	J
Potassium	612	2860	J	854	1160	J	2080	2880	J	700	1120	J	916	554		810	556	
Silver	<	5.7	U	<	2.3	U	<	5.8	U	<	2.2	U	<	1.1	U	<	1.1	U
Vanadium	11.2	5.7		11.1	2.3		18.2	5.8		14.4	2.2		17.2	1.1		19	1.1	
Zinc	5.2	11.4	J	7.3	4.7		<	11.5	U	6.4	4.5		8.2	2.2		8.5	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	45.8	U	<	46.6	U	<	46.1	U	<	44.9	U	<	44.3	U	<	44.5	U
Water Quality (percent)																		
Water	13	0.1		14	0.1		13	0.1		11	0.1		9.7	0.1		10	0.1	

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TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1275-0058			CAN127-1276-0004			CAN127-1276-0008			CAN127-1276-0018			CAN127-1276-0028			CAN127-1276-0038		
LAB SAMPLE NUMBER	0312770019SA			0312150009SA			0312150010SA			0312150011SA			0312150012SA			0312150013SA		
COLLECT DATE	09/14/93			09/13/93			09/13/93			09/13/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Chlorobenzene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
1,1-Dichloroethene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
1,2-Dichloroethene (total)	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
1,2-Dichloropropane	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Ethylbenzene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Tetrachloroethene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Toluene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
1,1,1-Trichloroethane	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Trichloroethene	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Xylenes (total)	<	5.6	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate										<	360	U						
Metals (mg/kg)																		
Aluminum	4270	11.2		6670	21.6		3640	22.1		4530	11		4370	10.9		4500	11	
Arsenic	1.2	0.56		2.5	0.54		1.1	0.55		1.8	0.55		1.9	0.55		1.3	0.55	
Barium	545	1.1	J	107	2.2		95.7	2.2		302	1.1		96.4	1.1		23.7	1.1	
Beryllium	0.3	0.22		0.29	0.43	J	<	0.44	U	0.47	0.22		0.3	0.22		0.23	0.22	
Cadmium	<	0.56	U	<	1.1	U	<	1.1	U	<	0.55	U	<	0.55	U	<	0.55	U
Calcium	73800	22.3		113000	43.3		152000	44.1		68500	21.9		76500	21.8		39300	22.1	
Chromium	2.6	1.1		3.9	2.2		<	2.2	U	2.9	1.1		3	1.1		3.4	1.1	
Cobalt	1.1	1.1		3.3	2.2		2.1	2.2	J	1.9	1.1		1.7	1.1		1.2	1.1	
Copper	1.5	2.2	J	4.8	4.3		1.5	4.4	J	2.7	2.2		2.8	2.2		1.8	2.2	J

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TABLE 10-2b

SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1275-0058			CAN127-1276-0004			CAN127-1276-0008			CAN127-1276-0018			CAN127-1276-0028			CAN127-1276-0038		
LAB SAMPLE NUMBER	0312770019SA			0312150009SA			0312150010SA			0312150011SA			0312150012SA			0312150013SA		
COLLECT DATE	09/14/93			09/13/93			09/13/93			09/13/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	3020	11.2		6140	21.6		3050	22.1		3620	11		3250	10.9		3280	11	
Lead	2.5	0.56		5.8	1.1		3.1	1.1		4.5	1.1		3.1	0.55		2.5	1.1	
Magnesium	4490	22.3		3020	43.3		2710	44.1		3320	21.9		5100	21.8		6940	22.1	
Manganese	43.2	1.1		98.5	2.2		31.1	2.2		47.2	1.1		42.5	1.1		32.6	1.1	
Nickel	2.9	4.5	J	9.7	8.7		5.8	8.8	J	4.4	4.4		3.9	4.4	J	3.9	4.4	J
Potassium	787	559		1540	1080		1150	1100		1510	549		1130	546		967	552	
Silver	<	1.1	U	<	2.2	U	<	2.2	U	<	1.1	U	<	1.1	U	<	1.1	U
Vanadium	17.5	1.1		16.4	2.2		10	2.2		12.6	1.1		12.8	1.1		16	1.1	
Zinc	7.9	2.2		14.5	4.3		6.8	4.4		7.8	2.2		7.1	2.2		8.3	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	44.7	U	<	43.3	U	<	44.1	U	<	43.9	U	<	43.7	U	<	44.1	U
Water Quality (percent)																		
Water	10	0.1		7.6	0.1		9.3	0.1		8.8	0.1		8.4	0.1		9.4	0.1	

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A complete summary of chemical results are presented in Appendix A.
J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Not detected RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1276-0048			CAN127-1276-0058			CAN127-1277-0004			CAN127-1277-0008			CAN127-1277-0018			CAN127-1277-0028		
LAB SAMPLE NUMBER	0312150014SA			0312150015SA			0311840011SA			0311840012SA			0311840013SA			0311840014SA		
COLLECT DATE	09/13/93			09/13/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U	<	11	U
Carbon tetrachloride	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Chlorobenzene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
1,1-Dichloroethene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
1,2-Dichloroethene (total)	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
1,2-Dichloropropane	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Ethylbenzene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Tetrachloroethene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Toluene	<	5.5	U	2.5	5.4	J	2.1	5.5	J	<	5.5	U	<	5.7	U	<	5.6	U
1,1,1-Trichloroethane	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Trichloroethene	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Xylenes (total)	<	5.5	U	<	5.4	U	<	5.5	U	<	5.5	U	<	5.7	U	<	5.6	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate										<	360	U						
Metals (mg/kg)																		
Aluminum	4660	11		3630	10.8		6130	10.9		3780	11		6250	11.3		5360	11.1	
Arsenic	1.5	0.55		1.1	0.54		2.8	0.55		1.5	0.55		2.4	0.57		1.4	0.56	
Barium	27.8	1.1		20.6	1.1		72.9	1.1		98.4	1.1		101	1.1		157	1.1	
Beryllium	0.22	0.22		0.16	0.22	J	0.49	0.22		0.37	0.22		0.71	0.23		0.38	0.22	
Cadmium	<	0.55	U	<	0.54	U	1.5	0.55		0.92	0.55		1.1	0.57		1.2	0.56	
Calcium	37000	22		8970	21.6		103000	21.8		104000	22.1		91000	22.7		76300	22.3	
Chromium	3.1	1.1		3.6	1.1		6.1	1.1		4.2	1.1	U	5.2	1.1	U	5.6	1.1	
Cobalt	2.9	1.1		1.4	1.1		3.2	1.1		2.3	1.1		3.2	1.1		1.4	1.1	
Copper	2	2.2	J	2.7	2.2		5.4	2.2		2.8	2.2		5.5	2.3		2.4	2.2	

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A complete summary of chemical results are presented in Appendix A.
J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Not detected RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1276-0048			CAN127-1276-0058			CAN127-1277-0004			CAN127-1277-0008			CAN127-1277-0018			CAN127-1277-0028		
LAB SAMPLE NUMBER	0312150014SA			0312150015SA			0311840011SA			0311840012SA			0311840013SA			0311840014SA		
COLLECT DATE	09/13/93			09/13/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	3760	11		3430	10.8		5800	10.9		3540	11		5200	11.3		3780	11.1	
Lead	2.6	1.1		2.6	1.1		6.1	2.7		4.6	0.55		7.4	1.1		3.1	0.56	
Magnesium	5240	22		3760	21.6		2630	21.8		2370	22.1		3970	22.7		6170	22.3	
Manganese	111	1.1		30.6	1.1		78.5	1.1		58.3	1.1		93	1.1		35	1.1	
Nickel	4.6	4.4		3.8	4.3	J	7.8	4.4		5.2	4.4		6.7	4.5		4.6	4.5	
Potassium	1010	549		816	540	J	1310	545		1050	552		2010	567		1050	557	
Silver	<	1.1	U	<	1.1	U	0.47	1.1	J	0.54	1.1	J	<	1.1	U	0.43	1.1	J
Vanadium	18.2	1.1		16.3	1.1		18.7	1.1		12.1	1.1		16.2	1.1		15	1.1	
Zinc	8.8	2.2		6.4	2.2		14.4	2.2		9.4	2.2		12.8	2.3		9	2.2	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	43.9	U	<	43.2	U	<	43.6	U	<	44.2	U	<	45.4	U	<	44.6	U
Water Quality (percent)																		
Water	8.9	0.1		7.4	0.1		8.3	0.1		9.4	0.1		12	0.1		10	0.1	

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A complete summary of chemical results are presented in Appendix A.
J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Not detected RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1277-0038			CAN127-1277-0048			CAN127-1277-0058			CAN127-1278-0004			CAN127-1278-0008			CAN127-1278-0018		
LAB SAMPLE NUMBER	0311840015SA			0311840016SA			0311840017SA			0311840004SA			0311840005SA			0311840006SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)																		
Benzene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	<	11	U	6.6	11	J	<	11	U
Carbon tetrachloride	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Chlorobenzene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	J	<	5.7	U
1,1-Dichloroethene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
1,2-Dichloroethene (total)	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
1,2-Dichloropropane	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Ethylbenzene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	J	<	5.7	U
Tetrachloroethene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	J	<	5.7	U
Toluene	1.7	5.5	J	2	5.5	J	2.6	5.5	J	<	5.5	U	<	5.6	J	<	5.7	U
1,1,1-Trichloroethane	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Trichloroethene	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Xylenes (total)	<	5.5	U	<	5.5	U	<	5.5	U	<	5.5	U	<	5.6	U	<	5.7	U
Semivolatile Organics (µg/kg)																		
Butyl benzyl phthalate													<	370	U			
Metals (mg/kg)																		
Aluminum	4470	11		4580	11		4370	11.1		4270	21.8		4500	11.1		5730	22.9	
Arsenic	1.3	0.55		1.1	0.55		1.2	0.55		2	0.55		1.7	0.56		2.2	0.57	
Barium	158	1.1		41.7	1.1		84.6	1.1		227	2.2		204	1.1		242	2.3	
Beryllium	0.31	0.22		0.28	0.22		0.27	0.22		0.42	0.44	J	0.46	0.22		0.44	0.46	J
Cadmium	0.86	0.55		<	0.55	U	1.1	0.55		2.6	1.1		1.2	0.56		2.4	1.1	
Calcium	77800	22		58200	22		68400	22.1		166000	43.6		83100	22.2		154000	45.7	
Chromium	6.1	1.1		4.9	1.1	U	6.3	1.1		4	2.2	U	4.9	1.1	U	6.7	2.3	U
Cobalt	1.5	1.1		1.2	1.1		1.7	1.1		2.6	2.2		2.2	1.1	J	2.7	2.3	
Copper	2.2	2.2		2.1	2.2	J	54.9	2.2		4.1	4.4	J	4	2.2		3.7	4.6	J

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A complete summary of chemical results are presented in Appendix A.
J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Not detected RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1277-0038			CAN127-1277-0048			CAN127-1277-0058			CAN127-1278-0004			CAN127-1278-0008			CAN127-1278-0018		
LAB SAMPLE NUMBER	0311840015SA			0311840016SA			0311840017SA			0311840004SA			0311840005SA			0311840006SA		
COLLECT DATE	09/12/93			09/12/93			09/12/93			09/12/93			09/12/93			09/12/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	3430	11		3570	11		3370	11.1		4170	21.8		4570	11.1		4780	22.9	
Lead	3.4	0.55		3	0.55		3.9	0.55		4.9	0.55		5.8	0.56		5.1	0.57	
Magnesium	4870	22		5890	22		5920	22.1		2460	43.6		2500	22.2		4940	45.7	
Manganese	40.3	1.1		47.5	1.1		41.3	1.1		57.1	2.2		71.6	1.1		71.1	2.3	
Nickel	4.3	4.4	J	4	4.4	J	4.6	4.4		6.4	8.7	J	6	4.4		7.6	9.1	J
Potassium	891	551		917	550		812	553		850	1090	J	1130	555		1540	1140	
Silver	0.51	1.1	J	0.48	1.1	J	0.35	1.1	J	1.2	2.2	J	0.8	1.1	J	1.6	2.3	J
Vanadium	14.9	1.1		18.2	1.1		20.9	1.1		15.4	2.2		15.2	1.1		17	2.3	
Zinc	7.9	2.2		8.8	2.2		11	2.2		11.1	4.4		11.1	2.2		10.4	4.6	
TPH (mg/kg)																		
Total Petroleum Hydrocarbons	<	44.1	U	<	44	U	<	44.2	U	<	43.6	U	170	44.4		55.9	45.7	
Water Quality (percent)																		
Water	9.2	0.1		9.2	0.1		9.5	0.1		8.3	0.1		10	0.1		13	0.1	

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A complete summary of chemical results are presented in Appendix A.
J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Not detected RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1278-0028			CAN127-1278-0038			CAN127-1278-0048			CAN127-1278-0058		
LAB SAMPLE NUMBER	0311840007SA			0311840008SA			0312160010SA			0312160011SA		
COLLECT DATE	09/12/93			09/12/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Volatile Organics (µg/kg)												
Benzene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
2-Butanone (MEK)	<	11	U	<	11	U	<	11	U	7.1	11	J
Carbon tetrachloride	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Chlorobenzene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
1,1-Dichloroethene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
1,2-Dichloroethene (total)	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
1,2-Dichloropropane	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Ethylbenzene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Tetrachloroethene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Toluene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
1,1,1-Trichloroethane	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Trichloroethene	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Xylenes (total)	<	5.6	U	<	5.5	U	<	5.6	U	<	5.6	U
Semivolatile Organics (µg/kg)												
Butyl benzyl phthalate												
Metals (mg/kg)												
Aluminum	7380	11.2		4530	11.1		4490	11.1		4430	11.3	
Arsenic	1.9	0.56		1.3	0.55		1.1	0.56		1.2	0.56	
Barium	189	1.1		74.4	1.1		113	1.1		31.6	1.1	
Beryllium	0.46	0.22		0.31	0.22		<	0.22	U	0.17	0.23	J
Cadmium	0.71	0.56		0.88	0.55		<	0.56	U	<	0.56	U
Calcium	89600	22.5		64200	22.1		58900	22.2		30800	22.6	
Chromium	5.6	1.1		4.7	1.1	U	3.2	1.1		2.7	1.1	
Cobalt	2.4	1.1		1.6	1.1		1.5	1.1		1.4	1.1	
Copper	3.1	2.2		2	2.2	J	1.6	2.2	J	1.8	2.3	J

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Nondetected value. RL = Reporting Limit.

TABLE 10-2b
SUMMARY OF CHEMICALS REPORTED FOR SUBSURFACE SAMPLES COLLECTED FROM SWMU 127

LOCATOR	CAN127-1278-0028			CAN127-1278-0038			CAN127-1278-0048			CAN127-1278-0058		
LAB SAMPLE NUMBER	0311840007SA			0311840008SA			0312160010SA			0312160011SA		
COLLECT DATE	09/12/93			09/12/93			09/13/93			09/13/93		
	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual	Result	RL	Qual
Iron	5230	11.2		3430	11.1		2990	11.1		2840	11.3	
Lead	4	0.56		4.2	0.55		2.1	0.56		2.3	0.56	
Magnesium	4850	22.5		3730	22.1		4960	22.2		4400	22.6	
Manganese	68.5	1.1		37.4	1.1		37	1.1		39.5	1.1	
Nickel	6.6	4.5		4.5	4.4		3.7	4.4	J	3.6	4.5	J
Potassium	1580	561		925	553		987	555		1000	564	
Silver	0.48	1.1	J	0.62	1.1	J	<	1.1	U	<	1.1	U
Vanadium	19.8	1.1		14.5	1.1		16.3	1.1		15.7	1.1	
Zinc	11.7	2.2		7.3	2.2		7.2	2.2		7.3	2.3	
TPH (mg/kg)												
Total Petroleum Hydrocarbons	<	44.9	U	<	44.2	U	<	44.4	U	<	45.1	U
Water Quality (percent)												
Water	11	0.1		9.6	0.1		10	0.1		11	0.1	

(1) Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.
A complete summary of chemical results are presented in Appendix A.
J=Estimated value below reporting limit or estimated based on data quality criteria.
R = Rejected value. Qual=Qualification
U = Not detected RL = Reporting Limit.

TABLE 10-3

COMPARISON OF MAXIMUM DETECTED METAL CONCENTRATIONS IN SURFACE SOILS TO BACKGROUND(1)
SWMU 127, CANNON AFB

Sample ID	Metal	Maximum detected concentration	Range of background concentrations (2)	Upper tolerance limit (UTL) background concentration (3)	Typical Level in Clovis, NM Region (4)	Does maximum detected exceed background
CAN127-1271-0000	Aluminum	9270	1410 - 11,000	10,540	50,000	N
CAN127-1275-0000	Antimony	7.8	<4.9 - 5.1	*	<1	Y
CAN127-1274-0000	Arsenic	2.9	0.67 - 28	15.5	6.5	N
CAN127-1275-0000	Barium	245	14.5 - 1200	642	500	N
CAN127-1274-0000	Beryllium	0.82	0.17 - 0.77	0.73	1 - 2	N**
CAN127-1272-0000	Cadmium	1.1	<0.51 - 4.2	*	---	Y
CAN127-1273-0000	Chromium	16.9	4 - 15.4	12.5	30	N**
CAN127-1274-0000	Cobalt	5.3	0.85 - 5.3	4.5	3 - 7	N**
CAN127-1275-0000	Copper	25.9	<2 - 18.4	*	20	Y
CAN127-1276-0000	Lead	48.2	1.1 - 46	25.8	15	Y
CAN127-1278-0000	Mercury	0.11	<0.1 - <0.12	*	0.032 - 0.085	Y
CAN127-1274-0002	Nickel	10.4	1.3 - 9.8	9	15	N**
CAN127-1274-0000	Selenium	0.27	<0.21 - 124	*	0.15 - 30	N**
CAN127-1272-0002	Silver	0.69	0.51 - 0.93	*	---	Y
CAN127-1274-0000	Vanadium	23	5.2 - 28.3	25.3	30 - 70	N
CAN127-1275-0000	Zinc	38.5	<4.3 - 27.5	21.9	45	N**

(1) All units in mg/kg.
(2) Compiled from data collected by Woodward -lyde for the RFI and RI (W-C 1992 and W-C 1993) and Walk, Haydel and Associates for the IRP (Walk, Haydel and Associates 1990).
Summarized in "Concentrations of Selected Naturally Occurring Chemical Constituents in Soil and Groundwater at Cannon AFB, NM" (W-C 1993)
(3) Upper Tolerance Limit (UTL) = mean + 2 x standard deviation. This is for all practicle purposes the same as the 90% upper confidence limit of the 95th percentile where UTL = mean + standard deviation x k, where k=2.02 for n=37 .
(4) USGS 1984
* Data insufficient to calculate UTL of background concentration
** Maximum concentration is within or only slightly above Base-wide background range and is within naturally-occurring levels (USGS 1984); therefore concentration is not considered to exceed background.

TABLE 10-4

COMPARISON OF MAXIMUM DETECTED METAL CONCENTRATIONS IN TOTAL SOILS TO BACKGROUND(1)
SWMU 127, CANNON AFB

Sample ID	Metal	Maximum detected concentration	Range of background concentrations (2)	Upper tolerance limit (UTL) background concentration (3)	Typical Level in Clovis, NM Region (4)	Does maximum detected exceed background
CAN127-1273-0002	Aluminum	11600	1410 - 11,000	10,540	50,000	N**
CAN127-1275-0000	Antimony	7.8	<4.9 - 5.1	*	<1	Y
CAN127-1274-0000	Arsenic	2.9	0.67 - 28	15.5	6.5	N
CAN127-1271-0002	Barium	971	14.5 - 1200	642	500	Y
CAN127-1274-0002	Beryllium	0.83	0.17 - 0.77	0.73	1 - 2	N**
CAN127-1272-0002	Cadmium	4.2	<0.51 - 4.2	*	---	Y
CAN127-1273-0000	Chromium	16.9	4 - 15.4	12.5	30	N**
CAN127-1274-0000	Cobalt	5.3	0.85 - 5.3	4.5	3 - 7	N**
CAN127-1277-0058	Copper	54.9	<2 - 18.4	*	20	Y
CAN127-1276-0000	Lead	48.2	1.1 - 46	25.8	15	Y
CAN127-1278-0000	Mercury	0.11	<0.1 - <0.12	*	0.032 - 0.085	Y
CAN127-1274-0002	Nickel	12.4	1.3 - 9.8	9	15	N**
CAN127-1274-0000	Selenium	0.27	<0.21 - 124	*	0.15 - 0.30	N**
CAN127-1272-0002	Silver	3.6	0.51 - 0.93	*	---	Y
CAN127-1276-0002	Thallium	0.14	0.14 - <0.23	*	---	Y
CAN127-1274-0000	Vanadium	23	5.2 - 28.3	25.3	30 - 70	N
CAN127-1275-0000	Zinc	38.5	<4.3 - 27.5	21.9	45	N**

(1) All units in mg/kg.
(2) Compiled from data collected by Woodward -Clyde for the RFI and RI (W-C 1992 and W-C 1993) and Walk, Haydel and Associates for the IRP (Walk, Haydel and Associates 1990).
Summarized in "Concentrations of Selected Naturally Occurring Chemical Constituents in Soil and Groundwater at Cannon AFB, NM" (W-C 1993)
(3) Upper Tolerance Limit (UTL = mean + 2 x standard deviation. This is for all practicle purposes the same as the 90% upper confidence limit of the 95th percentile where UTL = mean + standard deviation x k, where k=2.02 for n=37 .
(4) USGS 1984
* Data insufficient to calculate UTL of background concentration
** Maximum concentration is within or only slightly above Base-wide background range and is within naturally-occurring levels (USGS 1984); therefore concentration is not not considered to exceed background.

TABLE 10-5

CHEMICALS OF CONCERN IN SURFACE SOIL

Acenaphthene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene*
Carbazole
Chrysene
1,2-Dichloroethane
1,2-Dichloropropane
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
2-Methylnaphthalene*
Phenanthrene*
Pyrene
Toluene
Xylenes
TPH*
Antimony
Cadmium
Copper
Lead*
Mercury
Silver

* No EPA-established toxicity factor.

TABLE 10-6

CHEMICALS OF CONCERN IN TOTAL SOIL

Acenaphthene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene*
Butyl benzyl phthalate
Carbazole
Chrysene
1,2-Dichloropropane
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
2-Methylnaphthalene*
Phenanthrene*
Pyrene
Toluene
Xylenes
TPH*
Antimony
Barium
Cadmium
Copper
Lead*
Mercury
Silver
Thallium

* No EPA-established toxicity factor.

TABLE 10-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT POL WASH RACK (SWMU 127)

	1,2-Dichloroethane (µg/kg)			1,2-Dichloropropane (µg/kg)				Toluene (µg/kg)				Xylenes (total) (µg/kg)				Acenaphthene (µg/kg)		
Field ID	Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Qual	RL
CAN127-1271-0000		U	5.8	2.9	1.065	U	5.8	2.9	1.065	U	5.8	2.9	1.065	U	5.8		U	380
CAN127-1272-0000		U	5.8	2	0.693	U	5.8	2.9	1.065	U	5.8	2.9	1.065	U	5.8		U	380
CAN127-1273-0000		U	5.2	2.6	0.956	U	5.2	12	2.485		5.2	3.4	1.224		5.2		U	350
CAN127-1274-0000		U	5.5	2.75	1.012	U	5.5	2.3	0.833	J	5.5	1.5	0.405	J	5.5		U	370
CAN127-1275-0000		U	5.2	4.6	1.526		5.2	5.2	1.649		5.2	2.6	0.956	U	5.2	150	J	1400
CAN127-1276-0000	1.9	J	5.2	2.6	0.956	U	5.2	15	2.708		5.2	12	2.485		5.2		U	340
CAN127-1277-0000		U	5.3	2.65	0.975	U	5.3	5.5	1.705	J	5.3	5.9	1.775		5.3		U	350
CAN127-1278-0000		U	5.3	2.65	0.975	U	5.3	2.65	0.975	U	5.3	2.65	0.975	U	5.3		U	1400
Number	1			8	8			8	8			8	8			1		
Minimum detected	1.90			4.60				2.30				1.50				150		
Maximum detected	1.90			4.60				15.0				12.0				150		
Average	1.90			2.84	1.02			6.06	1.56			4.23	1.24			150		
H statistic					2.00				2.85				2.64					
Standard Deviation				0.76	0.23			4.81	0.71			3.38	0.63					
95% UCL				3.39	3.39			13.3	13.3			7.89	7.89					
RME	1.9			3.39				13.3				7.89				150		

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed

TABLE 10-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT POL WASH RACK (SWMU 127)

	Anthracene (µg/kg)			Benzo(a)anthracene (µg/kg)				Benzo(a)pyrene (µg/kg)				Benzo(b)fluoranthene (µg/kg)				Carbazole (µg/kg)			
Field ID	Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000		U	380	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380
CAN127-1272-0000		U	380	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380
CAN127-1273-0000	48	J	350	510	6.234		350	550	6.310		350	960	6.867		350	46	3.829	J	350
CAN127-1274-0000		U	370	83	4.419	J	370	120	4.787	J	370	270	5.598	J	370	185	5.220	U	370
CAN127-1275-0000		U	1400	8000	8.987		1400	8600	9.060		1400	17000	9.741		1400	1500	7.313		1400
CAN127-1276-0000		U	340	160	5.075	J	340	230	5.438	J	340	410	6.016		340	170	5.136	U	340
CAN127-1277-0000		U	350	190	5.247	J	350	180	5.193	J	350	390	5.966		350	175	5.165	U	350
CAN127-1278-0000		U	1400	150	5.011	J	1400	180	5.193	J	1400	380	5.940	J	1400	700	6.551	U	1400
Number	1			8	8			8	8			8	8			8	8		
Minimum detected	48.0			83.0				120				270				46.0			
Maximum detected	48.0			8000				8600				17000				1500			
Average	48.0			1184	5.68			1280	5.81			2474	6.33			395	5.46		
H statistic					4.77				4.43				4.77				3.74		
Standard Deviation				2757	1.42			2961	1.38			5875	1.47			487.4	1.04		
95% UCL				10587	10587			8781	8781			23580	23580			1780	1780		
RME	48.0			8000				8600				17000				1500			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed

TABLE 10-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT POL WASH RACK (SWMU 127)

	Chrysene (µg/kg)				Fluoranthene (µg/kg)				Fluorene (µg/kg)				Indeno(1,2,3-cd)pyrene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380	190	5.24702407	U	380
CAN127-1272-0000	190	5.247	U	380	190	5.247	U	380	190	5.247	U	380	190	5.24702407	U	380
CAN127-1273-0000	720	6.579		350	1500	7.313		350	175	5.165	U	350	390	5.96614674		350
CAN127-1274-0000	210	5.347	J	370	300	5.704	J	370	185	5.220	U	370	68	4.21950771	J	370
CAN127-1275-0000	14000	9.547		1400	17000	9.741		1400	290	5.670	J	1400	5100	8.53699582		1400
CAN127-1276-0000	300	5.704	J	340	570	6.346		340	170	5.136	U	340	160	5.07517382	J	340
CAN127-1277-0000	240	5.481	J	350	470	6.153		350	175	5.165	U	350	93	4.53259949	J	350
CAN127-1278-0000	260	5.561	J	1400	440	6.087	J	1400	700	6.551	U	1400	700	6.55108034	U	1400
Number	8	8			8	8			8	8			8	8		
Minimum detected	210				300				290				68.0			
Maximum detected	14000				17000				290				5100			
Average	2014	6.09			2583	6.48			259	5.43			861	5.67		
H statistic		4.77				4.77				2.36				4.43		
Standard Deviation	4846	1.46			5841	1.48			182	0.49			1725	1.37		
95% UCL	17920	17920			27726	27726			394	394			7420	7420		
RME	14000				17000				290				5100			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed

TABLE 10-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT POL WASH RACK (SWMU 127)

	Pyrene (mg/kg)				TPH (mg/kg)				Antimony (mg/kg)				Cadmium (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	190	5.247	U	380	23.05	3.138	U	46.1	3.45	1.238	U	6.9	0.29	-1.238	UJ	0.58
CAN127-1272-0000	190	5.247	U	380	93.2	4.535		46.3	3.45	1.238	U	6.9	1.1	0.095		0.58
CAN127-1273-0000	1400	7.244		350	66.8	4.202		41.9	3.45	1.238	U	6.3	0.26	-1.347	U	0.52
CAN127-1274-0000	230	5.438	J	370	253	5.533		44.3	3.3	1.194	U	6.6	0.49	-0.713	J	0.55
CAN127-1275-0000	17000	9.741		1400	344	5.841		83.9	7.8	2.054		6.3	0.53	-0.635		0.52
CAN127-1276-0000	550	6.310		340	80.5	4.388		41.6	3.1	1.131	U	6.2	0.26	-1.347	U	0.52
CAN127-1277-0000	440	6.087		350	44.1	3.786		42.1	3.15	1.147	U	6.3	0.265	-1.328	U	0.53
CAN127-1278-0000	360	5.886	J	1400	21.1	3.049	U	42.2	3.15	1.147	U	6.3	0.265	-1.328	U	0.53
Number	8	8			8	8			8	8			8	8		
Minimum detected	230				44.1				7.80				0.49			
Maximum detected	17000				344				7.80				1.10			
Average	2545	6.40			116	4.31			3.86	1.30			0.43	-0.98		
H statistic		4.77				3.74				2.13			2.45	2.45		
Standard Deviation	5854	1.50			118	1.01			1.60	0.31			0.29	0.52		
95% UCL	28051	28051			517	517			4.93	4.93			0.70	0.70		
RME	17000				344				4.93				0.70			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed

TABLE 10-7

CONCENTRATIONS OF CHEMICALS OF CONCERN IN SURFACE SOILS AT POL WASH RACK (SWMU 127)

	Copper (mg/kg)				Lead (mg/kg)				Mercury (mg/kg)				Silver (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	8.9	2.186		2.3	7.3	1.988		0.58	0.06	-2.813	U	0.12	0.69	-0.371	J	1.2
CAN127-1272-0000	7.3	1.988		2.3	4.4	1.482		2.9	0.06	-2.813	U	0.12	0.68	-0.386	J	1.2
CAN127-1273-0000	6.8	1.917		2.1	30.8	3.428		10.5	0.05	-2.996	U	0.1	0.5	-0.693	U	1
CAN127-1274-0000	8.5	2.140		2.2	12.6	2.534		2.8	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1
CAN127-1275-0000	25.9	3.254		2.1	29.2	3.374		5.2	0.05	-2.996	U	0.1	0.5	-0.693	U	1
CAN127-1276-0000	6.3	1.841		2.1	48.2	3.875		10.4	0.05	-2.996	U	0.1	0.5	-0.693	U	1
CAN127-1277-0000	7.1	1.960		2.1	43.2	3.766		5.3	0.055	-2.900	U	0.11	0.43	-0.844	J	1.1
CAN127-1278-0000	7.3	1.988		2.1	42.4	3.747		5.3	0.11	-2.207		0.11	0.53	-0.635	J	1.1
Number	8	8			8	8			8	8			8	8		
Minimum detected	6.30				4.40				0.11				0.43			
Maximum detected	25.9				48.2				0.11				0.69			
Average	9.76	2.16			27.3	3.02			0.06	-2.83			0.55	-0.61		
H statistic		2.36				3.30				2.06				1.95		
Standard Deviation	6.58	0.46			17.21	0.91			0.02	0.26			0.09	0.16		
95% UCL	14.5	14.5			96.4	96.4			0.08	0.08			0.62	0.62		
RME	14.5				48.2				0.08				0.62			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	1,2-Dichloropropane (ug/kg)				Toluene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	2.9	1.065	U	5.8	2.9	1.065	U	5.8
CAN127-1271-0002	2.9	1.065	U	5.8	2.9	1.065	U	5.8
CAN127-1271-0004	2.9	1.065	U	5.8	2.9	1.065	U	5.8
CAN127-1271-0008	2.85	1.047	U	5.7	2.85	1.047	U	5.7
CAN127-1272-0000	2.9	1.065	U	5.8	2.9	1.065	U	5.8
CAN127-1272-0002	3	1.099	U	6	3	1.099	U	6
CAN127-1272-0004	2.95	1.082	U	5.9	2.95	1.082	U	5.9
CAN127-1272-0008	2.95	1.082	U	5.9	2.95	1.082	U	5.9
CAN127-1273-0000	2.6	0.956	U	5.2	12	2.485		5.2
CAN127-1273-0002	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1273-0004	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1273-0008	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1273-0018	2.8	1.030	U	5.6	3.5	1.253	J	5.6
CAN127-1273-0028	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1273-0038	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1273-0048	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1273-0058	2.7	0.993	U	5.4	1.2	0.182	J	5.4
CAN127-1274-0000	2.75	1.012	U	5.5	2.3	0.833	J	5.5
CAN127-1274-0002	2.75	1.012	U	5.5	2.8	1.030	J	5.5
CAN127-1274-0004	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1274-0008	2.85	1.047	U	5.7	2.85	1.047	U	5.7
CAN127-1274-0018	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1274-0028	2.8	1.030	U	5.6	2.8	1.030	U	5.6
CAN127-1274-0038	2.8	1.030	U	5.6	2	0.693	J	5.6
CAN127-1274-0048	5.7	1.740		5.5	3.3	1.194	J	5.5
CAN127-1274-0058	13	2.565		5.4	1.6	0.470	J	5.4
CAN127-1275-0000	4.6	1.526	J	5.2	5.2	1.649		5.2
CAN127-1275-0002	2.9	1.065	U	5.8	2.9	1.065	U	5.8
CAN127-1275-0004	2.85	1.047	U	5.7	5.4	1.686	J	5.7
CAN127-1275-0008	2.9	1.065	U	5.8	18	2.890		5.8
CAN127-1275-0018	2.9	1.065	U	5.8	6.2	1.825		5.8
CAN127-1275-0028	2.8	1.030	U	5.6	2.9	1.065	U	5.6
CAN127-1275-0038	7.7	2.041		5.5	7.2	1.974		5.5
CAN127-1275-0048	2.8	1.030	U	5.6	12	2.485		5.6
CAN127-1275-0058	2.8	1.030	U	5.6	2.8	1.030	U	5.6
CAN127-1276-0000	2.6	0.956	U	5.2	15	2.708		5.2
CAN127-1276-0002	2.7	0.993	U	5.4	2.7	0.993	U	5.4
CAN127-1276-0004	2.7	0.993	U	5.4	2.7	0.993	U	5.4
CAN127-1276-0008	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1276-0018	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1276-0028	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1276-0038	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1276-0048	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1276-0058	2.7	0.993	U	5.4	2.5	0.916	J	5.4
CAN127-1277-0000	2.65	0.975	U	5.3	5.5	1.705	J	5.3
CAN127-1277-0002	2.7	0.993	U	5.4	3.8	1.335	J	5.4
CAN127-1277-0004	2.75	1.012	U	5.5	2.1	0.742	J	5.5

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	1,2-Dichloropropane (ug/kg)				Toluene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1277-0008	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1277-0018	2.85	1.047	U	5.7	2.85	1.047	U	5.7
CAN127-1277-0028	2.8	1.030	U	5.6	2.8	1.030	U	5.6
CAN127-1277-0038	2.75	1.012	U	5.5	1.7	0.531	J	5.5
CAN127-1277-0048	2.75	1.012	U	5.5	2	0.693	J	5.5
CAN127-1277-0058	2.75	1.012	U	5.5	2.6	0.956	J	5.5
CAN127-1278-0000	2.65	0.975	U	5.3	2.65	0.975	U	5.3
CAN127-1278-0002	2.7	0.993	U	5.4	2.7	0.993	U	5.4
CAN127-1278-0004	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1278-0008	2.8	1.030	U	5.6	2.8	1.030	UJ	5.6
CAN127-1278-0018	2.85	1.047	U	5.7	2.85	1.047	U	5.7
CAN127-1278-0028	2.8	1.030	U	5.6	2.8	1.030	U	5.6
CAN127-1278-0038	2.75	1.012	U	5.5	2.75	1.012	U	5.5
CAN127-1278-0048	2.8	1.030	U	5.6	2.8	1.030	U	5.6
CAN127-1278-0058	2.8	1.030	U	5.6	2.8	1.030	U	5.6
Number	62	62			62	62		
Minimum	4.60				1.20			
Maximum	13.0				18.0			
Average	3.10	1.084			3.71	1.152		
H statistic	1.73	1.733				1.830		
Standard Deviation	1.48	0.256			3.02	0.483		
95% UCL	3.23	3.235			3.98	3.982		
RME	3.23				3.98			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Xylenes (total) (µg/kg)				Acenaphthene (µg/kg)			Anthracene (µg/kg)		
Field ID	Result	Log Result	Qual	RL	Result	Qual	RL	Result	Qual	RL
CAN127-1271-0000	2.9	1.065	U	5.8		U	380		U	380
CAN127-1271-0002	2.9	1.065	U	5.8						
CAN127-1271-0004	2.9	1.065	U	5.8		U	380		U	380
CAN127-1271-0008	2.85	1.047	U	5.7						
CAN127-1272-0000	2.9	1.065	U	5.8		U	380		U	380
CAN127-1272-0002	3	1.099	U	6		U	400		U	400
CAN127-1272-0004	2.95	1.082	U	5.9						
CAN127-1272-0008	2.95	1.082	U	5.9						
CAN127-1273-0000	3.4	1.224	J	5.2		U	350	48	J	350
CAN127-1273-0002	2.75	1.012	U	5.5						
CAN127-1273-0004	2.75	1.012	U	5.5						
CAN127-1273-0008	2.75	1.012	U	5.5		U	360		U	360
CAN127-1273-0018	2.8	1.030	U	5.6						
CAN127-1273-0028	2.75	1.012	U	5.5						
CAN127-1273-0038	2.75	1.012	U	5.5						
CAN127-1273-0048	2.75	1.012	U	5.5						
CAN127-1273-0058	2.7	0.993	U	5.4						
CAN127-1274-0000	1.5	0.405	J	5.5		U	370		U	370
CAN127-1274-0002	2.75	1.012	U	5.5						
CAN127-1274-0004	2.75	1.012	U	5.5						
CAN127-1274-0008	2.85	1.047	U	5.7						
CAN127-1274-0018	2.75	1.012	U	5.5						
CAN127-1274-0028	2.8	1.030	U	5.6						
CAN127-1274-0038	2.8	1.030	U	5.6						
CAN127-1274-0048	2.75	1.012	U	5.5		U	360		U	360
CAN127-1274-0058	2.7	0.993	U	5.4						
CAN127-1275-0000	2.6	0.956	U	5.2	150	J	1400		U	1400
CAN127-1275-0002	2.9	1.065	U	5.8		U	380		U	380
CAN127-1275-0004	2.85	1.047	U	5.7						
CAN127-1275-0008	2.9	1.065	U	5.8						
CAN127-1275-0018	2.4	0.875	J	5.8						
CAN127-1275-0028	2.8	1.030	U	5.6						
CAN127-1275-0038	2.75	1.012	U	5.5						
CAN127-1275-0048	2.8	1.030	U	5.6						
CAN127-1275-0058	2.8	1.030	U	5.6						
CAN127-1276-0000	12	2.485		5.2		U	340		U	340
CAN127-1276-0002	2.7	0.993	U	5.4						
CAN127-1276-0004	2.7	0.993	U	5.4						
CAN127-1276-0008	2.75	1.012	U	5.5						
CAN127-1276-0018	2.75	1.012	U	5.5		U	360		U	360
CAN127-1276-0028	2.75	1.012	U	5.5						
CAN127-1276-0038	2.75	1.012	U	5.5						
CAN127-1276-0048	2.75	1.012	U	5.5						
CAN127-1276-0058	2.7	0.993	U	5.4						
CAN127-1277-0000	5.9	1.775		5.3		U	350		U	350
CAN127-1277-0002	1.5	0.405	J	5.4						
CAN127-1277-0004	2.75	1.012	U	5.5						

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Xylenes (total) (µg/kg)				Acenaphthene (µg/kg)			Anthracene (µg/kg)		
Field ID	Result	Log Result	Qual	RL	Result	Qual	RL	Result	Qual	RL
CAN127-1277-0008	2.75	1.012	U	5.5		U	360		U	360
CAN127-1277-0018	2.85	1.047	U	5.7						
CAN127-1277-0028	2.8	1.030	U	5.6						
CAN127-1277-0038	2.75	1.012	U	5.5						
CAN127-1277-0048	2.75	1.012	U	5.5						
CAN127-1277-0058	2.75	1.012	U	5.5						
CAN127-1278-0000	2.65	0.975	U	5.3		U	1400		U	1400
CAN127-1278-0002	2.7	0.993	U	5.4						
CAN127-1278-0004	2.75	1.012	U	5.5						
CAN127-1278-0008	2.8	1.030	U	5.6		U	370		U	370
CAN127-1278-0018	2.85	1.047	U	5.7						
CAN127-1278-0028	2.8	1.030	U	5.6						
CAN127-1278-0038	2.75	1.012	U	5.5						
CAN127-1278-0048	2.8	1.030	U	5.6						
CAN127-1278-0058	2.8	1.030	U	5.6						
Number	62	62			1			1		
Minimum	1.50				150			48.0		
Maximum	12.0				150			48.0		
Average	2.95	1.041			150			48.0		
H statistic		1.714								
Standard Deviation	1.26	0.241								
95% UCL	3.07	3.074								
RME	3.07				150			48.0		

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Benzo(a)anthracene (µg/kg)				Benzo(a)pyrene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	190	5.247	U	380	190	5.247	U	380
CAN127-1271-0002								
CAN127-1271-0004	190	5.247	U	380	190	5.247	U	380
CAN127-1271-0008								
CAN127-1272-0000	190	5.247	U	380	190	5.247	U	380
CAN127-1272-0002	200	5.298	U	400	200	5.298	U	400
CAN127-1272-0004								
CAN127-1272-0008								
CAN127-1273-0000	510	6.234		350	550	6.310		350
CAN127-1273-0002								
CAN127-1273-0004								
CAN127-1273-0008	180	5.193	U	360	180	5.193	U	360
CAN127-1273-0018								
CAN127-1273-0028								
CAN127-1273-0038								
CAN127-1273-0048								
CAN127-1273-0058								
CAN127-1274-0000	83	4.419	J	370	120	4.787	J	370
CAN127-1274-0002								
CAN127-1274-0004								
CAN127-1274-0008								
CAN127-1274-0018								
CAN127-1274-0028								
CAN127-1274-0038								
CAN127-1274-0048	180	5.193	U	360	180	5.193	U	360
CAN127-1274-0058								
CAN127-1275-0000	8000	8.987		1400	8600	9.060		1400
CAN127-1275-0002	190	5.247	U	380	190	5.247	U	380
CAN127-1275-0004								
CAN127-1275-0008								
CAN127-1275-0018								
CAN127-1275-0028								
CAN127-1275-0038								
CAN127-1275-0048								
CAN127-1275-0058								
CAN127-1276-0000	160	5.075	J	340	230	5.438	J	340
CAN127-1276-0002								
CAN127-1276-0004								
CAN127-1276-0008								
CAN127-1276-0018	180	5.193	U	360	180	5.193	U	360
CAN127-1276-0028								
CAN127-1276-0038								
CAN127-1276-0048								
CAN127-1276-0058								
CAN127-1277-0000	190	5.247	J	350	180	5.193	J	350
CAN127-1277-0002								
CAN127-1277-0004								

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Benzo(a)anthracene (µg/kg)				Benzo(a)pyrene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1277-0008	180	5.193	U	360	180	5.193	U	360
CAN127-1277-0018								
CAN127-1277-0028								
CAN127-1277-0038								
CAN127-1277-0048								
CAN127-1277-0058								
CAN127-1278-0000	150	5.011	J	1400	180	5.193	J	1400
CAN127-1278-0002								
CAN127-1278-0004								
CAN127-1278-0008	185	5.220	U	370	185	5.220	U	370
CAN127-1278-0018								
CAN127-1278-0028								
CAN127-1278-0038								
CAN127-1278-0048								
CAN127-1278-0058								
Number	16	16			16	16		
Minimum	83.0				120			
Maximum	8000				8600			
Average	685	5.453			733	5.516		
H statistic		2.713				2.713		
Standard Deviation	1953	1.002			2100	0.992		
95% UCL	779	778.748			816	815.564		
RME	779				816			

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Not detected. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Benzo(b)fluoranthene (µg/kg)				Butyl benzyl phthalate (µg/kg)		
Field ID	Result	Log Result	Qual	RL	Result	Qual	RL
CAN127-1271-0000	190	5.247	U	380		U	380
CAN127-1271-0002							
CAN127-1271-0004	190	5.247	U	380	110	J	380
CAN127-1271-0008							
CAN127-1272-0000	190	5.247	U	380		U	380
CAN127-1272-0002	200	5.298	U	400		U	400
CAN127-1272-0004							
CAN127-1272-0008							
CAN127-1273-0000	960	6.867		350		U	350
CAN127-1273-0002							
CAN127-1273-0004							
CAN127-1273-0008	180	5.193	U	360		U	360
CAN127-1273-0018							
CAN127-1273-0028							
CAN127-1273-0038							
CAN127-1273-0048							
CAN127-1273-0058							
CAN127-1274-0000	270	5.598	J	370		U	370
CAN127-1274-0002							
CAN127-1274-0004							
CAN127-1274-0008							
CAN127-1274-0018							
CAN127-1274-0028							
CAN127-1274-0038							
CAN127-1274-0048	180	5.193	U	360		U	360
CAN127-1274-0058							
CAN127-1275-0000	17000	9.741		1400		U	1400
CAN127-1275-0002	190	5.247	U	380		U	380
CAN127-1275-0004							
CAN127-1275-0008							
CAN127-1275-0018							
CAN127-1275-0028							
CAN127-1275-0038							
CAN127-1275-0048							
CAN127-1275-0058							
CAN127-1276-0000	410	6.016		340		U	340
CAN127-1276-0002							
CAN127-1276-0004							
CAN127-1276-0008							
CAN127-1276-0018	180	5.193	U	360		U	360
CAN127-1276-0028							
CAN127-1276-0038							
CAN127-1276-0048							
CAN127-1276-0058							
CAN127-1277-0000	390	5.966		350		U	350
CAN127-1277-0002							
CAN127-1277-0004							

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Benzo(b)fluoranthene (µg/kg)				Butyl benzyl phthalate (µg/kg)		
Field ID	Result	Log Result	Qual	RL	Result	Qual	RL
CAN127-1277-0008	180	5.193	U	360		U	360
CAN127-1277-0018							
CAN127-1277-0028							
CAN127-1277-0038							
CAN127-1277-0048							
CAN127-1277-0058							
CAN127-1278-0000	380	5.940	J	1400		U	1400
CAN127-1278-0002							
CAN127-1278-0004							
CAN127-1278-0008	185	5.220	U	370		U	370
CAN127-1278-0018							
CAN127-1278-0028							
CAN127-1278-0038							
CAN127-1278-0048							
CAN127-1278-0058							
Number	16	16			1		
Minimum	270				110		
Maximum	17000				110		
Average	1330	5.775			110		
H statistic		3.121					
Standard Deviation	4183	1.157					
95% UCL	1599	1599					
RME	1599				110		

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Not detected. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Carbazole (µg/kg)				Chrysene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	190	5.247	U	380	190	5.247	U	380
CAN127-1271-0002								
CAN127-1271-0004	190	5.247	U	380	190	5.247	U	380
CAN127-1271-0008								
CAN127-1272-0000	190	5.247	U	380	190	5.247	U	380
CAN127-1272-0002	200	5.298	U	400	200	5.298	U	400
CAN127-1272-0004								
CAN127-1272-0008								
CAN127-1273-0000	46	3.829	J	350	720	6.579		350
CAN127-1273-0002								
CAN127-1273-0004								
CAN127-1273-0008	180	5.193	U	360	180	5.193	U	360
CAN127-1273-0018								
CAN127-1273-0028								
CAN127-1273-0038								
CAN127-1273-0048								
CAN127-1273-0058								
CAN127-1274-0000	185	5.220	U	370	210	5.347	J	370
CAN127-1274-0002								
CAN127-1274-0004								
CAN127-1274-0008								
CAN127-1274-0018								
CAN127-1274-0028								
CAN127-1274-0038								
CAN127-1274-0048	180	5.193	U	360	180	5.193	U	360
CAN127-1274-0058								
CAN127-1275-0000	1500	7.313		1400	14000	9.547		1400
CAN127-1275-0002	190	5.247	U	380	190	5.247	U	380
CAN127-1275-0004								
CAN127-1275-0008								
CAN127-1275-0018								
CAN127-1275-0028								
CAN127-1275-0038								
CAN127-1275-0048								
CAN127-1275-0058								
CAN127-1276-0000	170	5.136	U	340	300	5.704	J	340
CAN127-1276-0002								
CAN127-1276-0004								
CAN127-1276-0008								
CAN127-1276-0018	180	5.193	U	360	180	5.193	U	360
CAN127-1276-0028								
CAN127-1276-0038								
CAN127-1276-0048								
CAN127-1276-0058								
CAN127-1277-0000	175	5.165	U	350	240	5.481	J	350
CAN127-1277-0002								
CAN127-1277-0004								

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Carbazole (µg/kg)				Chrysene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1277-0008	180	5.193	U	360	180	5.193	U	360
CAN127-1277-0018								
CAN127-1277-0028								
CAN127-1277-0038								
CAN127-1277-0048								
CAN127-1277-0058								
CAN127-1278-0000	700	6.551	U	1400	260	5.561		1400
CAN127-1278-0002								
CAN127-1278-0004								
CAN127-1278-0008	185	5.220	U	370	185	5.220	U	370
CAN127-1278-0018								
CAN127-1278-0028								
CAN127-1278-0038								
CAN127-1278-0048								
CAN127-1278-0058								
Number	16	16			16	16		
Minimum	46.0				210			
Maximum	1500				14000			
Average	290	5.343			1100	5.656		
H statistic		2.351				2.899		
Standard Deviation	350	0.724			3443	1.095		
95% UCL	422	422			1181	1181		
RME	422				1181			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Fluoranthene (µg/kg)				Fluorene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	190	5.247	U	380	190	5.247	U	380
CAN127-1271-0002								
CAN127-1271-0004	190	5.247	U	380	190	5.247	U	380
CAN127-1271-0008								
CAN127-1272-0000	190	5.247	U	380	190	5.247	U	380
CAN127-1272-0002	200	5.298	U	400	200	5.298	U	400
CAN127-1272-0004								
CAN127-1272-0008								
CAN127-1273-0000	1500	7.313		350	175	5.165	U	350
CAN127-1273-0002								
CAN127-1273-0004								
CAN127-1273-0008	180	5.193	U	360	180	5.193	U	360
CAN127-1273-0018								
CAN127-1273-0028								
CAN127-1273-0038								
CAN127-1273-0048								
CAN127-1273-0058								
CAN127-1274-0000	300	5.704	J	370	175	5.165	U	370
CAN127-1274-0002								
CAN127-1274-0004								
CAN127-1274-0008								
CAN127-1274-0018								
CAN127-1274-0028								
CAN127-1274-0038								
CAN127-1274-0048	180	5.193	U	360	180	5.193	U	360
CAN127-1274-0058								
CAN127-1275-0000	17000	9.741		1400	290	5.670	J	1400
CAN127-1275-0002	190	5.247	U	380	190	5.247	U	380
CAN127-1275-0004								
CAN127-1275-0008								
CAN127-1275-0018								
CAN127-1275-0028								
CAN127-1275-0038								
CAN127-1275-0048								
CAN127-1275-0058								
CAN127-1276-0000	570	6.346		340	170	5.136	U	340
CAN127-1276-0002								
CAN127-1276-0004								
CAN127-1276-0008								
CAN127-1276-0018	180	5.193	U	360	180	5.193	U	360
CAN127-1276-0028								
CAN127-1276-0038								
CAN127-1276-0048								
CAN127-1276-0058								
CAN127-1277-0000	470	6.153		350	175	5.165	U	350
CAN127-1277-0002								
CAN127-1277-0004								

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Fluoranthene (µg/kg)				Fluorene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1277-0008	180	5.193	U	360	180	5.193	U	360
CAN127-1277-0018								
CAN127-1277-0028								
CAN127-1277-0038								
CAN127-1277-0048								
CAN127-1277-0058								
CAN127-1278-0000	440	6.087	J	1400	700	6.551	U	1400
CAN127-1278-0002								
CAN127-1278-0004								
CAN127-1278-0008	185	5.220	U	370	185	5.220	U	370
CAN127-1278-0018								
CAN127-1278-0028								
CAN127-1278-0038								
CAN127-1278-0048								
CAN127-1278-0058								
Number	16	16			16	16		
Minimum	300				290			
Maximum	17000				290			
Average	1384	5.851			222	5.321		
H statistic		3.121				1.914		
Standard Deviation	4178	1.199			130	0.350		
95% UCL	1876	1876			259	259		
RME	1876				259			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was perform

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Indeno(1,2,3-cd)pyrene (µg/kg)				Pyrene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	190	5.247	U	380	190	5.247	U	380
CAN127-1271-0002								
CAN127-1271-0004	190	5.247	U	380			U	380
CAN127-1271-0008								
CAN127-1272-0000	190	5.247	U	380	190	5.247	U	380
CAN127-1272-0002	200	5.298	U	400	200	5.298	U	400
CAN127-1272-0004								
CAN127-1272-0008								
CAN127-1273-0000	390	5.966		350	1400	7.244		350
CAN127-1273-0002								
CAN127-1273-0004								
CAN127-1273-0008	180	5.193	U	360	180	5.193	U	360
CAN127-1273-0018								
CAN127-1273-0028								
CAN127-1273-0038								
CAN127-1273-0048								
CAN127-1273-0058								
CAN127-1274-0000	68	4.220	J	370	230	5.438	J	370
CAN127-1274-0002								
CAN127-1274-0004								
CAN127-1274-0008								
CAN127-1274-0018								
CAN127-1274-0028								
CAN127-1274-0038								
CAN127-1274-0048	180	5.193	U	360	180	5.193	U	360
CAN127-1274-0058								
CAN127-1275-0000	5100	8.537		1400	17000	9.741		1400
CAN127-1275-0002	190	5.247	U	380	190	5.247	U	380
CAN127-1275-0004								
CAN127-1275-0008								
CAN127-1275-0018								
CAN127-1275-0028								
CAN127-1275-0038								
CAN127-1275-0048								
CAN127-1275-0058								
CAN127-1276-0000	160	5.075	J	340	550	6.310		340
CAN127-1276-0002								
CAN127-1276-0004								
CAN127-1276-0008								
CAN127-1276-0018	180	5.193	U	360	180	5.193	U	360
CAN127-1276-0028								
CAN127-1276-0038								
CAN127-1276-0048								
CAN127-1276-0058								
CAN127-1277-0000	93	4.533	J	350	440	6.087		350
CAN127-1277-0002								
CAN127-1277-0004								

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Indeno(1,2,3-cd)pyrene (µg/kg)				Pyrene (µg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1277-0008	180	5.193	U	360	180	5.193	U	360
CAN127-1277-0018								
CAN127-1277-0028								
CAN127-1277-0038								
CAN127-1277-0048								
CAN127-1277-0058								
CAN127-1278-0000	700	6.551	U	1400	360	5.886	J	1400
CAN127-1278-0002								
CAN127-1278-0004								
CAN127-1278-0008	185	5.220	U	370	185	5.220	U	370
CAN127-1278-0018								
CAN127-1278-0028								
CAN127-1278-0038								
CAN127-1278-0048								
CAN127-1278-0058								
Number	16	16			15	15		
Minimum	68.0				230			
Maximum	5100				17000			
Average	524	5.448			1444	5.849		
H statistic		2.713				3.163		
Standard Deviation	1229	0.966			4315	1.226		
95% UCL	729	729			2073	2073		
RME	729				2073			

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Not detected. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	TPH (mg/kg)				Antimony (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	23.05	3.138	U	46.1	3.45	1.238	U	6.9
CAN127-1271-0002	23.05	3.138	U	46.1	6.9	1.932	U	13.8
CAN127-1271-0004	46.6	3.842		46.2	6.95	1.939	U	13.9
CAN127-1271-0008	48.6	3.884		45.7	6.85	1.924	U	13.7
CAN127-1272-0000	93.2	4.535		46.3	3.45	1.238	U	6.9
CAN127-1272-0002	48.7	3.886		48.4	18.15	2.899	U	36.3
CAN127-1272-0004	50.1	3.914		47.1	17.65	2.871	U	35.3
CAN127-1272-0008	23.75	3.168	U	47.5	7.15	1.967	U	14.3
CAN127-1273-0000	66.8	4.202		41.9	3.15	1.147	U	6.3
CAN127-1273-0002	21.8	3.082	U	43.6	3.25	1.179	U	6.5
CAN127-1273-0004	21.85	3.084	U	43.7	6.55	1.879	U	13.1
CAN127-1273-0008	21.95	3.089	U	43.9	3.3	1.194	U	6.6
CAN127-1273-0018	22.4	3.109	U	44.8	6.75	1.910	U	13.5
CAN127-1273-0028	22.1	3.096	U	44.2	3.3	1.194	U	6.6
CAN127-1273-0038	22.1	3.096	U	44.2	3.3	1.194	U	6.6
CAN127-1273-0048	21.95	3.089	U	43.9	3.3	1.194	U	6.6
CAN127-1273-0058	21.4	3.063	U	42.8	3.2	1.163	U	6.4
CAN127-1274-0000	253	5.533		44.3	3.3	1.194	U	6.6
CAN127-1274-0002	22	3.091	U	44	3.3	1.194	U	6.6
CAN127-1274-0004	22.05	3.093	U	44.1	6.6	1.887	U	13.2
CAN127-1274-0008	22.65	3.120	U	45.3	6.8	1.917	U	13.6
CAN127-1274-0018	22	3.091	U	44	3.3	1.194	U	6.6
CAN127-1274-0028	22.35	3.107	U	44.7	6.7	1.902	U	13.4
CAN127-1274-0038	22.45	3.111	U	44.9	3.35	1.209	U	6.7
CAN127-1274-0048	21.95	3.089	U	43.9	3.3	1.194	U	6.6
CAN127-1274-0058	21.55	3.070	U	43.1	3.25	1.179	U	6.5
CAN127-1275-0000	344	5.841		83.9	7.8	2.054		6.3
CAN127-1275-0002	23.05	3.138	U	46.1	6.9	1.932	U	13.8
CAN127-1275-0004	22.9	3.131	U	45.8	17.15	2.842	U	34.3
CAN127-1275-0008	23.3	3.148	U	46.6	7	1.946	U	14
CAN127-1275-0018	23.05	3.138	U	46.1	17.3	2.851	U	34.6
CAN127-1275-0028	22.45	3.111	U	44.9	6.75	1.910	U	13.5
CAN127-1275-0038	22.15	3.098	U	44.3	3.3	1.194	U	6.6
CAN127-1275-0048	22.25	3.102	U	44.5	3.35	1.209	U	6.7
CAN127-1275-0058	22.35	3.107	U	44.7	3.35	1.209	U	6.7
CAN127-1276-0000	80.5	4.388		41.6	3.1	1.131	U	6.2
CAN127-1276-0002	21.6	3.073	U	43.2	3.25	1.179	U	6.5
CAN127-1276-0004	21.65	3.075	U	43.3	6.5	1.872	U	13
CAN127-1276-0008	22.05	3.093	U	44.1	6.6	1.887	U	13.2
CAN127-1276-0018	21.95	3.089	U	43.9	3.3	1.194	U	6.6
CAN127-1276-0028	21.85	3.084	U	43.7	3.25	1.179	U	6.5
CAN127-1276-0038	22.05	3.093	U	44.1	3.3	1.194	U	6.6
CAN127-1276-0048	21.95	3.089	U	43.9	3.3	1.194	U	6.6
CAN127-1276-0058	21.6	3.073	U	43.2	3.25	1.179	U	6.5
CAN127-1277-0000	44.1	3.786		42.1	3.15	1.147	U	6.3
CAN127-1277-0002	21.55	3.070	U	43.1	3.25	1.179	U	6.5
CAN127-1277-0004	21.8	3.082	U	43.6	3.25	1.179	U	6.5

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	TPH (mg/kg)				Antimony (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1277-0008	22.1	3.096	U	44.2	3.3	1.194	U	6.6
CAN127-1277-0018	22.7	3.122	U	45.4	3.4	1.224	U	6.8
CAN127-1277-0028	22.3	3.105	U	44.6	3.35	1.209	U	6.7
CAN127-1277-0038	22.05	3.093	U	44.1	3.3	1.194	U	6.6
CAN127-1277-0048	22	3.091	U	44	3.3	1.194	U	6.6
CAN127-1277-0058	22.1	3.096	U	44.2	3.3	1.194	U	6.6
CAN127-1278-0000	21.1	3.049	U	42.2	3.15	1.147	U	6.3
CAN127-1278-0002	21.8	3.082	U	43.6	3.25	1.179	U	6.5
CAN127-1278-0004	21.8	3.082	U	43.6	6.55	1.879	U	13.1
CAN127-1278-0008	170	5.136		44.4	3.35	1.209	U	6.7
CAN127-1278-0018	55.9	4.024		45.7	6.85	1.924	U	13.7
CAN127-1278-0028	21.45	3.066	U	44.9	3.35	1.209	U	6.7
CAN127-1278-0038	22.1	3.096	U	44.2	3.3	1.194	U	6.6
CAN127-1278-0048	22.2	3.100	U	44.4	3.35	1.209	U	6.7
CAN127-1278-0058	22.55	3.116	U	45.1	3.4	1.224	U	6.8
Number	62	62			62	62.		
Minimum	46.6				7.80			
Maximum	344				7.80			
Average	38.9	3.353			5.18	1.500		
H statistic		1.925				1.830		
Standard Deviation	53.8	0.605			3.64	0.486		
95% UCL	39.9	39.9			5.65	5.65		
RME	39.9				5.65			

RL = Laboratory reporting limit
RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.
J = Estimated value below reporting limit or estimated based on data quality criteria
U = Not detected. Value shown is one-half RL
Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN
IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Barium (mg/kg)				Cadmium (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	91.7	4.519		1.2	0.29	-1.238	U	0.58
CAN127-1271-0002	971	6.878		2.3	3	1.099		1.2
CAN127-1271-0004	285	5.652		2.3	2.1	0.742		1.2
CAN127-1271-0008	163	5.094		2.3	2	0.693		1.1
CAN127-1272-0000	91.9	4.521		1.2	1.1	0.095		0.58
CAN127-1272-0002	206	5.328		6	4.2	1.435		3
CAN127-1272-0004	435	6.075		5.9	2.9	1.065		2.9
CAN127-1272-0008	98.4	4.589		2.4	1.8	0.588		1.2
CAN127-1273-0000	115	4.745		1	0.26	-1.347	U	0.52
CAN127-1273-0002	99	4.595		1.1	0.275	-1.291	U	0.55
CAN127-1273-0004	255	5.541		2.2	0.55	-0.598	U	1.1
CAN127-1273-0008	93.9	4.542		1.1	0.275	-1.291	U	0.55
CAN127-1273-0018	110	4.700		2.2	0.55	-0.598	U	1.1
CAN127-1273-0028	137	4.920		1.1	0.275	-1.291	U	0.55
CAN127-1273-0038	61.9	4.126		1.1	0.275	-1.291	U	0.55
CAN127-1273-0048	106	4.663		1.1	0.275	-1.291	U	0.55
CAN127-1273-0058	12.9	2.557		1.1	0.27	-1.309	U	0.54
CAN127-1274-0000	125	4.828	J	1.1	0.49	-0.713	J	0.55
CAN127-1274-0002	75.7	4.327	J	1.1	0.275	-1.291	U	0.55
CAN127-1274-0004	517	6.248		2.2	0.55	-0.598	U	1.1
CAN127-1274-0008	100	4.605	J	2.3	0.55	-0.598	U	1.1
CAN127-1274-0018	68.2	4.222	J	1.1	0.275	-1.291	U	0.55
CAN127-1274-0028	74.4	4.309	J	2.2	0.55	-0.598	U	1.1
CAN127-1274-0038	42.6	3.752	J	1.1	0.28	-1.273	U	0.56
CAN127-1274-0048	56.1	4.027	J	1.1	0.275	-1.291	U	0.55
CAN127-1274-0058	17.1	2.839	J	1.1	0.27	-1.309	U	0.54
CAN127-1275-0000	245	5.501	J	1	0.53	-0.635		0.52
CAN127-1275-0002	104	4.644	J	2.3	0.6	-0.511	U	1.2
CAN127-1275-0004	435	6.075	J	5.7	1.45	0.372	U	2.9
CAN127-1275-0008	167	5.118	J	2.3	0.6	-0.511	U	1.2
CAN127-1275-0018	445	6.098	J	5.8	1.45	0.372	U	2.9
CAN127-1275-0028	65.4	4.181	J	2.2	0.55	-0.598	U	1.1
CAN127-1275-0038	148	4.997	J	1.1	0.275	-1.291	U	0.55
CAN127-1275-0048	36.6	3.600	J	1.1	0.28	-1.273	U	0.56
CAN127-1275-0058	545	6.301	J	1.1	0.28	-1.273	U	0.56
CAN127-1276-0000	74.3	4.308		1	0.26	-1.347	U	0.52
CAN127-1276-0002	105	4.654		1.1	0.27	-1.309	U	0.54
CAN127-1276-0004	107	4.673		2.2	0.55	-0.598	U	1.1
CAN127-1276-0008	95.7	4.561		2.2	0.55	-0.598	U	1.1
CAN127-1276-0018	302	5.710		1.1	0.275	-1.291	U	0.55
CAN127-1276-0028	96.4	4.569		1.1	0.275	-1.291	U	0.55
CAN127-1276-0038	23.7	3.165		1.1	0.275	-1.291	U	0.55
CAN127-1276-0048	27.8	3.325		1.1	0.275	-1.291	U	0.55
CAN127-1276-0058	20.6	3.025		1.1	0.27	-1.309	U	0.54
CAN127-1277-0000	84.1	4.432		1.1	0.265	-1.328	U	0.53
CAN127-1277-0002	102	4.625		1.1	0.27	-1.309	U	0.54
CAN127-1277-0004	72.9	4.289		1.1	1.5	0.405		0.55

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Barium (mg/kg)				Cadmium (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1277-0008	98.4	4.589		1.1	0.92	-0.083		0.55
CAN127-1277-0018	101	4.615		1.1	1.1	0.095		0.57
CAN127-1277-0028	157	5.056		1.1	1.2	0.182		0.56
CAN127-1277-0038	158	5.063		1.1	0.86	-0.151		0.55
CAN127-1277-0048	41.7	3.731		1.1	0.275	-1.291	U	0.55
CAN127-1277-0058	84.6	4.438		1.1	1.1	0.095		0.55
CAN127-1278-0000	83.8	4.428		1.1	0.265	-1.328	U	0.53
CAN127-1278-0002	79.4	4.374		1.1	0.27	-1.309	U	0.54
CAN127-1278-0004	227	5.425		2.2	2.6	0.956		1.1
CAN127-1278-0008	204	5.318		1.1	1.2	0.182		0.56
CAN127-1278-0018	242	5.489		2.3	2.4	0.875		1.1
CAN127-1278-0028	189	5.242		1.1	0.71	-0.342		0.56
CAN127-1278-0038	74.4	4.309		1.1	0.88	-0.128		0.55
CAN127-1278-0048	113	4.727		1.1	0.28	-1.273	U	0.56
CAN127-1278-0058	31.6	3.453		1.1	0.28	-1.273	U	0.56
Number	62	62			62	62		
Minimum	12.90				0.49			
Maximum	971				4.20			
Average		4.683			0.80	-0.605		
H statistic	2.08	2.075				2.075		
Standard Deviation	159.5	0.849			0.83	0.812		
95% UCL	194	194			0.94	0.94		
RME	194				0.94			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Copper (mg/kg)				Lead (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1271-0000	8.9	2.186		2.3	7.3	1.988		0.58
CAN127-1271-0002	2.8	1.030	J	4.6	2.7	0.993	J	2.9
CAN127-1271-0004	5	1.609	J	4.6	3.2	1.163		1.2
CAN127-1271-0008	2.2	0.788	J	4.6	2.5	0.916	J	2.9
CAN127-1272-0000	7.3	1.988		2.3	4.4	1.482		2.9
CAN127-1272-0002	2.6	0.956	J	12.1	1.6	0.470	J	6
CAN127-1272-0004	1.9	0.642	J	11.8	2.4	0.875	J	2.9
CAN127-1272-0008	2.2	0.788	J	4.8	2.4	0.875	J	3
CAN127-1273-0000	6.8	1.917		2.1	30.8	3.428		10.5
CAN127-1273-0002	7.9	2.067		2.2	8	2.079		1.1
CAN127-1273-0004	5.2	1.649		4.4	4.2	1.435		0.55
CAN127-1273-0008	2.6	0.956		2.2	3.2	1.163		0.55
CAN127-1273-0018	2.3	0.833	J	4.5	4	1.386		0.56
CAN127-1273-0028	2	0.693	J	2.2	3.1	1.131		2.8
CAN127-1273-0038	2.2	0.788		2.2	2.9	1.065		0.55
CAN127-1273-0048	1.5	0.405	J	2.2	2.3	0.833		0.55
CAN127-1273-0058	1.3	0.262	J	2.1	1.6	0.470		0.54
CAN127-1274-0000	8.5	2.140		2.2	12.6	2.534		2.8
CAN127-1274-0002	8	2.079		2.2	8.4	2.128		0.55
CAN127-1274-0004	2.5	0.916	J	4.4	4.6	1.526		0.55
CAN127-1274-0008	1.1	0.095	J	4.5	3.2	1.163		0.57
CAN127-1274-0018	3	1.099		2.2	4.4	1.482		1.1
CAN127-1274-0028	1.3	0.262	J	4.5	2.9	1.065		0.56
CAN127-1274-0038	1.3	0.262	J	2.2	2.4	0.875		0.56
CAN127-1274-0048	1.2	0.182	J	2.2	2.3	0.833		0.55
CAN127-1274-0058	1.1	0.095	J	2.2	2	0.693		0.54
CAN127-1275-0000	25.9	3.254		2.1	29.2	3.374		5.2
CAN127-1275-0002	5.9	1.775		4.6	6.7	1.902		0.58
CAN127-1275-0004	5.7	1.740	U	11.4	3	1.099		0.57
CAN127-1275-0008	1.8	0.588	J	4.7	2.7	0.993		0.58
CAN127-1275-0018	3.2	1.163	J	11.5	3.1	1.131		0.58
CAN127-1275-0028	1.7	0.531	J	4.5	1.7	0.531		0.56
CAN127-1275-0038	2.7	0.993		2.2	1.9	0.642		0.55
CAN127-1275-0048	1.9	0.642	J	2.2	2.2	0.788		0.56
CAN127-1275-0058	1.5	0.405	J	2.2	2.5	0.916		0.56
CAN127-1276-0000	6.3	1.841		2.1	48.2	3.875		10.4
CAN127-1276-0002	8.4	2.128		2.2	9.2	2.219		1.1
CAN127-1276-0004	4.8	1.569		4.3	5.8	1.758		1.1
CAN127-1276-0008	1.5	0.405	J	4.4	3.1	1.131		1.1
CAN127-1276-0018	2.7	0.993		2.2	4.5	1.504		1.1
CAN127-1276-0028	2.8	1.030		2.2	3.1	1.131		0.55
CAN127-1276-0038	1.8	0.588	J	2.2	2.5	0.916		1.1
CAN127-1276-0048	2	0.693	J	2.2	2.6	0.956		1.1
CAN127-1276-0058	2.7	0.993		2.2	2.6	0.956		1.1
CAN127-1277-0000	7.1	1.960		2.1	43.2	3.766		5.3
CAN127-1277-0002	9.9	2.293		2.2	9.2	2.219		1.1
CAN127-1277-0004	5.4	1.686		2.2	3.05	1.115	U	6.1

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Copper (mg/kg)				Lead (mg/kg)			
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL
CAN127-1277-0008	2.8	1.030		2.2	4.6	1.526		0.55
CAN127-1277-0018	5.5	1.705		2.3	7.4	2.001		1.1
CAN127-1277-0028	2.4	0.875		2.2	3.1	1.131		0.56
CAN127-1277-0038	2.2	0.788		2.2	3.4	1.224		0.55
CAN127-1277-0048	2.1	0.742	J	2.2	3	1.099		0.55
CAN127-1277-0058	54.9	4.006		2.2	3.9	1.361		0.55
CAN127-1278-0000	7.3	1.988		2.1	42.4	3.747		5.3
CAN127-1278-0002	9.1	2.208		2.2	7.5	2.015		0.54
CAN127-1278-0004	4.1	1.411	J	4.4	4.9	1.589		0.55
CAN127-1278-0008	4	1.386		2.2	5.8	1.758		0.56
CAN127-1278-0018	3.7	1.308	J	4.6	5.1	1.629		0.57
CAN127-1278-0028	3.1	1.131		2.2	4	1.386		0.56
CAN127-1278-0038	2	0.693	J	2.2	4.2	1.435		0.55
CAN127-1278-0048	1.6	0.470	J	2.2	2.1	0.742		0.56
CAN127-1278-0058	1.8	0.588	J	2.3	2.3	0.833		0.56
Number	62	62			62	62		
Minimum	1.10				1.60			
Maximum	54.9				48.2			
Average	4.92	1.198			6.83	1.459		
H statistic		2.035				2.035		
Standard Deviation	7.45	0.769			10.01	0.800		
95% UCL	5.44	5.44			7.29	7.29		
RME	5.44				7.29			

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Mercury (mg/kg)				Silver (mg/kg)				Thallium (mg/kg)		
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Qual	RL
CAN127-1271-0000	0.06	-2.813	U	0.12	0.69	-0.371	J	1.2		U	2.3
CAN127-1271-0002	0.06	-2.813	U	0.12	1.1	0.095	J	2.3		UJ	1.2
CAN127-1271-0004	0.06	-2.813	U	0.12	1.2	0.182	J	2.3		UJ	1.2
CAN127-1271-0008	0.055	-2.900	U	0.11	0.84	-0.174	J	2.3		UJ	1.1
CAN127-1272-0000	0.06	-2.813	U	0.12	0.68	-0.386	J	1.2		UJ	1.2
CAN127-1272-0002	0.06	-2.813	U	0.12	3.6	1.281	J	6		UJ	1.2
CAN127-1272-0004	0.06	-2.813	U	0.12	2.6	0.956	J	5.9		UJ	1.2
CAN127-1272-0008	0.06	-2.813	U	0.12	1.4	0.336	J	2.4		UJ	1.2
CAN127-1273-0000	0.05	-2.996	U	0.1	0.5	-0.693	U	1		U	0.52
CAN127-1273-0002	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1	0.13	J	0.55
CAN127-1273-0004	0.055	-2.900	U	0.11	1.1	0.095	U	2.2		UJ	1.1
CAN127-1273-0008	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	1.1
CAN127-1273-0018	0.055	-2.900	U	0.11	1.1	0.095	U	2.2		UJ	1.1
CAN127-1273-0028	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	1.1
CAN127-1273-0038	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.55
CAN127-1273-0048	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.55
CAN127-1273-0058	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.54
CAN127-1274-0000	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.55
CAN127-1274-0002	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.55
CAN127-1274-0004	0.055	-2.900	U	0.11	1.1	0.095	U	2.2		UJ	1.1
CAN127-1274-0008	0.055	-2.900	U	0.11	1.15	0.140	U	2.3		UJ	1.1
CAN127-1274-0018	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	0.55
CAN127-1274-0028	0.055	-2.900	U	0.11	1.1	0.095	U	2.2		UJ	0.56
CAN127-1274-0038	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	0.56
CAN127-1274-0048	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	0.55
CAN127-1274-0058	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	0.54
CAN127-1275-0000	0.05	-2.996	U	0.1	0.5	-0.693	U	1		U	0.52
CAN127-1275-0002	0.06	-2.813	U	0.12	1.15	0.140	U	2.3		UJ	0.58
CAN127-1275-0004	0.055	-2.900	U	0.11	2.85	1.047	U	5.7		UJ	1.1
CAN127-1275-0008	0.06	-2.813	U	0.12	1.15	0.140	U	2.3		UJ	1.2
CAN127-1275-0018	0.06	-2.813	U	0.12	2.9	1.065	U	5.8		UJ	1.2
CAN127-1275-0028	0.055	-2.900	U	0.11	1.1	0.095	U	2.2		UJ	1.1
CAN127-1275-0038	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	0.55
CAN127-1275-0048	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	0.56
CAN127-1275-0058	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	1.1
CAN127-1276-0000	0.05	-2.996	U	0.1	0.5	-0.693	U	1		U	0.52
CAN127-1276-0002	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1	0.14	J	0.54
CAN127-1276-0004	0.055	-2.900	U	0.11	1.1	0.095	U	2.2		UJ	1.1
CAN127-1276-0008	0.055	-2.900	U	0.11	1.1	0.095	U	2.2		UJ	1.1
CAN127-1276-0018	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	1.1
CAN127-1276-0028	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	1.1
CAN127-1276-0038	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.55
CAN127-1276-0048	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.55
CAN127-1276-0058	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.54
CAN127-1277-0000	0.055	-2.900	U	0.11	0.43	-0.844	J	1.1		U	0.53
CAN127-1277-0002	0.055	-2.900	U	0.11	0.47	-0.755	J	1.1		U	0.54
CAN127-1277-0004	0.055	-2.900	U	0.11	0.47	-0.755	J	1.1		UJ	1.1

TABLE 10-8
CONCENTRATIONS OF CHEMICALS OF CONCERN IN TOTAL SOIL AT POL WASH RACK (SWMU 127)

	Mercury (mg/kg)				Silver (mg/kg)				Thallium (mg/kg)		
Field ID	Result	Log Result	Qual	RL	Result	Log Result	Qual	RL	Result	Qual	RL
CAN127-1277-0008	0.055	-2.900	U	0.11	0.54	-0.616	J	1.1		UJ	1.1
CAN127-1277-0018	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		U	0.57
CAN127-1277-0028	0.055	-2.900	U	0.11	0.43	-0.844	J	1.1		U	0.56
CAN127-1277-0038	0.055	-2.900	U	0.11	0.51	-0.673	J	1.1		UJ	1.1
CAN127-1277-0048	0.055	-2.900	U	0.11	0.48	-0.734	J	1.1		U	0.55
CAN127-1277-0058	0.055	-2.900	U	0.11	0.35	-1.050	J	1.1		U	0.55
CAN127-1278-0000	0.11	-2.207		0.11	0.53	-0.635	J	1.1		U	0.53
CAN127-1278-0002	0.055	-2.900	U	0.11	0.45	-0.799	J	1.1		U	0.54
CAN127-1278-0004	0.055	-2.900	U	0.11	1.2	0.182	J	2.2		UJ	1.1
CAN127-1278-0008	0.055	-2.900	U	0.11	0.8	-0.223	J	1.1		U	0.56
CAN127-1278-0018	0.055	-2.900	U	0.11	1.6	0.470	J	2.3		UJ	1.1
CAN127-1278-0028	0.055	-2.900	U	0.11	0.48	-0.734	J	1.1		UJ	1.1
CAN127-1278-0038	0.055	-2.900	U	0.11	0.62	-0.478	J	1.1		U	0.55
CAN127-1278-0048	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	0.56
CAN127-1278-0058	0.055	-2.900	U	0.11	0.55	-0.598	U	1.1		UJ	0.56
Number	62	62			62	62.000			2		
Minimum	0.11				0.35				0.13		
Maximum	0.11				3.00				0.14		
Average	0.06	-2.880			0.86	-0.319			0.14		
H statistic		1.670				1.860					
Standard Deviation	0.01	0.096			0.64	0.516					
95% UCL	0.06	0.06			0.94	0.94					
RME	0.06				0.94				0.14		

RL = Laboratory reporting limit

RME = Lower of 95% UCL or maximum detected. 95% UCL concentrations were not calculated for sample sets with n < 3.

J = Estimated value below reporting limit or estimated based on data quality criteria

U = Not detected. Value shown is one-half RL

Where no RL is shown, no analysis was performed.

TABLE 10-9
SOIL CONCENTRATIONS
ADJUSTED FOR DERMAL ABSORPTION
SURFACE SOIL
SWMU 127

	Average Concentration (mg/kg)	RME Concentration (mg/kg)	Absorbed Fraction (1)	Adjusted Average Concentration(2) (mg/kg)	Adjusted RME Concentration(3) (mg/kg)
1,2-Dichloroethane	0.0019	0.0019	0.0005	9.50E-07	9.50E-07
1,2-Dichloropropane	0.0028	0.0034	0.03	8.40E-05	1.02E-04
Acenaphthene	0.15	0.15	0.1	0.015	0.015
Anthracene	0.048	0.048	0.1	0.0048	0.0048
Benzo(a)anthracene	1.20	8.00	0.1	0.12	0.8
Benzo(a)pyrene	1.30	8.60	0.1	0.13	0.86
Benzo(b)fluoranthene	2.50	17.0	0.1	0.25	1.7
Carbozole	0.39	1.50	0.1	0.039	0.15
Chrysene	2.00	14.0	0.1	0.2	1.4
Fluoranthene	2.60	17.0	0.1	0.26	1.7
Fluorene	0.26	0.29	0.1	0.026	0.029
Indeno(1,2,3-cd)pyrene	0.86	5.10	0.1	0.086	0.51
Mercury	0.06	0.08	0.01	0.0006	0.0008
Pyrene	2.50	17.0	0.1	0.25	1.7
Toluene	0.006	0.013	0.03	1.80E-04	3.90E-04
Xylenes	0.004	0.008	0.03	1.20E-04	2.40E-04

(1) Absorbed fraction from Table C-25, Appendix C.
(2) Adjusted average concentration = average concentration x absorbed fraction
(3) Adjusted RME concentration = RME concentration x absorbed fraction

TABLE 10-10
SOIL CONCENTRATIONS
ADJUSTED FOR DERMAL ABSORPTION
TOTAL SOIL
SWMU 127

	Average Concentration (mg/kg)	RME Concentration (mg/kg)	Absorbed Fraction (1)	Adjusted Average Concentration(2) (mg/kg)	Adjusted RME Concentration(3) (mg/kg)
1,2-Dichloropropane	0.0031	0.0032	0.03	0.00009	0.000096
Acenaphthene	0.15	0.15	0.1	0.015	0.015
Anthracene	0.048	0.048	0.1	0.0048	0.0048
Benzo(a)anthracene	0.69	0.817	0.1	0.07	0.0817
Benzo(a)pyrene	0.73	0.816	0.1	0.073	0.0816
Benzo(b)fluoranthene	1.30	1.60	0.1	0.13	0.16
Butyl benzyl phthalate	0.11	0.11	0.1	0.011	0.011
Carbozole	0.29	0.42	0.1	0.029	0.042
Chrysene	1.10	1.18	0.1	0.11	0.118
Fluoranthene	1.40	1.88	0.1	0.14	0.188
Fluorene	0.22	0.23	0.1	0.022	0.023
Indeno(1,2,3-cd)pyrene	0.52	0.73	0.1	0.052	0.073
Mercury	0.06	0.06	0.01	0.0006	0.0006
Pyrene	1.40	2.07	0.1	0.14	0.207
Toluene	0.0037	0.004	0.03	0.0001	0.00012
Xylenes	0.003	0.003	0.03	0.00009	0.00009

(1) Absorbed fraction from Table C-25, Appendix C.

(2) Adjusted average concentration = average concentration x absorbed fraction

(3) Adjusted RME concentration = RME concentration x absorbed fraction

TABLE 10-11

VADOSE ZONE FATE AND TRANSPORT MODELING FROM TOTAL SOILS AT SWMU 127

	t (y)	Cs (µg/kg)	Co (g/m^3)	L (m)	W (m)	T (m)	VWC (L/L)	foc	Koc (ml/g)	Kd (ml/g)	Soil Half Life (y)	P (g/cm^3)	I (m/y)	H (m)	TOT (y)
1,2-Dichloropropane	0	3.1	4.96E-03	40	165	17.683	0.15	0.003	51	0.153	3.5	1.6	0.015	61.585	1621
Acenaphthene	0	150	2.40E-01	40	165	17.683	0.15	0.003	18	0.054	0.3	1.6	0.015	61.585	971
Anthracene	0	48	7.68E-02	40	165	17.683	0.15	0.003	16000	48	1.26	1.6	0.015	61.585	315931
Antimony	0	5180	8.29E+00	40	165	17.683	0.15	0.003	NA	3981	NA	1.6	0.015	61.585	26152070
Barium	0	154780	2.48E+02	40	165	17.683	0.15	0.003	NA	50	NA	1.6	0.015	61.585	329069
Benzo(a)anthracene	0	684.88	1.10E+00	40	165	17.683	0.15	0.003	1400000	4200	1.86	1.6	0.015	61.585	27590696
Benzo(a)pyrene	0	732.81	1.17E+00	40	165	17.683	0.15	0.003	6500000	19500	1.45	1.6	0.015	61.585	128097416
Benzo(b)fluoranthene	0	1329.69	2.13E+00	40	165	17.683	0.15	0.003	550000	1650	1.67	1.6	0.015	61.585	10839576
Benzylbutylphalate	0	110	1.76E-01	40	165	17.683	0.15	0.003	68	0.204	0.2	1.6	0.015	61.585	1956
Cadmium	0	800	1.28E+00	40	165	17.683	0.15	0.003	NA	7	NA	1.6	0.015	61.585	46599
Carbazole	0	290.06	4.64E-01	40	165	17.683	0.15	0.003	5100	15.3	0.2	1.6	0.015	61.585	101123
Chrysene	0	1099.69	1.76E+00	40	165	17.683	0.15	0.003	250000	750	2.72	1.6	0.015	61.585	4927416
Copper	0	4920	7.87E+00	40	165	17.683	0.15	0.003	NA	20	NA	1.6	0.015	61.585	131997
Fluoranthene	0	1384.06	2.21E+00	40	165	17.683	0.15	0.003	1380	4.14	1.21	1.6	0.015	61.585	27812
Fluorene	0	221.88	3.55E-01	40	165	17.683	0.15	0.003	5010	15.03	0.2	1.6	0.015	61.585	99349
Indeno(1,2,3-c)pyrene	0	523.5	8.38E-01	40	165	17.683	0.15	0.003	31000000	93000	2	1.6	0.015	61.585	610923816
Lead	0	6830	1.09E+01	40	165	17.683	0.15	0.003	NA	100	NA	1.6	0.015	61.585	657523
Mercury	0	60	9.60E-02	40	165	17.683	0.15	0.003	NA	100	NA	1.6	0.015	61.585	657523
Pyrene	0	1443.67	2.31E+00	40	165	17.683	0.15	0.003	38000	114	5.2	1.6	0.015	61.585	749489
Silver	0	860	1.38E+00	40	165	17.683	0.15	0.003	NA	100	NA	1.6	0.015	61.585	657523
Thallium	0	140	2.24E-01	40	165	17.683	0.15	0.003	NA	2000	NA	1.6	0.015	61.585	13138749
Toluene	0	3.71	5.94E-03	40	165	17.683	0.15	0.003	300	0.9	0.2	1.6	0.015	61.585	6528
Xylenes	0	2.95	4.72E-03	40	165	17.683	0.15	0.003	830	2.49	0.2	1.6	0.015	61.585	16973

t = Time where leachate concentration is estimated
Cs Concentration of chemical in source soil
(average concentration from Table 7-8)
Co Concentration of chemical in source soil (calculated)
L = Length of site in direction of groundwater flow
W = Width of site perpendicular to groundwater flow
T = Thickness of source area
VWC = Volumetric water content of soil
foc = Fraction of organic carbon
Koc = Organic carbon partition coefficient
TOT = Total vadose zone transit time
Kd = Soil/water partition coefficient (values estimated as Koc*foc or from INEL (1991) study, if available)
P = bulk density of soil
I = Infiltration rate

H = Depth to groundwater (approx. 79.3 m) - depth of contaminated area
Rd = Retardation factor
Leach Rate = Leaching-rate constant
Qo = Present mass of chemical in source soil
Q(t) = Mass of contaminant in soil at time of leachate concentration prediction
qc = Yearly flux of chemical from source soil in leachate
Cl(1) = Concentration of chemical in leachate leaving source soil
Cl(2) = Concentration of chemical in leachate entering groundwater considering degradation in vadose zone
i = Groundwater hydraulic gradient
b = Mixing thickness in aquifer (equal to screen length)
Qw = Groundwater volumetric flow rate through cross section defined by WP and b
Ql = Volumetric flow rate of leachate
Cw(2) = Concentration of chemical in groundwater considering degradation and dilution
(Note: concentrations shown as 0.00E+00 are less than 1.00E-300 µg/L)
Soil half-life (from the Soil Chemistry of Hazardous Materials [1988]) =
time required for one-half the amount of chemical to be degraded in soil.

TABLE 10-11

VADOSE ZONE FATE AND TRANSPORT MODELING FROM TOTAL SOILS AT SWMU 127

	Rd	Leach Rate (y^-1)	Qo (g)	Q(t) (g)	qc (g/y)	Cl(1) (µg/L)	Cl(2) (µg/L)	K (m/s)	i (m/m)	b (m)	Qw (m^3/y)	Ql (m^3/yr)	Cw (µg/L)
1,2-Dichloropropane	2.63E+00	2.15E-03	5.79E+02	5.79E+02	1.24E+00	1.26E+01	5.20E-139	2.00E-04	0.0019	10	19773	99	2.59E-141
Acenaphthene	1.58E+00	3.59E-03	2.80E+04	2.80E+04	1.01E+02	1.02E+03	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Anthracene	5.13E+02	1.10E-05	8.96E+03	8.96E+03	9.88E-02	9.98E-01	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Antimony	4.25E+04	1.33E-07	9.67E+05	9.67E+05	1.29E-01	1.30E+00	1.30E+00	2.00E-04	0.0019	10	19773	99	6.48E-03
Barium	5.34E+02	1.06E-05	2.89E+07	2.89E+07	3.06E+02	3.09E+03	3.09E+03	2.00E-04	0.0019	10	19773	99	1.54E+01
Benzo(a)anthracene	4.48E+04	1.26E-07	1.28E+05	1.28E+05	1.61E-02	1.63E-01	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Benzo(a)pyrene	2.08E+05	2.72E-08	1.37E+05	1.37E+05	3.72E-03	3.76E-02	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Benzo(b)fluoranthene	1.76E+04	3.21E-07	2.48E+05	2.48E+05	7.98E-02	8.06E-01	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Benzylbutylphalate	3.18E+00	1.78E-03	2.05E+04	2.05E+04	3.66E+01	3.69E+02	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Cadmium	7.57E+01	7.47E-05	1.49E+05	1.49E+05	1.12E+01	1.13E+02	1.13E+02	2.00E-04	0.0019	10	19773	99	5.62E-01
Carbazole	1.64E+02	3.44E-05	5.42E+04	5.42E+04	1.87E+00	1.88E+01	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Chrysene	8.00E+03	7.07E-07	2.05E+05	2.05E+05	1.45E-01	1.47E+00	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Copper	2.14E+02	2.64E-05	9.19E+05	9.19E+05	2.42E+01	2.45E+02	2.45E+02	2.00E-04	0.0019	10	19773	99	1.22E+00
Fluoranthene	4.52E+01	1.25E-04	2.58E+05	2.58E+05	3.24E+01	3.27E+02	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Fluorene	1.61E+02	3.51E-05	4.14E+04	4.14E+04	1.45E+00	1.47E+01	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Indeno(1,2,3-c)pyrene	9.92E+05	5.70E-09	9.78E+04	9.78E+04	5.57E-04	5.63E-03	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Lead	1.07E+03	5.30E-06	1.28E+06	1.28E+06	6.76E+00	6.82E+01	6.82E+01	2.00E-04	0.0019	10	19773	99	3.40E-01
Mercury	1.07E+03	5.30E-06	1.12E+04	1.12E+04	5.93E-02	5.99E-01	5.99E-01	2.00E-04	0.0019	10	19773	99	2.99E-03
Pyrene	1.22E+03	4.65E-06	2.70E+05	2.70E+05	1.25E+00	1.27E+01	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Silver	1.07E+03	5.30E-06	1.61E+05	1.61E+05	8.51E-01	8.59E+00	8.59E+00	2.00E-04	0.0019	10	19773	99	4.28E-02
Thallium	2.13E+04	2.65E-07	2.61E+04	2.61E+04	6.93E-03	7.00E-02	7.00E-02	2.00E-04	0.0019	10	19773	99	3.49E-04
Toluene	1.06E+01	5.34E-04	6.93E+02	6.93E+02	3.70E-01	3.73E+00	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00
Xylenes	2.76E+01	2.05E-04	5.51E+02	5.51E+02	1.13E-01	1.14E+00	0.00E+00	2.00E-04	0.0019	10	19773	99	0.00E+00

t = Time where leachate concentration is estimated
Cs Concentration of chemical in source soil
(average concentration from Table 7-8)
Co Concentration of chemical in source soil (calculated)
L = Length of site in direction of groundwater flow
W = Width of site perpendicular to groundwater flow
T = Thickness of source area
VWC = Volumetric water content of soil
foc = Fraction of organic carbon
Koc = Organic carbon partition coefficient
TOT = Total vadose zone transit time
Kd = Soil/water partition coefficient (values estimated as Koc*foc or from INEL (1991) study, if available)
P = bulk density of soil
I = Infiltration rate

H = Depth to groundwater (approx. 79.3 m) - depth of contaminated area
Rd = Retardation factor
Leach Rate = Leaching-rate constant
Qo = Present mass of chemical in source soil
Q(t) = Mass of contaminant in soil at time of leachate concentration prediction
qc = Yearly flux of chemical from source soil in leachate
Cl(1) = Concentration of chemical in leachate leaving source soil
Cl(2) = Concentration of chemical in leachate entering groundwater considering degradation in vadose zone
i = Groundwater hydraulic gradient
b = Mixing thickness in aquifer (equal to screen length)
Qw = Groundwater volumetric flow rate through cross section defined by WP and b
Ql = Volumetric flow rate of leachate
Cw(2) = Concentration of chemical in groundwater considering degradation and dilution
(Note: concentrations shown as 0.00E+00 are less than 1.00E-300 µg/L)
Soil half-life (from the Soil Chemistry of Hazardous Materials [1988]) =
time required for one-half the amount of chemical to be degraded in soil.

TABLE 10-12

COMPARISON OF MODELED GROUNDWATER CONCENTRATIONS TO RBCs(1)

	Cw(2) (µg/L)	Tap Water RBC (1) (µg/L)	Does modeled concentration exceed RBC?
1,2-Dichloropropane	2.5902E-141	0.16	No
Acenaphthene	0	2200	No
Anthracene	0	11000	No
Antimony	6.48E-03	15	No
Barium	1.54E+01	2600	No
Benzo(A)Anthracene	0	0.092	No
Benzo(A)pyrene	0	0.0092	No
Benzo(b)fluoranthene	0	0.092	No
Benzylbutylphalate	0	7300	No
Cadmium	5.62E-01	18	No
Carbazole	0	3.4	No
Chrysene	0	9.2	No
Copper	1.22E+00	1400	No
Fluoranthene	0	1500	No
Fluorene	0	1500	No
Indeno(1,2,3-C)pyrene	0	0.092	No
Lead	3.40E-01	15 (3)	No
Mercury	2.99E-03	11	No
Pyrene	0	1100	No
Silver	4.28E-02	180	No
Thallium	3.49E-04	2.9	No
Toluene	0	750	No
Xylenes	0	12000	No

(1) RBC is the EPA Region III risk-based concentration for residential tap water ingestion and inhalation.
(2) Cw is the modeled concentration as defined in table 10-11.
(3) No Region III RBC is available for lead. 15 is the action level defined in the May 1993 issue of Drinking water regulation and health advisories (EPA 1993).
The modeled concentration, zero is a value less than 1E-300.

TABLE 10-13
RME AIR CONCENTRATIONS OF VOLATILE COMPOUNDS FROM SURFACE SOILS AT SWMU 127

	ps (g/cm3)	alpha (cm2/s)	LS (m)	V (m/s)	DH (m)	A (cm2)	T (s)	Dei (cm2/s)	E (unitless)	Di cm2/s)
1,2-Dichloroethane	2.65	3.85E-03	45	2.25	2	20250000	7.90E+08	6.82E-02	0.35	0.09643
1,2-Dichloropropane	3.65	8.10E-04	45	2.25	2	20250000	7.90E+08	5.99E-02	0.35	0.08473
Toluene	2.65	5.15E-04	45	2.25	2	20250000	7.90E+08	5.87E-02	0.35	0.08301

Method and default values from EPA (1991b) Risk Assessment Guidance for Superfund: Part B.
The method and equation are discussed in detail in Appendix B.
ps = soil density
alpha = (Dei*E)/(E+(ps(1-E)/Kas))
LS = Length of the SWMU in direction of wind (default value)
V = Wind velocity (default value)
DH = Diffusion height; height of box into which volatilization occurs (default value)
A = Surface area of SWMU (default value: 45m x 45m)
Time = Time of exposure (25 years; equivalent to default RME occupational exposure period)
Dei = Effective diffusivity (Di * E^0.33)
E = True soil porosity (default value)
Di = Molecular diffusivity (EPA 1988) Superfund Exposure Assessment Manual
Koc = organic carbon partition coefficient (from Appendix A, Table A-1)
H = Henry's Law constant (from Appendix A, Table A-1)
Kd = Soil/water partitioning coefficient (Koc * OC)
OC = Organic carbon fraction in soil (0.02 default value)
Kas = Soil/air partition coefficient (H/Kd * 41)
VF = Volatilization Factor = (LS x V x DH/A) + (3.14 alpha x T)^0.5/(2 x Dei x E x Kas x 0.001 kg/g)
Csoil = RME concentration of compound in soil (Table 10-7)
Cair = RME concentration of compound in air (Csoil/VF)
Note: Chemicals of concern that do not have EPA-established inhalation toxicity factors were not included in this table.

TABLE 10-13
RME AIR CONCENTRATIONS OF VOLATILE COMPOUNDS FROM SURFACE SOILS AT SWMU 127

	Koc (ml/g)	H (atm-m3/mol)	Kd (cm3/g)	Kas g soil/cm3 air)	VF (m3/kg)	C soil (mg/kg)	C air (mg/m3)
1,2-Dichloroethane	30	4.31E-03	6.00E-01	2.95E-01	2.20E+03	0.002	8.64E-07
1,2-Dichloropropane	51	2.31E-03	1.02E+00	9.29E-02	3.64E+03	0.003	8.24E-07
Toluene	300	6.37E-03	6.00E+00	4.35E-02	6.32E+03	0.013	2.06E-06

Method and default values from EPA (1991b) Risk Assessment Guidance for Superfund: Part B.
The method and equation are discussed in detail in Appendix B.
ps = soil density
alpha = (Dei*E)/(E+(ps(1-E)/Kas))
LS = Length of the SWMU in direction of wind (default value)
V = Wind velocity (default value)
DH = Diffusion height; height of box into which volatilization occurs (default value)
A = Surface area of SWMU (default value: 45m x 45m)
Time = Time of exposure (25 years; equivalent to default RME occupational exposure period)
Dei = Effective diffusivity (Di * E^0.33)
E = True soil porosity (default value)
Di = Molecular diffusivity (EPA 1988) Superfund Exposure Assessment Manual
Koc = organic carbon partition coefficient (from Appendix A, Table A-1)
H = Henry's Law constant (from Appendix A, Table A-1)
Kd = Soil/water partitioning coefficient (Koc * OC)
OC = Organic carbon fraction in soil (0.02 default value)
Kas = Soil/air partition coefficient (H/Kd * 41)
VF = Volatilization Factor = (LS x V x DH/A) + (3.14 alpha x T)^0.5/(2 x Dei x E x Kas x 0.001 kg/g)
Csoil = RME concentration of compound in soil (Table 10-7)
Cair = RME concentration of compound in air (Csoil/VF)
Note: Chemicals of concern that do not have EPA-established inhalation toxicity factors were not included in this table.

TABLE 10-14
RME AIR CONCENTRATIONS OF PARTICULATE-BOUND CHEMICALS FROM SURFACE SOILS AT SWMU 127

	RME Soil Concentration (mg/kg)	PEF (m3/kg)	Air Concentration (mg/m3)
Benzo(a)anthracene	8.00	4.63E+09	1.73E-09
Benzo(a)pyrene	8.60	4.63E+09	1.86E-09
Benzo(b)fluoranthene	17.0	4.63E+09	3.67E-09
Cadmium	0.70	4.63E+09	1.51E-10
Chrysene	14.0	4.63E+09	3.02E-09
Indeno(1,2,3-cd)pyrene	5.10	4.63E+09	1.10E-09
Mercury	0.08	4.63E+09	1.73E-11

RME Soil Concentration from Table 10-7
PEF = Particulate Emission Factor default value from EPA (1991b)
Air Concentration = Soil concentration/PEF

TABLE 10-15
RME AIR CONCENTRATIONS OF VOLATILE COMPOUNDS FROM TOTAL SOILS AT SWMU 127

	ps (g/cm3)	alpha (cm2/s)	LS (m)	V (m/s)	DH (m)	A (cm2)	T (s)	Dei (cm2/s)	E (unitless)	Di cm2/s)
1,2-Dichloropropane	3.65	8.10E-04	45	2.25	2	20250000	7.90E+08	5.99E-02	0.35	0.08473
Toluene	2.65	5.15E-04	45	2.25	2	20250000	7.90E+08	5.87E-02	0.35	0.08301

Method and default values from EPA (1991b) Risk Assessment Guidance for Superfund: Part B.
The method and equation are discussed in detail in Appendix B.
ps = soil density
alpha = (Dei*E)/(E+(ps(1-E)/Kas))
LS = Length of the SWMU in direction of wind (default value)
V = Wind velocity (default value)
DH = Diffusion height; height of box into which volatilization occurs (default value)
A = Surface area of SWMU (default value: 45m x 45m)
Time = Time of exposure (25 years; equivalent to default RME occupational exposure period)
Dei = Effective diffusivity (Di * E^0.33)
E = True soil porosity (default value)
Di = Molecular diffusivity (EPA 1988) Superfund Exposure Assessment Manual
Koc = organic carbon partition coefficient (from Appendix A, Table A-1)
H = Henry's Law constant (Appendix A, Table A-1)
Kd = Soil/water partitioning coefficient (Koc * OC)
OC = Organic carbon fraction in soil (0.02 default value)
Kas = Soil/air partition coefficient (H/Kd * 41)
VF = Volatilization Factor = (LS x V x DH/A) + (3.14 alpha x T)^0.5/(2 x Dei x E x Kas x 0.001 kg/g)
Csoil = RME concentration of compound in soil (Table 10-8)
Cair = RME concentration of compound in air (Csoil/VF)
Note: Chemicals of concern that do not have EPA-established inhalation toxicity factors were not included in this table.

TABLE 10-15
RME AIR CONCENTRATIONS OF VOLATILE COMPOUNDS FROM TOTAL SOILS AT SWMU 127

	Koc (ml/g)	H (atm-m3/mol)	Kd (cm3/g)	Kas g soil/cm3 air)	VF (m3/kg)	C soil (mg/kg)	C air (mg/m3)
1,2-Dichloropropane	51	2.31E-03	1.02E+00	9.29E-02	3.64E+03	0.003	8.79E-07
Toluene	300	6.37E-03	6.00E+00	4.35E-02	6.32E+03	0.004	6.33E-07

Method and default values from EPA (1991b) Risk Assessment Guidance for Superfund: Part B.
The method and equation are discussed in detail in Appendix B.
ps = soil density
alpha = (Dei*E)/(E+(ps(1-E)/Kas))
LS = Length of the SWMU in direction of wind (default value)
V = Wind velocity (default value)
DH = Diffusion height; height of box into which volatilization occurs (default value)
A = Surface area of SWMU (default value: 45m x 45m)
Time = Time of exposure (25 years; equivalent to default RME occupational exposure period)
Dei = Effective diffusivity (Di * E^0.33)
E = True soil porosity (default value)
Di = Molecular diffusivity (EPA 1988) Superfund Exposure Assessment Manual
Koc = organic carbon partition coefficient (from Appendix A, Table A-1)
H = Henry's Law constant (Appendix A, Table A-1)
Kd = Soil/water partitioning coefficient (Koc * OC)
OC = Organic carbon fraction in soil (0.02 default value)
Kas = Soil/air partition coefficient (H/Kd * 41)
VF = Volatilization Factor = (LS x V x DH/A) + (3.14 alpha x T)^0.5/(2 x Dei x E x Kas x 0.001 kg/g)
Csoil = RME concentration of compound in soil (Table 10-8)
Cair = RME concentration of compound in air (Csoil/VF)
Note: Chemicals of concern that do not have EPA-established inhalation toxicity factors were not included in this table.

TABLE 10-16
RME AIR CONCENTRATIONS OF PARTICULATE-BOUND CHEMICALS FROM TOTAL SOILS AT SWMU 127

	RME Soil Concentration (mg/kg)	PEF (m3/kg)	Air Concentration (mg/m3)
Barium	194	4.63E+09	4.19E-08
Benzo(a)anthracene	0.82	4.63E+09	1.76E-10
Benzo(a)pyrene	0.82	4.63E+09	1.76E-10
Benzo(b)fluoranthene	1.60	4.63E+09	3.46E-10
Cadmium	0.94	4.63E+09	2.03E-10
Chrysene	1.18	4.63E+09	2.55E-10
Indeno(1,2,3-cd)pyrene	0.73	4.63E+09	1.57E-10
Mercury	0.06	4.63E+09	1.30E-11

RME Soil Concentration from Table 10-7
PEF = Particulate Emission Factor default value from EPA (1991b)
Air Concentration = Soil concentration/PEF

TABLE 10-17

SUMMARY OF INTAKE FACTORS[1]

Occupational (Base Workers)	Average	RME
Dermal Contact with Soil (kg/kg-d)		
Noncarcinogenic	4.70×10^{-7}	2.69×10^{-5}
Carcinogenic	6.04×10^{-8}	9.61×10^{-6}
Soil Ingestion (kg/kg-d)		
Noncarcinogenic	5.87×10^{-9}	4.89×10^{-7}
Carcinogenic	7.55×10^{-10}	1.75×10^{-7}
Inhalation (m^3/kg-d)		
Noncarcinogenic	1.08×10^{-2}	1.96×10^{-1}
Carcinogenic	1.39×10^{-3}	6.99×10^{-2}
Construction Workers	**Average**	**RME**
Dermal Contact with Soil (kg/kg-d)		
Noncarcinogenic	3.13×10^{-7}	4.70×10^{-6}
Carcinogenic	4.47×10^{-9}	6.71×10^{-8}
Soil Ingestion (kg/kg-d)		
Noncarcinogenic	1.96×10^{-8}	1.57×10^{-7}
Carcinogenic	2.80×10^{-10}	2.24×10^{-9}
Inhalation (m^3/kg-d)		
Noncarcinogenic	7.20×10^{-3}	3.13×10^{-2}
Carcinogenic	1.03×10^{-4}	4.47×10^{-4}
Trespasser	**Average**	**RME**
Dermal Contact with Soil (kg/kg-d)		
Noncarcinogenic	1.40×10^{-7}	1.48×10^{-5}
Carcinogenic	1.20×10^{-8}	1.27×10^{-6}
Soil Ingestion (kg/kg-d)		
Noncarcinogenic	1.75×10^{-9}	1.40×10^{-7}
Carcinogenic	1.50×10^{-10}	1.20×10^{-8}
Inhalation (m^3/kg-d)		
Noncarcinogenic	3.21×10^{-3}	5.59×10^{-2}
Carcinogenic	2.75×10^{-4}	4.79×10^{-3}

[1] Exposure assumptions and intake factor calculations are shown in Tables C-1 through C-22 (Appendix C). Intake factors are multiplied by exposure point concentrations of chemicals of concern to estimate daily chemical intake in terms of mg chemical per kilogram body weight per day (mg/kg-d).

TABLE 10-18

SUMMARY OF HUMAN HEALTH RISKS AT SWMU 127

Receptor/Pathway	Average Exposure			Reasonable Maximum Exposure		
	Cancer Risk	Subchronic H.I.	Chronic H.I.	Cancer Risk	Subchronic H.I.	Chronic H.I.
Occupational Worker (Surface Soil)						
-- Dermal Contact	5×10^{-11}		9×10^{-7}	3×10^{-8}		7×10^{-5}
-- Ingestion	1×10^{-8}		6×10^{-5}	2×10^{-5}		7×10^{-3}
-- Inhalation of VOCs	1×10^{-10}		8×10^{-6}	6×10^{-9}		2×10^{-4}
-- Inhalation of Particulates	2×10^{-11}		2×10^{-9}	1×10^{-9}		4×10^{-8}
	1×10^{-8}		7×10^{-5}	2×10^{-5}		7×10^{-3}
Construction Worker (Total Soil)						
-- Dermal Contact	3×10^{-12}	6×10^{-7}		6×10^{-11}	9×10^{-6}	
-- Ingestion	2×10^{-9}	3×10^{-4}		2×10^{-8}	3×10^{-3}	
-- Inhalation of VOCs	0.00	2×10^{-6}		0.00	8×10^{-6}	
-- Inhalation of Particulates	3×10^{-13}	2×10^{-7}		1×10^{-12}	9×10^{-7}	
	2×10^{-9}	3×10^{-4}		2×10^{-8}	3×10^{-3}	
Trespasser (Surface Soil)						
-- Dermal Contact	9×10^{-12}	3×10^{-7}		4×10^{-9}	4×10^{-5}	
-- Ingestion	2×10^{-9}	2×10^{-5}		1×10^{-6}	2×10^{-3}	
-- Inhalation of VOCs	2×10^{-11}	8×10^{-7}		4×10^{-10}	1×10^{-5}	
-- Inhalation of Particulates	5×10^{-12}	7×10^{-10}		8×10^{-11}	1×10^{-8}	
	2×10^{-9}	2×10^{-5}		1×10^{-6}	2×10^{-3}	

Note: Apparent inconsistencies in summation of risks are due to rounding of risk values. See Appendix C for nonrounded risk values.

TABLE 10-19

RISK-BASED CONCENTRATIONS (RBCs) FOR TPH IN SOIL[1]

Noncarcinogenic

Fuel	Oral RfD[2] mg/kg-d	RME Intake Factor[3] kg/kg-d	HI	Soil RBC[4] mg/kg
JP4	0.08	4.90E-07	1	163265
Unl. gasoline	0.2	4.90E-07	1	408163

Carcinogenic

Fuel	Oral SF[2] 1/(mg/kg-d)	RME Intake Factor[3] kg/kg-d	Target Cancer Risk Level	Soil RBC[4] mg/kg
Unl. gasoline	1.70E-03	1.75E-07	1.00E-05	33613

[1] RBCs are based on occupational soil ingestion exposures

[2] RFDs and SFs from EPA 1992. Risk Assessment Issue Paper for Oral Systemic and Carcinogenic Toxicity for Multiple Fuels. From Joan S. Dollarhide, Superfund Health Risk Technical Support Center to Carol Sweeney, USEPA, Region X, March 24. The oral toxicity factors are based on extrapolation from inhalation studies. They are under review and subject to change.

[3] IFs for occupational soil ingestion from Table C-2.

[4] Noncarcinogenic RBC = RFD x HI/IF Carcinogenic RBC = Risk Level/(IF x SF)

TABLE 10-20

SUMMARY OF CHEMICALS REPORTED IN SURFACE SOILS* AT SWMU 127 CANNON AFB (mg/kg)

Chemical	CAN127-1271-0000	CAN127-1272-0000	CAN127-1273-0000	CAN127-1273-0002	CAN127-1274-0000	CAN127-1274-0002	CAN127-1275-0000	CAN127-1275-0002	CAN127-1276-0000	CAN127-1276-0002	CAN127-1277-0000	CAN127-1277-0002
Volatile Organics												
1,2-Dichloroethane	0.0029 U	0.0029 U	0.0026 U	0.0028 U	0.0028 U	0.0028 U	0.0026 U	0.0029 U	0.0019 J	0.0027 U	0.0027 U	0.0027 U
1,2-Dichloropropane	0.0029 U	0.0029 U	0.0026 U	0.0028 U	0.0028 U	0.0028 U	0.0046 J	0.0029 U	0.0026 U	0.0027 U	0.0027 U	0.0027 U
Toluene	0.0029 U	0.0029 U	0.012	0.0028 U	0.0023 J	0.0028 J	0.0052	0.0029 U	0.015	0.0027 U	0.0055 J	0.0038 J
Xylenes (total)	0.0029 U	0.0029 U	0.0034 J	0.0028 U	0.0015 J	0.0028 U	0.0026 U	0.0029 U	0.012	0.0027 U	0.0059	0.0015 J
Semivolatile Organics												
Acenaphthene	0.19 U	0.19 U	0.175 U		0.185 U		0.15 J	0.19 U	0.17 U		0.175 U	
Anthracene	0.19 U	0.19 U	0.048 J		0.185 U		0.7 U	0.19 U	0.17 U		0.175 U	
Benzo(a)anthracene	0.19 U	0.19 U	0.51		0.083 J		8	0.19 U	0.16 J		0.19 J	
Benzo(a)pyrene	0.19 U	0.19 U	0.55		0.12 J		8.6	0.19 U	0.23 J		0.18 J	
Benzo(b)fluoranthene	0.19 U	0.19 U	0.96		0.27 J		17	0.19 U	0.41		0.39	
Benzo(g,h,i)perylene	0.19 U	0.19 U	0.47		0.072 J		5.1	0.19 U	0.19 J		0.091 J	
Carbazole	0.19 U	0.19 U	0.046 J		0.185 U		1.5	0.19 U	0.17 U		0.175 U	
Chrysene	0.19 U	0.19 U	0.72		0.21 J		14	0.19 U	0.3 J		0.24 J	
Fluoranthene	0.19 U	0.19 U	1.5		0.3 J		17	0.19 U	0.57		0.47	
Fluorene	0.19 U	0.19 U	0.175 U		0.185 U		0.29 J	0.19 U	0.17 U		0.175 U	
Ideno(1,2,3-cd)pyrene	0.19 U	0.19 U	0.39		0.068 J		5.1	0.19 U	0.16 J		0.093 J	
2-Methylnaphthalene	0.19 U	0.19 U	0.175 U		0.185 U		0.7 U	0.19 U	0.17 U		0.25 J	
Phenanthrene	0.19 U	0.19 U	0.57		0.12 J		8.1	0.19 U	0.21 J		0.19 J	
Pyrene	0.19 U	0.19 U	1.4		0.23 J		17	0.19 U	0.55		0.44	
Metals												
Aluminum	9270	7220	7650	11600	7490	9560	6530	8570	7170	11400	5640	8800
Antimony	3.5 U	3.5 U	3.2 U	3.3 U	3.3 U	3.3 U	7.8	6.9 U	3.1 U	3.3 U	3.2 U	3.3 U
Arsenic	2	1.9	2.2	2.4	2.9	2.3	2.1	2.1	2	2.4	2.2	2.8
Barium	91.7	91.9	115	99	125 J	75.7 J	245 J	104 J	74.3	105	84.1	102
Beryllium	0.67	0.53	0.46	0.7	0.82	0.83	0.45	0.65	0.43	0.7	0.49	0.72
Cadmium	0.29 UJ	1.1	0.26 U	0.28 U	0.49 J	0.28 U	0.53	0.6 U	0.26 U	0.27	0.27 U	0.27 U
Calcium	19200 J	56900	10300	14000	7210	4820	45300	106000	6630	4740	18200	16700
Chromium	9.9	7.3	16.9	10.3	9.4	10	15.3	5.8	9.9	9.3	9.9	9.5
Cobalt	4.5	3.7	3.4	4.8	5.3	5.2	2.8	4.3	2.9	4.9	3.4	4.8
Copper	8.9	7.3	6.8	7.9	8.5	8	25.9	5.9	6.3	8.4	7.1	9.9
Iron	8610	6380	7770	10500	8420	9250	7650	7920	5990	8990	6260	8960

TABLE 10-20

SUMMARY OF CHEMICALS REPORTED IN SURFACE SOILS* AT SWMU 127 CANNON AFB (mg/kg)

Chemical	CAN127-1271-0000	CAN127-1272-0000	CAN127-1273-0000	CAN127-1273-0002	CAN127-1274-0000	CAN127-1274-0002	CAN127-1275-0000	CAN127-1275-0002	CAN127-1276-0000	CAN127-1276-0002	CAN127-1277-0000	CAN127-1277-0002
Lead	7.3	4.4	30.8	8	12.6	8.4	29.2	6.7	48.2	9.2	43.2	9.2
Magnesium	2030	1890	1570	2360	1800	2180	1850	2640	1300	2510	1340	2270
Manganese	179	138	166	206	246	213	332	127	141	218	154	189
Mercury	0.06 U	0.06 U	0.05 U	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U	0.05 U	0.06 U	0.06 U	0.06 U
Nickel	10.4	8	7	11.4	9.5	12.4	6.8	10.1	6.2	10.5	6.6	10.4
Potassium	1680	1410	1910	2400	1390	1760	1180	1550	2060	2520	1540	1760
Selenium	0.6 UJ	0.6 UJ	0.26 UJ	0.6 UJ	0.27 J	0.28 UJ	0.26 UJ	0.6 UJ	0.26 UJ	0.27 UJ	0.27 UJ	0.06 UJ
Silver	0.69 J	0.68 J	0.5 U	0.6 U	0.6 U	0.6 U	0.5 U	1.15 U	0.5 U	0.6 U	0.43 J	0.47 J
Thallium	1.2 U	0.6 UJ	0.26 U	0.13 J	0.28 U	0.28 U	0.26 U	0.29 UJ	0.26 U	0.14 J	0.27 U	0.27 U
Vanadium	17.9	14.2	17.6	21.4	23	19.2	16.5	15.8	12.9	17.7	14.6	18.6
Zinc	21.9	17.4	25.4	24.4	20.4	21.7	38.5	18	25.3	24	24.1	21
TPH	23.1 U	93.2	66.8	21.8 U	253 J	22 U	344	23.1 U	80.5	21.6 U	44.1	21.6 U

* Between 0 and 2 feet deep

R Rejected

J Estimated value below reporting limit or estimated based on data quality criteria

U Non-detect, value shown i s one-half the reporting limit

TABLE 10-20

SUMMARY OF CHEMICALS REPORTED IN SURFACE SOILS* AT SWMU 127 CANNON AFB (mg/kg)

Chemical	CAN127-1278-0000	CAN127-1278-0002	N	Arithmetic Mean	95% UCL	Maximum
Volatile Organics						
1,2-Dichloroethane	0.0027 U	0.0027 U	14	0.003	0.003	0.003
1,2-Dichloropropane	0.0027 U	0.0027 U	14	0.003	0.003	0.005
Toluene	0.0027 U	0.0027 U	14	0.005	0.006	0.015
Xylenes (total)	0.0027 U	0.0027 U	14	0.004	0.005	0.012
Semivolatile Organics						
Acenaphthene	0.7 U		9	0.236	0.34	0.70
Anthracene	0.7 U		9	0.283	0.43	0.70
Benzo(a)anthracene	0.15 J		9	1.074	2.62	8.00
Benzo(a)pyrene	0.18 J		9	1.159	2.82	8.60
Benzo(b)fluoranthene	0.38 J		9	2.220	5.52	17.00
Benzo(g,h,i)perylene	0.7 U		9	0.799	1.77	5.10
Carbazole	0.7 U		9	0.372	0.65	1.50
Chrysene	0.26 J		9	1.811	4.54	14.00
Fluoranthene	0.44 J		9	2.317	5.60	17.00
Fluorene	0.7 U		9	0.252	0.35	0.70
Ideno(1,2,3-cd)pyrene	0.7 U		9	0.787	1.76	5.10
2-Methylnaphthalene	0.7 U		9	0.306	0.44	0.70
Phenanthrene	0.19 J		9	1.106	2.67	8.10
Pyrene	0.36 J		9	2.283	5.58	17.00
Metals						
Aluminum	6790	8050	14	8267	9061.27	11600
Antimony	3.2 U	3.3 U	14	3.9	4.55	7.80
Arsenic	2.3	2.6	14	2.3	2.44	2.90
Barium	83.8	79.4	14	105.4	124.95	245.00
Beryllium	0.45	0.68	14	0.61	0.68	0.83
Cadmium	0.27 U	0.27 U	14	0.39	0.50	1.10
Calcium	5730	43500	14	25659	38717	106000
Chromium	11.3	8.8	14	10.3	11.55	16.90
Cobalt	3.3	4.4	14	4.1	4.51	5.30
Copper	7.3	9.1	14	9.1	11.36	25.90
Iron	7060	7800	14	7969	8548.91	10500

TABLE 10-20

SUMMARY OF CHEMICALS REPORTED IN SURFACE SOILS* AT SWMU 127 CANNON AFB (mg/kg)

Chemical	CAN127-1278-0000	CAN127-1278-0002	N	Arithmetic Mean	95% UCL	Maximum
Lead	42.4	7.5	14	19.1	26.38	48.20
Magnesium	1220	2300	14	1947	2156.92	2640
Manganese	151	168	14	188	212.33	332
Mercury	0.11	0.06 U	14	0.06	0.07	0.11
Nickel	6.9	9.8	14	9.0	9.92	12.40
Potassium	1630	1650	14	1746	1916.40	2520
Selenium	0.27 U	0.6 UJ	14	0.4	0.46	0.60
Silver	0.53 J	0.45 J	14	0.59	0.67	1.15
Thallium	0.27 U	0.27 U	14	0.34	0.46	1.20
Vanadium	14.6	16.9	14	17.2	18.48	23.00
Zinc	22.1	19.4	14	23.1	25.44	38.50
TPH	21.2 U	21.8 U	14	75.6	120.79	344.00

* Between 0 and 2 feet deep

R Rejected

J Estimated value below reporting limit or estimated based on data quality criteria

U Non-detect, value shown i s one-half the reporting limit

TABLE 10-21

CHEMICALS OF CONCERN IN SOILS SWMU 127
CANNON AFB
(mg/kg)

Chemicals	Maximum Concentration	UTL Cannon Background Concentrations(1)	Levels in Southwestern U.S. Soils(2)	Normal Range In U.S. Soils (3)	Retained as a COC?
Volatile Organics					
1,2-Dichloroethane	0.0029	---	---	---	Y
1,2-Dichloropropane	0.0046	---	---	---	Y
Toluene	0.015	---	---	---	Y
Xylenes	0.012	---	---	---	Y
Semivolatile Organics					
Acenaphthene	0.7	---	---	---	Y
Anthracene	0.7	---	---	---	Y
Benzo(a)anthracene	8	---	---	---	Y
Benzo(a)pyrene	8.6	---	---	---	Y
Benzo(b)fluoranthene	17	---	---	---	Y
Benzo(g,h,i)perylene	5.1	---	---	---	Y
Carbazole	1.5	---	---	---	Y
Chrysene	14	---	---	---	Y
Fluoranthene	17	---	---	---	Y
Fluorene	0.7	---	---	---	Y
Ideno(1,2,3-cd)pyrene	5.1	---	---	---	Y
2-Methylnaphthalene	0.7	---	---	---	Y
Phenanthrene	8.1	---	---	---	Y
Pyrene	17	---	---	---	Y
Metals					
Aluminum	11600	10540	5000	700 - 100000	Y
Antimony	7.8	*	<1	0.2 - 10	Y
Arsenic	2.9	15.5	6.5	1.0 - 40	N
Barium	245	642	500	10 - 5,000	N
Beryllium	0.83	0.73	1 - 2	<1 - 15	N
Cadmium	1.1	*	---	0.01 - 2.0	Y
Calcium	106000	186400	---	---	N**
Chromium	16.9	12.5	30	5 -1,500	N
Cobalt	5.3	4.5	3 - 7	0.5 - 65	N
Copper	25.9	*	20	1 - 700	Y
Iron	105000	8720	15000	100 - 100000	N
Lead	48.2	25.8	15	10 - 700	Y
Magnesium	2640	11790	---	---	N**
Manganese	332	164	500	20 - 10000	N

TABLE 10-21

CHEMICALS OF CONCERN IN SOILS SWMU 127
CANNON AFB
(mg/kg)

Chemicals	Maximum Concentration	UTL Cannon Background Concentrations(1)	Levels in Southwestern U.S. Soils(2)	Normal Range In U.S. Soils (3)	Retained as a COC?
Mercury	0.11	*	0.32	<0.01 - 4.6	N
Nickel	12.4	9	15	2 - 750	N
Potassium	2520	2572	---	---	N**
Selenium	0.6	*	0.3	<0.1 - 4.3	Y
Silver	1.15	*	---	0.01 - 8	Y
Thallium	1.2	*	---	---	Y
Vanadium	23	25.3	---	---	N
Zinc	38.5	21.9	45	<5 - 2900	N
TPH	344	---	---	---	Y

(1) Upper Tolerance Limit (UTL) of the mean = mean + 2 x standard deviation. This is for all practical purposes the same the 90% upper confidence limit of the 95th percentile where UTL = mean + standard deviation x k, where k = 2.02 for n =

(2) USGS (1984)

(3) Values mainly from Bowen (1979). Values for copper, lead, selenium, and zinc from USGS (1984).

* Data insufficient to calculate UTL of background concentration.

** Essential nutrient natural to soils. Not expected to be of concern compared to other COCs.

Y = Yes

N = No

--- = Not available

TABLE 10-22
RISK CHARACTERIZATION SUMMARY - SWMU 127

Chemical	Sample Number											
	CAN127-1271-0000	CAN127-1272-0000	CAN127-1273-0000	CAN127-1273-0002	CAN127-1274-0000	CAN127-1274-0002	CAN127-1275-0000	CAN127-1275-0002	CAN127-1276-0000	CAN127-1276-0002	CAN127-1277-0000	CAN127-1277-0002
Volatile Organics												
1,2-Dichloroethane	0.0029 U	0.0029 U	0.0026 U	0.0028 U	0.0028 U	0.0028 U	0.0026 U	0.0029 U	0.0019 J	0.0027 U	0.0027 U	0.0027 U
1,2-Dichloropropane	0.0029 U	0.0029 U	0.0026 U	0.0028 U	0.0028 U	0.0028 U	0.0046 J	0.0029 U	0.0026 U	0.0027 U	0.0027 U	0.0027 U
Toluene	0.0029 U	0.0029 U	0.012	0.0028 U	0.0023 J	0.0028 J	0.0052	0.0029 U	0.015	0.0027 U	0.0055 J	0.0038 J
Xylenes (total)	0.0029 U	0.0029 U	0.0034 J	0.0028 U	0.0015 J	0.0028 U	0.0026 U	0.0029 U	0.012	0.0027 U	0.0059	0.0015 J
Semivolatile Organics												
Acenaphthene	0.19 U	0.19 U	0.175 U		0.185 U		0.15 J	0.19 U	0.17 U		0.175 U	
Anthracene	0.19 U	0.19 U	0.048 J		0.185 U		0.7 U	0.19 U	0.17 U		0.175 U	
Benzo(a)anthracene	0.19 U	0.19 U	0.51		0.083 J		8	0.19 U	0.16 J		0.19 J	
Benzo(a)pyrene	0.19 U	0.19 U	0.55		0.12 J		8.6	0.19 U	0.23 J		0.18 J	
Benzo(b)fluoranthene	0.19 U	0.19 U	0.96		0.27 J		17	0.19 U	0.41		0.39	
Benzo(g,h,i)perylene	0.19 U	0.19 U	0.47		0.072 J		5.1	0.19 U	0.19 J		0.091 J	
Carbazole	0.19 U	0.19 U	0.046 J		0.185 U		1.5	0.19 U	0.17 U		0.175 U	
Chrysene	0.19 U	0.19 U	0.72		0.21 J		14	0.19 U	0.3 J		0.24 J	
Fluoranthene	0.19 U	0.19 U	1.5		0.3 J		17	0.19 U	0.57		0.47	
Fluorene	0.19 U	0.19 U	0.175 U		0.185 U		0.29 J	0.19 U	0.17 U		0.175 U	
Ideno(1,2,3-cd)pyrene	0.19 U	0.19 U	0.39		0.068 J		5.1	0.19 U	0.16 J		0.093 J	
2-Methylnaphthalene	0.19 U	0.19 U	0.175 U		0.185 U		0.7 U	0.19 U	0.17 U		0.25 J	
Phenanthrene	0.19 U	0.19 U	0.57		0.12 J		8.1	0.19 U	0.21 J		0.19 J	
Pyrene	0.19 U	0.19 U	1.4		0.23 J		17	0.19 U	0.55		0.44	
Metals												
Aluminum	9270	7220	7650	11600	7490	9560	6530	8570	7170	11400	5640	8800
Antimony	3.5 U	3.5 U	3.2 U	3.3 U	3.3 U	3.3 U	7.8	6.9 U	3.1 U	3.3 U	3.2 U	3.3 U
Cadmium	0.29 UJ	1.1	0.26 U	0.28 U	0.49 J	0.28 U	0.53	0.6 U	0.26 U	0.27	0.27 U	0.27 U
Copper	8.9	7.3	6.8	7.9	8.5	8	25.9	5.9	6.3	8.4	7.1	9.9
Lead	7.3	4.4	30.8	8	12.6	8.4	29.2	6.7	48.2	9.2	43.2	9.2
Selenium	0.6 UJ	0.6 UJ	0.26 UJ	0.6 UJ	0.27 J	0.28 UJ	0.26 UJ	0.6 UJ	0.26 UJ	0.27 UJ	0.27 UJ	0.06 UJ
Silver	0.69 J	0.68 J	0.5 U	0.6 U	0.6 U	0.6 U	0.5 U	1.15 U	0.5 U	0.6 U	0.43 J	0.47 J
Thallium	1.2 U	0.6 UJ	0.26 U	0.13 J	0.28 U	0.28 U	0.26 U	0.29 UJ	0.26 U	0.14 J	0.27 U	0.27 U
TPH	23.1 U	93.2	66.8	21.8 U	253 J	22 U	344	23.1 U	80.5	21.6 U	44.1	21.6 U

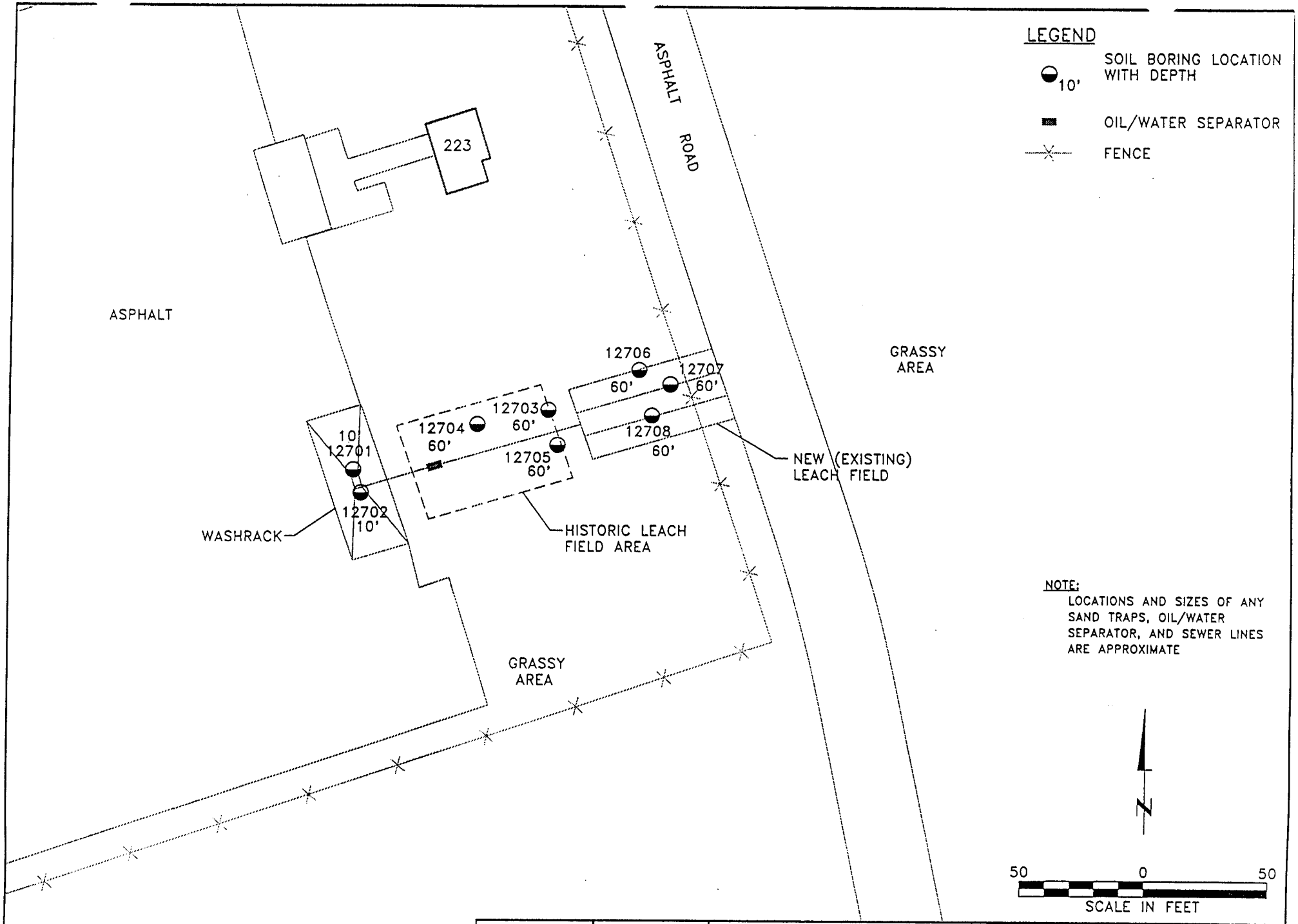
** Mean soil concentration multiplied by BAF of 4.6 (Cd) and 12 (Se).
R Rejected
J Estimated value below reporting limit or estimated based on data quality criteria
U Non-detect, value shown is one-half the reporting limit

TABLE 10-22
RISK CHARACTERIZATION SUMMARY - SWMU 127

Chemical	CAN127-1278-0000	CAN127-1278-0002	N	Arithmetic Mean (mg/kg)	Robin Benchmark Dietary Level (mg/kg)	Risk?
Volatile Organics						
1,2-Dichloroethane	0.0027 U	0.0027 U	14	0.003	312.5	--
1,2-Dichloropropane	0.0027 U	0.0027 U	14	0.003	1000	--
Toluene	0.0027 U	0.0027 U	14	0.005	12500	--
Xylenes (total)	0.0027 U	0.0027 U	14	0.004	5000	--
Semivolatile Organics						
Acenaphthene	0.7 U		9	0.236	0.4	--
Anthracene	0.7 U		9	0.283	5000	--
Benzo(a)anthracene	0.15 J		9	1.074	0.4	--
Benzo(a)pyrene	0.18 J		9	1.159	0.002	Possible
Benzo(b)fluoranthene	0.38 J		9	2.220	8	--
Benzo(g,h,i)perylene	0.7 U		9	0.799	375	--
Carbazole	0.7 U		9	0.372	250	--
Chrysene	0.26 J		9	1.811	12	--
Fluoranthene	0.44 J		9	2.317	625	--
Fluorene	0.7 U		9	0.252	625	--
Ideno(1,2,3-cd)pyrene	0.7 U		9	0.787	14.4	--
2-Methylnaphthalene	0.7 U		9	0.306	815	--
Phenanthrene	0.19 J		9	1.106	150	--
Pyrene	0.36 J		9	2.283	375	--
Metals						
Aluminum	6790	8050	14	8267	1500	Possible
Antimony	3.2 U	3.3 U	14	3.9	16.5	--
Cadmium	0.27 U	0.27 U	14	1.79**	10.5	--
Copper	7.3	9.1	14	9.1	260	--
Lead	42.4	7.5	14	19.1	87.5	--
Selenium	0.27 U	0.6 UJ	14	4.8**	5	--
Silver	0.53 J	0.45 J	14	0.59	41	--
Thallium	0.27 U	0.27 U	14	0.34	600	--
TPH	21.2 U	21.8 U	14	75.6	241	--

* Between 0 and 2 feet deep
** Mean soil concentration multiplied by BAF of 4.6 (Cd) and 12 (Se).
R Rejected
J Estimated value below reporting limit or estimated based on data quality criteria
U Non-detect, value shown i s one-half the reporting limit

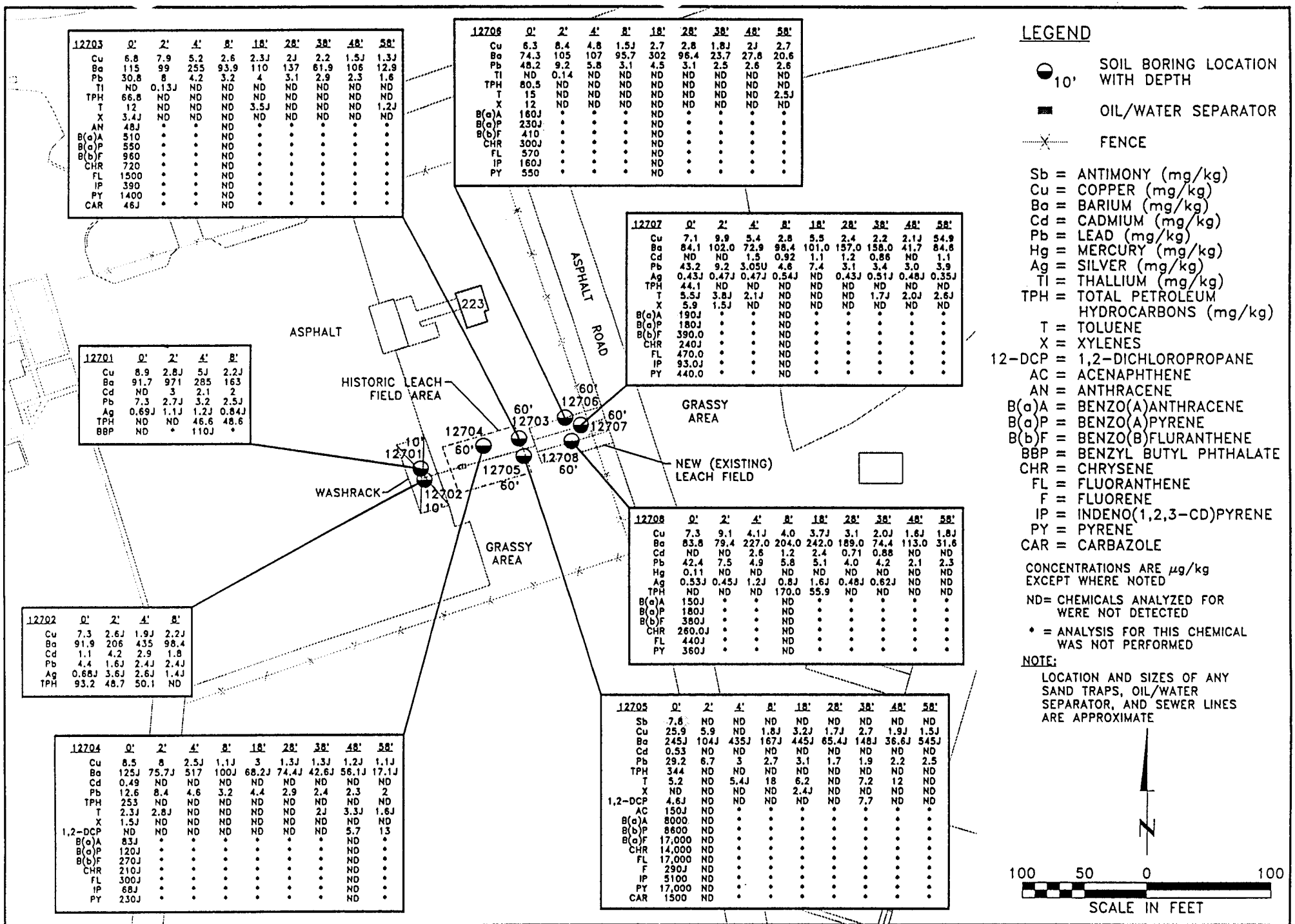
CAD FILE: 11W10.DWG V=SITE 01/12/1994 15:10



SOURCE: CANNON AFB CAD FILES AND CANNON AFB RFI FIELD SAMPLING PLAN.

DRN BY: CJG	DATE: 08/17/93	SAND TRAP AT POL WASHRACK - SWMU 127 SITE PLAN AND BORING LOCATIONS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. C3M11W
CHK'D BY: .	REVISION: 0		FIG. NO. 10-1

CAD FILE: C3M11 VG V=HITS 02/15/1994 14:21



12703	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	6.8	7.9	5.2	2.6	2.3J	2J	2.2	1.5J	1.3J
Ba	115	99	255	93.9	110	137	61.9	106	12.9
Pb	30.8	8	4.2	3.2	4	3.1	2.9	2.3	1.6
Tl	ND	0.13J	ND	ND	ND	ND	ND	ND	ND
TPH	66.8	ND	ND	ND	ND	ND	ND	ND	ND
T	12	ND	ND	ND	3.5J	ND	ND	ND	1.2J
X	3.4J	ND	ND	ND	ND	ND	ND	ND	ND
AN	48J	*	*	ND	*	*	*	*	*
B(a)A	510	*	*	ND	*	*	*	*	*
B(a)P	550	*	*	ND	*	*	*	*	*
B(b)F	960	*	*	ND	*	*	*	*	*
CHR	720	*	*	ND	*	*	*	*	*
FL	1500	*	*	ND	*	*	*	*	*
IP	390	*	*	ND	*	*	*	*	*
PY	1400	*	*	ND	*	*	*	*	*
CAR	46J	*	*	ND	*	*	*	*	*

12706	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	6.3	8.4	4.8	1.5J	2.7	2.8	1.8J	2J	2.7
Ba	74.3	105	107	95.7	302	96.4	23.7	27.8	20.6
Pb	48.2	9.2	5.8	3.1	4.5	3.1	2.5	2.6	2.6
Tl	ND	0.14	ND	ND	ND	ND	ND	ND	ND
TPH	80.5	ND	ND	ND	ND	ND	ND	ND	ND
T	15	ND	ND	ND	ND	ND	ND	ND	2.5J
X	12	ND	ND	ND	ND	ND	ND	ND	ND
B(a)A	160J	*	*	*	ND	*	*	*	*
B(a)P	230J	*	*	*	ND	*	*	*	*
B(b)F	410	*	*	*	ND	*	*	*	*
CHR	300J	*	*	*	ND	*	*	*	*
FL	570	*	*	*	ND	*	*	*	*
IP	160J	*	*	*	ND	*	*	*	*
PY	550	*	*	*	ND	*	*	*	*

12707	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	7.1	9.9	5.4	2.8	5.5	2.4	2.2	2.1J	54.9
Ba	84.1	102.0	72.9	98.4	101.0	157.0	158.0	41.7	84.6
Cd	ND	ND	1.5	0.92	1.1	1.2	0.86	ND	1.1
Pb	43.2	9.2	3.05U	4.6	7.4	3.1	3.4	3.0	3.9
Ag	0.43J	0.47J	0.47J	0.54J	ND	0.43J	0.51J	0.48J	0.35J
TPH	44.1	ND	ND	ND	ND	ND	ND	ND	ND
T	5.5J	3.8J	2.1J	ND	ND	ND	1.7J	2.0J	2.6J
X	5.9	1.5J	ND	ND	ND	ND	ND	ND	ND
B(a)A	190J	*	*	ND	*	*	*	*	*
B(a)P	180J	*	*	ND	*	*	*	*	*
B(b)F	390.0	*	*	ND	*	*	*	*	*
CHR	240J	*	*	ND	*	*	*	*	*
FL	470.0	*	*	ND	*	*	*	*	*
IP	93.0J	*	*	ND	*	*	*	*	*
PY	440.0	*	*	ND	*	*	*	*	*

12701	0'	2'	4'	8'
Cu	8.9	2.8J	5J	2.2J
Ba	91.7	971	285	163
Cd	ND	3	2.1	2
Pb	7.3	2.7J	3.2	2.5J
Ag	0.69J	1.1J	1.2J	0.84J
TPH	ND	ND	46.6	48.6
BBP	ND	*	110J	*

12708	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	7.3	9.1	4.1J	4.0	3.7J	3.1	2.0J	1.6J	1.8J
Ba	83.8	79.4	227.0	204.0	242.0	189.0	74.4	113.0	31.6
Cd	ND	ND	2.6	1.2	2.4	0.71	0.88	ND	ND
Pb	42.4	7.5	4.9	5.8	5.1	4.0	4.2	2.1	2.3
Hg	0.11	ND	ND	ND	ND	ND	ND	ND	ND
Ag	0.53J	0.45J	1.2J	0.8J	1.6J	0.48J	0.62J	ND	ND
TPH	ND	ND	ND	170.0	55.9	ND	ND	ND	ND
B(a)A	150J	*	*	ND	*	*	*	*	*
B(a)P	180J	*	*	ND	*	*	*	*	*
B(b)F	380J	*	*	ND	*	*	*	*	*
CHR	260.0J	*	*	ND	*	*	*	*	*
FL	440J	*	*	ND	*	*	*	*	*
PY	360J	*	*	ND	*	*	*	*	*

12702	0'	2'	4'	8'
Cu	7.3	2.6J	1.9J	2.2J
Ba	91.9	206	435	98.4
Cd	1.1	4.2	2.9	1.8
Pb	4.4	1.6J	2.4J	2.4J
Ag	0.68J	3.6J	2.6J	1.4J
TPH	93.2	48.7	50.1	ND

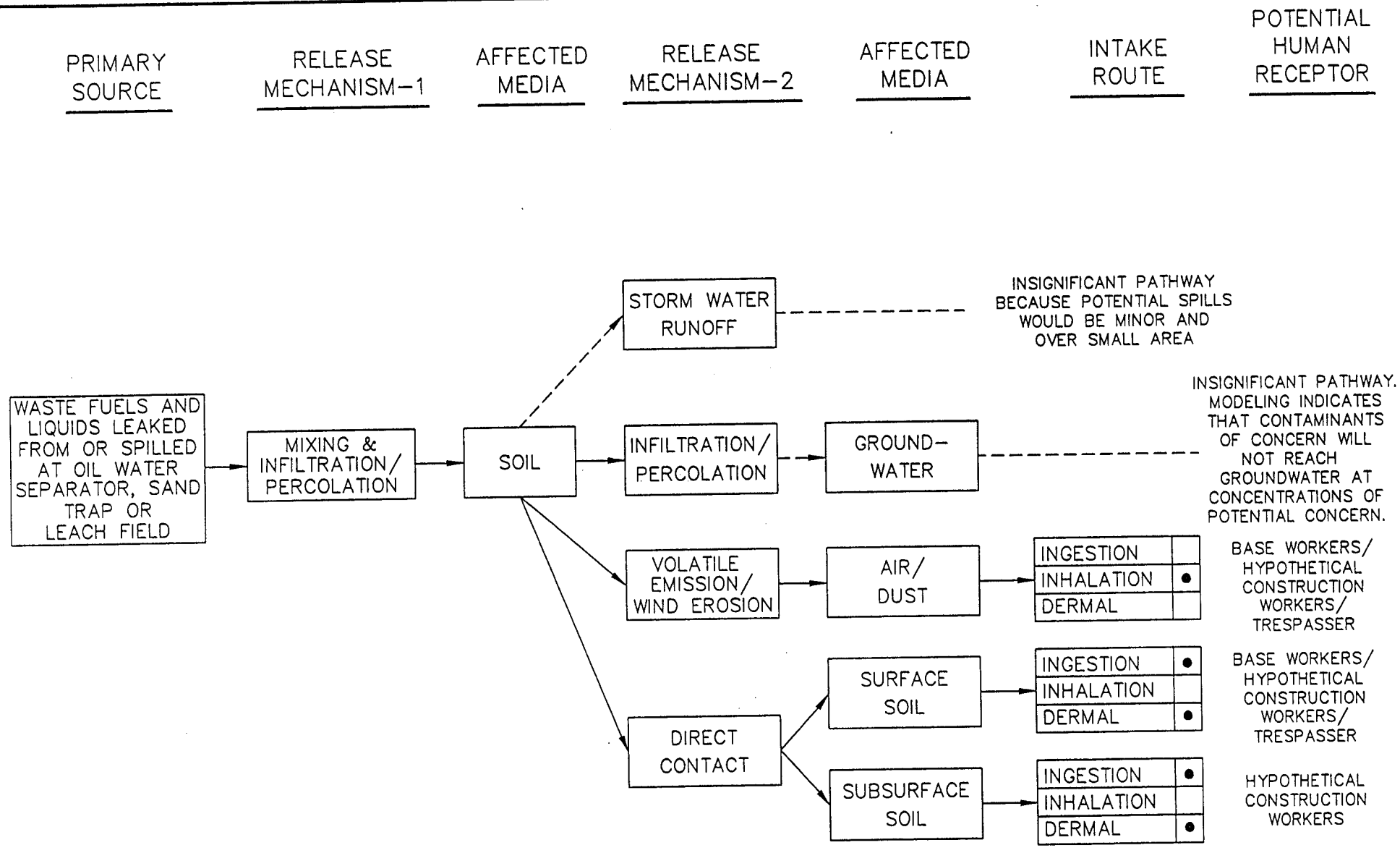
12704	0'	2'	4'	8'	18'	28'	38'	48'	58'
Cu	8.5	8	2.5J	1.1J	3	1.3J	1.3J	1.2J	1.1J
Ba	125J	75.7J	517	100J	68.2J	74.4J	42.6J	56.1J	17.1J
Cd	0.49	ND	ND	ND	ND	ND	ND	ND	ND
Pb	12.6	8.4	4.6	3.2	4.4	2.9	2.4	2.3	2
TPH	253	ND	ND	ND	ND	ND	ND	ND	ND
T	2.3J	2.8J	ND	ND	ND	ND	2J	3.3J	1.6J
X	1.5J	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DCP	ND	ND	ND	ND	ND	ND	ND	5.7	13
B(a)A	83J	*	*	*	*	*	*	ND	*
B(a)P	120J	*	*	*	*	*	*	ND	*
B(b)F	270J	*	*	*	*	*	*	ND	*
CHR	210J	*	*	*	*	*	*	ND	*
FL	300J	*	*	*	*	*	*	ND	*
IP	68J	*	*	*	*	*	*	ND	*
PY	230J	*	*	*	*	*	*	ND	*

12705	0'	2'	4'	8'	18'	28'	38'	48'	58'
Sb	7.8	ND	ND	ND	ND	ND	ND	ND	ND
Cu	25.9	5.9	ND	1.8J	3.2J	1.7J	2.7	1.9J	1.5J
Ba	245J	104J	435J	167J	445J	65.4J	148J	36.6J	545J
Cd	0.53	ND	ND	ND	ND	ND	ND	ND	ND
Pb	29.2	6.7	3	2.7	3.1	1.7	1.9	2.2	2.5
TPH	344	ND	ND	ND	ND	ND	ND	ND	ND
T	5.2	ND	5.4J	18	6.2	ND	7.2	12	ND
X	ND	ND	ND	ND	2.4J	ND	ND	ND	ND
1,2-DCP	4.6J	ND	ND	ND	ND	ND	7.7	ND	ND
AC	150J	ND	*	*	*	*	*	*	*
B(a)A	8000	ND	*	*	*	*	*	*	*
B(b)P	8600	ND	*	*	*	*	*	*	*
B(a)F	17,000	ND	*	*	*	*	*	*	*
CHR	14,000	ND	*	*	*	*	*	*	*
FL	17,000	ND	*	*	*	*	*	*	*
F	290J	ND	*	*	*	*	*	*	*
IP	5100	ND	*	*	*	*	*	*	*
PY	17,000	ND	*	*	*	*	*	*	*
CAR	1500	ND	*	*	*	*	*	*	*

SOURCE: CANNON AFB CAD FILES AND CANNON AFB RFI FIELD SAMPLING PLAN.

DRN BY: CJG	DATE: 01/05/94	SAND TRAP AT POL WASHRACK – SWMU 127 CHEMICAL CONCENTRATIONS DETECTED IN SOIL CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO.	FIG. NO.
CHK'D BY: .	REVISION: 0		C3M11W	10-2

CAD FILE: C3M11W20.D V=SWMU-127 01/19/1994 16:16



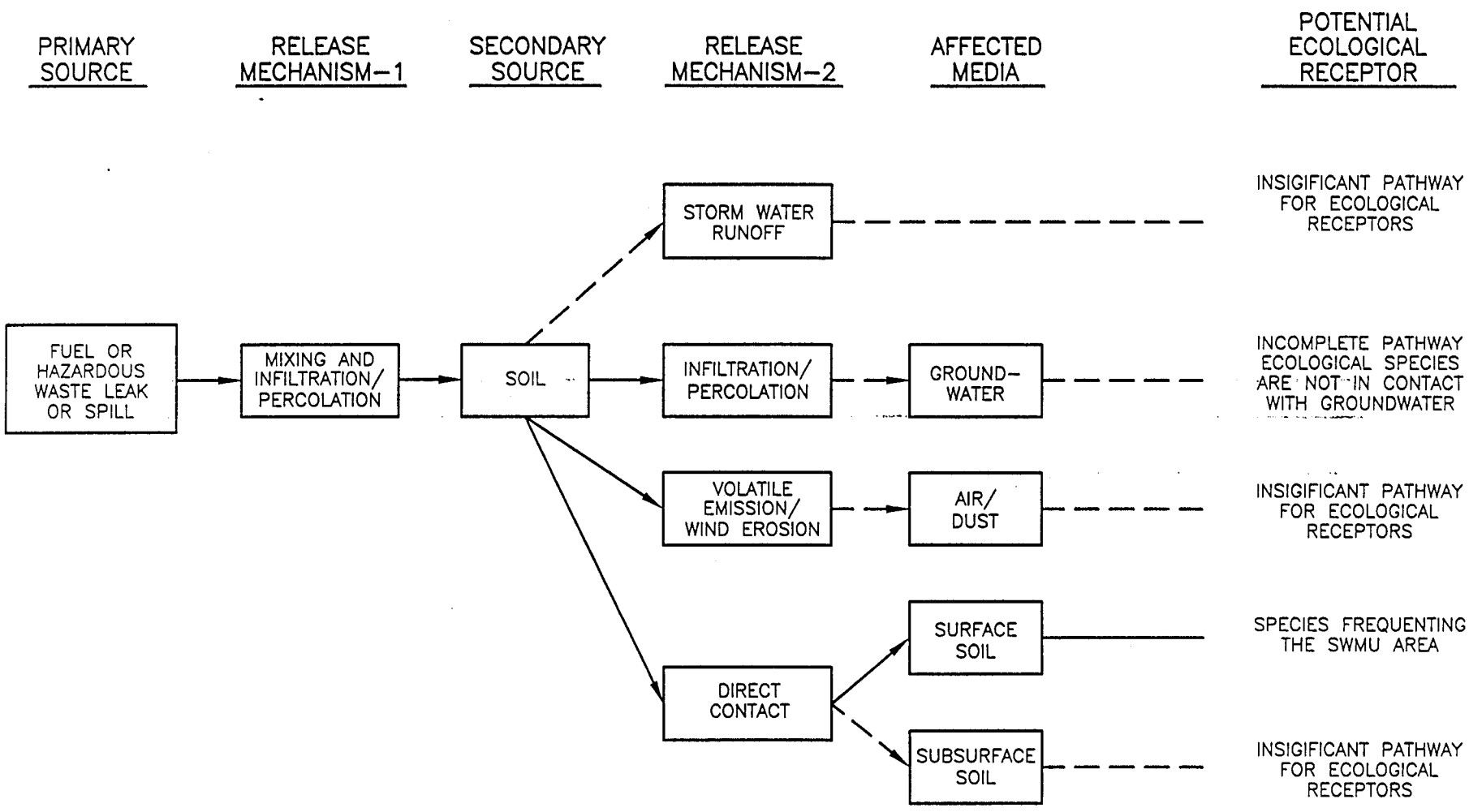
NOTE:

SOLID LINES REPRESENT POTENTIALLY COMPLETE PATHWAYS

DASHED LINES REPRESENT INCOMPLETE OR INSIGNIFICANT PATHWAYS

ONLY FUTURE USE EXPOSURES WILL BE CONSIDERED FOR SOILS PRESENTLY COVERED BY PAVEMENT

DRN BY JWB	DATE 08/19/93	EXPOSURE PATHWAY FLOW CHART SAND TRAP AT POL WASHRACK, LEACH FIELD SWMU 127 CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO. C3M11W
CHK'D BY .	REVISIONS: 0		FIG. NO. 10-3

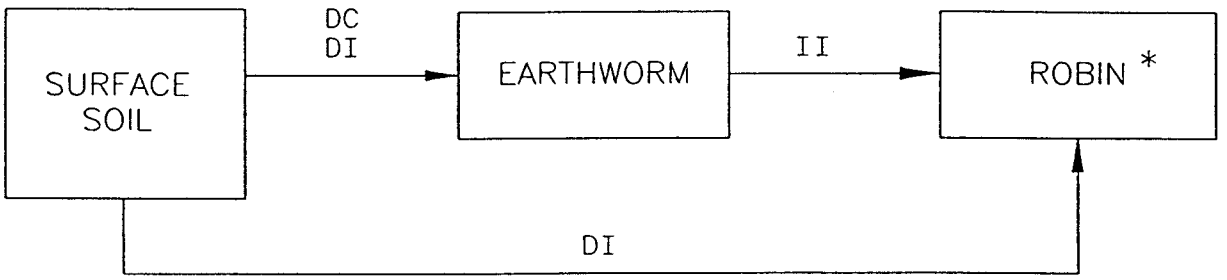


NOTES:

SOLID LINES REPRESENT POTENTIALLY COMPLETE AND SIGNIFICANT PATHWAYS

DASHED LINES REPRESENT INCOMPLETE OR INSIGNIFICANT PATHWAYS

DRN BY NVD	DATE 12/30/93	EXPOSURE PATHWAY FLOW CHART FOR SWMU 127 ECOLOGICAL RECEPTORS CANNON AIR FORCE BASE NEW MEXICO	PROJECT NO.	FIG. NO.
CHK'D BY	REVISIONS: 0		C3M11W	10-4



DC = DIRECT CONTACT

DI = DIRECT INGESTION

II = INDIRECT INGESTION
(i.e. SECONDARY, TERTIARY CONSUMPTION)

* = KEY RECEPTOR SPECIES

CAD FILE: C3M1' WG V=SWMU-127 02/15/1994 9:30

DRN BY NVD	DATE 12/30/93	CONCEPTUAL SITE MODEL SWMU 127	PROJECT NO.	FIG. NO.
CHK'D BY	REVISIONS: 0	CANNON AIR FORCE BASE NEW MEXICO	C3M11W	10-5

To evaluate the potential for contaminants in the vadose, or unsaturated, zone to be transported to underlying groundwater at SWMUs 31, 77, and 127 at Cannon AFB, New Mexico, the fate and transport of contaminants in the vadose zone was modeled[1]. This was accomplished by developing a conceptual vadose zone model for SWMUs 31, 77, and 127 and applying two mathematical models: Hydrologic Evaluation of Landfill Performance (HELP®) and Multimedia Exposure Assessment Model (MULTIMED). The HELP model, Version 3.01, was used to estimate a net infiltration rate for input into MULTIMED. MULTIMED, Version 2.00, was then used to model contaminant migration through the vadose zone to the water table. This appendix presents the modeling approach and provides documentation and output, as applicable, for each model.

D.1 CONCEPTUAL VADOSE ZONE MODEL

Activities associated with potential chemical releases at SWMUs 31, 77, and 127 generally date from the 1970s to present. As part of previous investigations, soil borings were completed to total depths of 10, 20, and 60 feet below ground surface (bgs), respectively, at SWMUs 31, 77, and 127. TPH, as an indicator parameter of petroleum-related contamination, was detected primarily in surface or near-surface soils (i.e., < 5 feet bgs) at these SWMUs. Specific chemicals detected above MSSLs, which include some VOCs, SVOCs (PAHs), and metals, were also detected in surface or near-surface soils. At SWMU 127, TPH was also detected at a depth of 20 feet bgs, with a maximum detected depth of 50 feet bgs, in addition to surface or near-surface soils.

Because of relatively close site proximity and similar geology, a generalized soil geologic profile for SWMUs 31, 77, and 127 was developed. In order to make use of published, statistically based values for various parameters necessary for modeling of the system, the geologic profile, as encountered in borings completed at the SWMUs, was defined in terms of USDA soil texture classes. Because they can be discontinuous and/or fractured, the presence of caliche layers as low-permeability barriers was neglected. The vadose zone profile, or schematic, used for modeling is shown in Figure D-1.

For the purposes of modeling, the geologic profile shown on Figure D-1 was separated into two zones: an upper zone from 0 to 60 feet bgs and a lower zone from 60 to 280 feet bgs. Sixty feet is the maximum depth of soil borings completed at the SWMUs and 280 feet is the estimated depth to the water table based on 1984 potentiometric surface contours (Figure 3-2). The 0- to 60-foot soil zone is used by the HELP model to estimate the net infiltration rate for input into MULTIMED. The 60- to 280-foot soil zone is the assumed vadose zone for use with MULTIMED through which contaminants in soil water would be expected to migrate.

Indicator chemicals used for modeling include each chemical detected above MSSLs at SWMUs 31, 77, and/or 127. These include:

[1] Although part of the CMS, vadose zone contaminant fate and transport at SWMU 48A was not modeled, since none of the analyzed chemicals at this SWMU were detected above USEPA Region VI MSSLs.

- VOCs
  - Benzene
  - Xylenes
- SVOCs (PAHs)
  - Benzo(a)anthracene
  - Benzo(a)pyrene
  - Benzo(b)fluoranthene
  - Dibenzo(a,h)anthracene
  - Indeno(1,2,3)pyrene
- Metals
  - Arsenic
  - Chromium
  - Lead

Modeled concentrations of these chemicals are assumed to be constant in soil from 0 to 60 feet bgs. This is a somewhat conservative assumption since they were mostly detected in surface or near-surface soils.

D.2 HELP® MODEL

The HELP model was used to estimate a net infiltration rate for input into MULTIMED for SWMUs 31, 77, and 127. This section provides model documentation, input parameters, and model output.

D.2.1 Documentation

Information in this section has been taken primarily from Schroeder et al. 1994. The HELP model is a quasi-two-dimensional, deterministic, water-routing model for determining water balances (Schroeder et al. 1994). The general water balance equation is:

$$PERC = P - RO - \Delta ST - ET$$

where:

PERC = Percolation (inches)
P = Precipitation (inches)
RO = Surface runoff (inches)
Δ ST = Change in soil moisture storage (inches)
ET = Evapotranspiration (inches)

The HELP model was developed to help hazardous waste landfill designers and regulators evaluate the hydrologic performance of proposed landfill designs. The model accepts weather,

soil, and design data and uses solution techniques that account for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, soil moisture storage, lateral subsurface drainage, leachate recirculation, unsaturated vertical drainage, and leakage through soil, geomembrane, or composite liners. Landfill systems, including various combinations of vegetation, cover soils, waste cells, lateral drain layers, low-permeability barrier soils, and synthetic geomembrane liners, may be modeled. Results are expressed as daily, monthly, annual, and long-term average water budgets (Schroeder et al. 1994).

The HELP model requires daily climatologic data, soil characteristics, and design specifications to perform the analysis. Daily rainfall data may be input by the user, generated stochastically, or taken from the model's historical database. The model contains parameters for generating synthetic precipitation for 139 U.S. cities. The historical database contains five years of daily precipitation data for 102 U.S. cities. Daily temperature and solar radiation data are generated stochastically or may be input by the user. Necessary soil data include porosity, field capacity, wilting point, saturated hydraulic conductivity, and Soil Conservation Service (SCS) runoff curve number for antecedent moisture condition II. The model contains default soil characteristics for 42 material types for use when measurements or site-specific estimates are not available (Schroeder et al. 1994).

Figure D-2 is a definition sketch for a somewhat typical closed hazardous waste landfill profile. The layers in the landfill are typed by the hydraulic function that they perform. Four types of layers are available: vertical percolation layers, lateral drainage layers, barrier soil liners, and geomembrane liners. The topsoil and waste layers are generally vertical percolation layers. Sand layers above liners are typically lateral drainage layers; compacted clay layers are typically barrier soil liners. Geomembranes are typed as geomembrane liners. Composite liners are modeled as two layers. Geotextiles are not considered as layers unless they perform a unique hydraulic function (Schroeder et al. 1994).

In a vertical percolation layer (e.g., layers 1 and 5 in Figure D-2), flow is either downward due to gravity drainage or extracted by evapotranspiration. Unsaturated vertical drainage is assumed to occur by gravity drainage whenever the soil moisture is greater than the field capacity (greater than the wilting point for soils in the evaporative zone) or when the soil suction of the layer below the vertical percolation layer is greater than the soil suction in the vertical percolation layer. The rate of gravity drainage (percolation) in a vertical percolation layer is assumed to be a function of the soil moisture storage and largely independent of conditions in adjacent layers. The rate can be restricted when the layer below is saturated and drains slower than the vertical percolation layer (Schroeder et al. 1994).

More detailed information on the HELP model, including data generation, default values, methods of solution, and assumptions/limitations, can be found in Schroeder et al. 1994.

D.2.2 Input

HELP input parameters for SWMUs 31, 77, and 127 are summarized in Table D-1 and described below.

Soil and Design Data

The generalized cross-section shown on Figure D-1 was used to define soil layers for the first 60 feet of depth. HELP default soil values for porosity, field capacity, wilting point, and saturated hydraulic conductivity were used for sandy clay loam (0 to 10 feet, HELP texture No. 10), sandy loam (10 to 30 feet, HELP texture No. 6), loamy sand (30 to 50 feet, HELP texture No. 4), and sand (50 to 60 feet, HELP texture No. 2). A HELP-computed runoff curve number was used for runoff calculations using a slope of 1 percent, slope length of 100 feet, soil texture = 10 (sandy clay loam), and vegetation condition = 2 (poor stand of grass – adjusted between 1 [bare] and 3 [fair] to account for ~50% paved area). Each layer was modeled as a vertical percolation layer. The soil moisture of each layer was initialized by the program.

Evapotranspiration Data

Amarillo, Texas was selected in the HELP default database as the nearest city to Clovis, New Mexico, with similar climate. Evaporative zone depth was set at 18 inches. This value is between 12 inches for bare conditions and 25 inches for fair conditions to account for an estimated 50-percent paved area. Twelve inches is the minimum evaporative zone depth for the area of the U.S. that includes Clovis, based on isocontour maps provided in Schroeder et al. 1994. The minimum leaf area index was set at 1.0 for a poor stand of grass (adjusted between 0.0 [bare] and 2.0 [fair] to account for ~50% paved area). All other evapotranspiration parameters (growing season, wind speed, humidity) are default values for Amarillo.

Precipitation, Temperature, and Solar Radiation Data

The HELP synthetic weather generator was used to generate daily values of precipitation, temperature, and solar radiation using coefficients for Amarillo, Texas, the nearest city in the HELP default database to Clovis, New Mexico, with similar climate. Mean monthly values of precipitation and temperature were adjusted using National Oceanic and Atmospheric Administration (NOAA) data from the Clovis, New Mexico, weather station for the period of 1910 to 1998. Latitude for solar radiation was set at 34.42 degrees, which is the latitude reported for the Clovis weather station (latitude for Amarillo = 35.23 degrees). Daily values were generated for 100 years, the maximum allowed by the model.

D.2.3 Output

The HELP model for SWMUs 31, 77, and 127 was run for 100 years of simulation. Soil moisture was initialized by the program at or near the field capacity for each layer. Percolation values for each year of simulation are provided in Table D-2. Annual percolation through the bottom layer (i.e., at 60 feet bgs) ranged from 0.0012 to 1.52 inches with an average value of 0.36 inches. Values ranged from 0.0012 to 0.026 inches for the first 29 years of simulation, while soil moisture storage steadily increased, and then ranged from 0.36 to 1.52 inches for the remainder of the 100-year period, while soil moisture storage was relatively constant. Peak daily value of infiltration for the 100-year period was 0.0052 inches. Annual rates compare favorably

to the reported estimates of 0.5 to 1.0 inches per year for recharge rates to the Ogallala aquifer at Cannon AFB (Section 3.5).

Based on the results described above, a net infiltration of 1.5 inches per year for SWMUs 31, 77, and 127 was selected for input into MULTIMED. This is believed to be a conservative estimate of infiltration rate for the site based on the following:

- In general, the HELP model has been shown to overpredict percolation rates (i.e., vertical moisture flux) in semiarid and arid climates (Fleenor and King 1995). The HELP model's flow algorithm is primarily based on gravity drainage and field capacity concepts. Under more arid conditions, capillary forces, which have an upward gradient, should also be considered (Mulkey et al. 1989).
- Additional storage in the remainder of vadose zone (60 to 280 feet bgs) is neglected by the model. This would lower the amount of percolation through the bottom layer if it were extended to the water table.
- The maximum, rather than the average, annual infiltration from the 100-year simulation period was selected.

In addition, the selected infiltration rate of 1.5 inches per year is less than the infiltration rate of 2 inches per year used for vadose zone modeling at Site SD-11 at Cannon AFB (URSGWC 1999). The lower infiltration rate is considered to reasonably account for paved areas at SWMUs 31, 77, and 127; whereas, Site SD-11 is unpaved with little vegetation.

Output generated by the HELP model for SWMUs 31, 77, and 127 is provided in Attachment D-1. Output is provided in summary format, showing average monthly, average annual, and peak daily values rather than daily, monthly, or annual values for each year of simulation.

D.3 MULTIMED

MULTIMED was used to model contamination migration at SWMUs 31, 77, and 127 through the vadose zone to the water table. This section provides model documentation, input parameters, and model output.

D.3.1 Documentation

Information in this section has been taken primarily from Salhotra et al. 1995. MULTIMED uses analytical, semianalytical, and numerical solution techniques to solve the mathematical equations describing flow and transport. The model consists of modules that estimate contaminant releases to air, soil, groundwater, and surface water from a waste disposal facility or contaminated soils. Modules include the landfill, unsaturated zone flow, unsaturated zone transport, saturated zone transport, surface water, air emissions, air dispersion, and statistical analysis (i.e., Monte Carlo) modules. Releases to air are estimated independently of releases to the subsurface or surface water. The program uses a pre-processor (PREMED®) for input and a post-processor (POSTMED®) for output (Salhotra et al. 1995, Sharp-Hansen et al. 1995).

Figure D-3 presents a schematic of waste facility and leachate migration as simulated by MULTIMED. For simulation of leachate flux, the steady-state infiltration rate can be either input directly or estimated using the landfill module. The landfill module is one-dimensional and steady-state, and simulates the effect of precipitation, runoff, infiltration, evapotranspiration, barrier layers, and lateral drainage. A one-dimensional, semianalytical module simulates flow in the unsaturated zone. The output from this module, degree of water saturation versus depth, is used as input to the unsaturated zone transport module. This module simulates transient, one-dimensional (vertical) transport in the unsaturated zone, including longitudinal (vertical direction) dispersion, linear or nonlinear adsorption, and first-order decay. Steady-state or time series concentrations at the water table estimated by this module are used to couple the unsaturated zone transport module with the steady-state or transient, semianalytical saturated zone module. The saturated zone module includes one-dimensional uniform flow, three-dimensional dispersion, linear adsorption, first-order decay, and dilution due to direct infiltration into the groundwater plume. The surface water module simulates contamination of a surface stream due to complete interception of a steady-state saturated zone plume. Air emissions and atmospheric dispersion modules simulate the movements of contaminants into the atmosphere. The uncertainty of input parameters can be quantified using built-in Monte Carlo uncertainty analysis (Salhotra et al. 1995).

Version 2.0 of MULTIMED includes a numerical unsaturated zone transport option, which was not included in Version 1.0, to allow the user to simulate (1) nonlinear adsorption, (2) initial contamination conditions, (3) time-varying infiltration rates, and (4) volatilization of chemicals in the unsaturated zone. The numerical unsaturated zone transport model in MULTIMED Version 2.0 is based on the VADOFT code (Salhotra et al. 1995). These four model enhancements are briefly summarized as follows (Salhotra et al. 1995):

(1) Nonlinear Adsorption. The numerical model allows the user to simulate chemicals, such as metals, which have a nonlinear relationship between the dissolved- and adsorbed-phase concentration. Two nonlinear adsorption models are considered: the Freundlich adsorption isotherm and an empirical adsorption model defined by the user. The dissolved and adsorbed phases are considered to be in equilibrium in both the linear or nonlinear adsorption models.

(2) Initial Contamination Conditions. The numerical model allows for simulation of the transport of chemicals that have already migrated out of the waste source and are present as soil contamination in the unsaturated zone. For example, the user can directly enter the profile of soil chemical concentrations versus depth, eliminating the need to simulate pre-existing contamination as a waste source.

(3) Time-Varying Infiltration Rates. The numerical model allows for simulation of the leaching of chemicals from a waste source whose water infiltration rates vary with time, allowing the user to simulate the effects of changes in waste management alternatives, such as caps, on chemical migration. The user may enter an arbitrary time series of

infiltration rates, on an annual basis, that allows infiltration to increase or decrease for different time periods.

(4) Volatilization of Chemicals from the Unsaturated Zone. The numerical model allows for simulation of the vertical transport of chemicals in the unsaturated zone by both infiltration within the water phase and diffusion within the vapor phase. The leaching and volatilization processes are simulated simultaneously such that the air and ground water pathways can compete for the chemical; a mass balance is maintained between the initial chemical mass and the chemical mass ultimately released to the air or groundwater.

The four enhancements to MULTIMED have been verified through testing and have been found to be correctly implemented in the unsaturated zone transport module. Recommendations for improving Version 2.0, which is currently in beta (i.e., test) form, include revision of the convolution integral scheme to avoid spurious saturated zone results when the initial mass-in-place and variable infiltration rate options are invoked (Tetra Tech/GeoTrans 1995).

Because MULTIMED relies on primarily analytical solutions, the complexity of the systems that can be represented by the model is limited. The MULTIMED model does not account for site-specific spatial variability, shape of the land disposal facility, site-specific boundary conditions, multiple aquifers, or pumping wells. Also, MULTIMED cannot simulate multiphase flow, fracture flow, or chemical reactions between contaminants. Site-specific use of MULTIMED requires the assumption of spatially uniform, or homogeneous, hydrogeologic properties. For complex systems, it may be more appropriate to use MULTIMED as a "screening level" model to gain a better understanding of the system. A numerical model could then be applied if it is needed and if there are sufficient data for its use (Salhotra et al. 1995, Sharp-Hansen et al. 1995).

More detailed information on the MULTIMED model, including governing equations, boundary and initial conditions, and limitations associated with the unsaturated zone flow, unsaturated zone transport, and saturated zone transport modules, can be found in Salhotra et al. 1995. Information on model application and input parameter selection can be found in Sharp-Hansen et al. 1995.

D.3.2 Input

Because MULTIMED the model must balance contaminant mass flux entering and leaving the initial mixing zone in groundwater directly below the facility or affected area, aquifer parameters were also input. Although not a primary goal of contaminant fate and transport modeling at SWMUs 31, 77, and 127, the input of aquifer parameters also allows for the evaluation of the dilution effects of initial mixing in groundwater.

To compare results and determine the most appropriate scenario for evaluating transport of contaminants in soil at SWMUs 31, 77, and 127 to groundwater, MULTIMED was run under steady state, pulse source, and source decay conditions while considering both sorption and sorption/biodegradation as attenuation mechanisms. The numerical unsaturated transport module of Version 2.00, as described in the preceding section, was not used for this analysis.

MULTIMED input parameters for SWMUs 31, 77, and 127 are summarized in Table D-3. Input parameters specific to modeled chemicals are summarized in Table D-4. The following paragraphs provide descriptions of the input parameters.

Source-Specific Parameters

The infiltration rate was set at 1.5 inches per year, based on output from the HELP model (Section D.2). Recharge rate, or the net amount of water that percolates into the aquifer outside of the areal extent of the site area, was set equal to the infiltration rate. Area is nominally assumed to be about 100 feet by 100 feet. The initial concentration was set at 1.0 mg/L for each model run, since model response is linear with this parameter (Sharp-Hansen et al. 1995). This allows for the calculation of an attenuation or dilution-attenuation factor (DAF) that can be divided into a source concentration of any magnitude, all other parameters remaining the same, to calculate a concentration at the bottom of the unsaturated zone or at a chosen receptor point in the aquifer.

A source decay constant of 0.35, 0.069, and 0.0069 year $^{-1}$, equivalent to half-lives of 2, 10, and 100 years, respectively, was input for source decay model runs for VOCs, SVOCs, and metals. Degradation half-lives reported in Howard et al. 1991 for modeled VOCs (i.e., benzene, xylenes) range from 0.04 to 0.08 years for soil and from 1 to 2 years for aqueous, anaerobic conditions. For modeled SVOCs (i.e., PAHs), degradation half-lives reported in Howard et al. 1991 range from 1.45 to 2.58 years for soil and from 5.8 to 10.3 years for aqueous, anaerobic conditions. Therefore, for VOCs and SVOCs, constants equivalent to a half-lives of 2 and 10 years, respectively, were used to be conservative. While source decay mechanisms for organics may consist of primarily of biodegradation, mechanisms for metals may include sorption, precipitation and ion exchange. Studies that have use curve-fitting techniques to develop first-order rate constants for typical leachate constituents (e.g., biological oxygen demand, sulfate, chloride, calcium, and sodium) data have observed rate constants equivalent to a half-life of about 10 years (Lu et al. 1981, 1985). However, for other parameters, such as nitrate and heavy metals, the data does not exhibit any apparent trends (Lu et al. 1981, 1985). For these reasons, a constant equivalent to a half-life of 100 years, or about one order of magnitude above the highest observed half-life, was used for metals (i.e., arsenic, chromium, lead). Source decay constants used in model runs are shown on Table D-4. For pulse source model runs, a pulse duration of 100 years was used.

Chemical-Specific Parameters

The normalized organic carbon distribution coefficient, K_{oc}, for VOCs and SVOCs and the distribution coefficient, K_d, for metals are taken primarily from the Soil Screening Guidance Technical Background Document (USEPA 1996), as compiled and evaluated from various sources. Solute concentrations are considered to be low enough such that the use of linear isotherms is acceptable to describe the relationship between sorbed concentrations and concentrations in pore water. For VOCs and SVOCs, K_d is calculated as the product of K_{oc} and fraction organic carbon content. K_d values for arsenic (3+) and chromium (6+), which are the

most mobile of those species, are taken from pH-dependent empirical relationships developed by applying regression analysis to data gathered from aquifer material, groundwater, and leachate samples from six landfill sites, as well as other literature data (USEPA 1992). The K_d value for lead (2+) was taken from the results of an effort to generate effective metal adsorption coefficients that represent metal speciation and adsorption in the soil matrix under varying environmental conditions (USEPA 1992). The geochemical model MINTEQA2 was used to develop isotherms of K_d versus log molal concentrations using low, medium, and high values of pH, leachate organics, natural organic matter, and iron oxide content for unsaturated and saturated zones. For lead, the value of K_d was taken from the linear part of the isotherm (lower concentration), for the condition of unsaturated zone, medium pH, low leachate organics, low natural organic matter, and low iron oxide. The biodegradation coefficient for the saturated zone is input as 0.0. K_{oc} and K_d values used for the different chemicals are shown on Table D-4.

Unsaturated Flow Parameters

Values for saturated hydraulic conductivity and porosity are taken from default values for HELP texture No. 2 (sand) (Schroeder et al. 1994). Values for air entry pressure head and residual water content for sand are taken from Rawls et al. 1992. Van Genuchten coefficients, α and β, used to define the relationship between relative permeability and water saturation are taken from Carsel and Parrish 1988. The layer thickness or unsaturated zone depth is calculated by subtracting the depth of the bottom of the upper soil zone (60 feet) from the estimated depth of the water table (280 feet).

Unsaturated Transport Parameters

Since calculation using the MULTIMED regression equation provided in Sharp-Hansen et al. 1995 exceeds 1.0 m, the longitudinal dispersivity for the unsaturated zone layer is set at the maximum value of 1.0 m for deep unsaturated zones. Percent organic matter is set at 0.07, based on the median value for sand (hydrologic soil group A) at 0.9-1.2 m from the table of data provided in Sharp-Hansen et al. 1995 and referenced from other sources. Fraction organic carbon content is calculated by dividing percent organic matter by 172.4. Dry bulk density is calculated using porosity and assumed specific gravity of 2.65. Biological decay coefficient for models runs that consider biodegradation is set at first-order decay rates of 0.35 and 0.069 $year^{-1}$, respectively, based on half-lives of 2 years for VOCs and 10 years for SVOCs. See Table D-4.

Aquifer-Specific Parameters

Aquifer porosity is assumed to be 0.40 for a typical sand aquifer. Particle diameter is set at 0.2 cm, but is not used by the model since porosity is input directly. Dry bulk density is calculated using aquifer porosity and assumed specific gravity of 2.65. Aquifer thickness is based on an estimated average thickness for the Ogallala aquifer at Cannon AFB of 120 feet (Section 3.5). Mixing zone depth, or aquifer source thickness, is derived by the model. Groundwater seepage velocity is calculated by Darcy's Law using a hydraulic conductivity of 1.0×10^{-2} cm/sec (Section 3.5), hydraulic gradient of 7.5 feet/mile (Section 3.5), and porosity

of 0.40. Retardation coefficient is derived by the model using dry bulk density, contaminant distribution coefficient, and porosity. Longitudinal, transverse, and vertical dispersivities are calculated using research-based regression equations as described in Sharp-Hansen et al. 1995. Aquifer temperature and pH is set at 12°C and 6.8, respectively. Organic carbon content is calculated using percent organic matter of 0.07. Well distance from site is set at 1.0 m to evaluate initial mixing zone dilution.

D.3.3 Output

MULTIMED output for SWMUs 31, 77, and 127 for various chemicals, source conditions, and transport processes is summarized in Table D-5. Active transport processes shown in the table refer only to the unsaturated zone. Dispersion is included as part of each model run. The calculated DAF represents attenuation in the vadose zone and primarily dilution in the initial groundwater mixing zone, because the well distance for the saturated zone is only a short distance (1.0 m) from the source.

When using MULTIMED for steady-state analyses, which assume a constant, infinite source, sorption/retardation has no effect on output concentrations unless transport decay is also considered. Under these conditions, the concentration at the bottom of the unsaturated zone is assumed to be equal to the initial leachate concentration (i.e., contaminant is assumed to have achieved breakthrough in vadose zone). Therefore, for steady-state, nontransport decay conditions, AF=1.0 and DAF=6.0 for all chemicals.

MULTIMED will not calculate maximum concentrations in saturated zone when using the decay source option. Also, the program would not calculate saturated zone concentrations at times that exceeded 1,000 years. For model runs where t_{max} > 1,000 years, (e.g., SVOCs and metals), no DAFs were calculated. If the concentration at the bottom of the vadose zone was equal to zero, then the saturated zone concentration was assumed to equal zero. For VOC decay source runs, the maximum saturated zone concentration was calculated at the corresponding time for the maximum concentration at the bottom of the unsaturated zone.

For VOCs (i.e., benzene, xylenes), consideration of sorption only results in generally low AFs and DAFs. When transport decay (biodegradation) is also considered, resultant concentrations are near zero. For SVOCs (i.e., PAHs), sorption-only runs result in higher AFs and DAFs and runs including biodegradation result in concentrations of zero. For metals (i.e., arsenic, chromium), where biodegradation is not applicable, AFs and DAFs fall between those of VOCs and SVOCs.

Output generated by MULTIMED for SWMUs 31, 77, and 127 is provided in Attachment D-2. MULTIMED output files shown in the attachment for each model run include the following:

- Main output, which summarizes input parameters and shows results in the saturated zone;
- Unsaturated flow output, which shows steady-state velocity, degree of water saturation, and pressure head at each node of the unsaturated zone; and

- Unsaturated transport output, which shows concentrations versus time at the bottom of the unsaturated zone.

D.4 ASSUMPTIONS AND LIMITATIONS

The results of the vadose zone contaminant fate and transport modeling at SWMUs 31, 77, and 127 are based on a conservative, analytical approach with many simplifying assumptions. Primary among these is the assumption of constant flow in the unsaturated zone. The steady-state infiltration rate of 1.5 inches per year used for modeling is greater than the value of reported estimates for recharge rates to the Ogallala aquifer of 0.5 to 1.0 inches per year (Section 3.5). However, due to high evapotranspiration and low precipitation (i.e., semiarid climate), recharge likely only occurs during heavy rainfall events or during cool months when precipitation exceeds evapotranspiration.

In shallow soil systems, recharge is very dynamic and tends to follow the patterns and quantities of precipitation (Mulkey et al. 1989). Assuming steady-state conditions in a system that exhibits transient behavior may produce inaccurate results and may underestimate contaminant concentrations (Sharp-Hansen et al. 1995). The "spikeness" (i.e., temporal variation) of the recharge, however, decreases with depth, resulting for many studies in the assumption of steady or constant recharge conditions (Mulkey et al. 1989). Therefore, for modeling at SWMUs 31, 77, and 127, the use of a constant infiltration rate assumes that there is significant depth from the upper soil zone to the water table (220 feet) such that recharge, or infiltration, in the vadose zone approaches a steady-state, or constant, rate.

Although not evaluated by this study, implementation of a more complex, numerical model (e.g., typical for RBCA Tier 3) would most likely produce results that are more representative of actual flow and transport processes that occur at SWMUs 31, 77, and 127. The use of a numerical model might even result in lower predicted concentrations at the water table for similar assumed source conditions. This is based on the observation that some important unsaturated flow processes that presumably occur at the site, due to its semiarid climate, are not necessarily accounted for in the models used. These include the effects of capillary forces and hysteresis in the soil system.

D.5 REFERENCES

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ATTACHMENT D-1
HELP OUTPUT

ATTACHMENT D-2
MULTIMED OUTPUT

TABLE D-1
SUMMARY OF HELP® INPUT PARAMETERS
CANNON AFB SWMUs 31, 77, AND 127

Parameter	Units	Value	Comments
Soil and Design Data			
Layer 1 - Sandy clay loam			
Thickness	in	120	= 10 feet
Porosity	vol/vol	0.398	HELP texture no. 10
Field Capacity	vol/vol	0.244	HELP texture no. 10
Wilting Point	vol/vol	0.136	HELP texture no. 10
Saturated hydraulic conductivity	cm/sec	1.2E-04	HELP texture no. 10
Layer 2 - Sandy loam			
Thickness	in	240	= 20 feet
Porosity	vol/vol	0.453	HELP texture no. 6
Field Capacity	vol/vol	0.190	HELP texture no. 6
Wilting Point	vol/vol	0.085	HELP texture no. 6
Saturated hydraulic conductivity	cm/sec	7.2E-04	HELP texture no. 6
Layer 3 - Loamy sand			
Thickness	in	240	= 20 feet
Porosity	vol/vol	0.437	HELP texture no. 4
Field Capacity	vol/vol	0.105	HELP texture no. 4
Wilting Point	vol/vol	0.047	HELP texture no. 4
Saturated hydraulic conductivity	cm/sec	1.7E-03	HELP texture no. 4
Layer 4 - Sand			
Thickness	in	120	= 10 feet
Porosity	vol/vol	0.437	HELP texture no. 2
Field Capacity	vol/vol	0.062	HELP texture no. 2
Wilting Point	vol/vol	0.024	HELP texture no. 2
Saturated hydraulic conductivity	cm/sec	5.8E-03	HELP texture no. 2
Runoff Curve Number			
Slope	%	1.0	
Slope Length	ft	100	
Vegetation Condition		2	poor stand of grass (1=bare, 3=fair)
Evapotranspiration Data			
Evaporative zone depth	in	18	adjust from 12" to 25" for ~50% paved
Maximum leaf area index		1.0	adjust from 0 to 2 for ~50% paved
Start of growing season	day	95	Amarillo, Texas
End of growing season	day	303	Amarillo, Texas
Average annual wind speed	mph	13.7	Amarillo, Texas
Average 1st quarter relative humidity	%	55.0	Amarillo, Texas
Average 2nd quarter relative humidity	%	52.0	Amarillo, Texas
Average 3rd quarter relative humidity	%	57.0	Amarillo, Texas
Average 4th quarter relative humidity	%	57.0	Amarillo, Texas
Precipitation, Temperature, and Solar Radiation Data			
Station latitude	degrees	34.42	Clovis, NM weather station

Normal Mean Monthly Precipitation (in) - Clovis, NM NOAA data (1910-1998)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.43	0.43	0.60	1.05	2.09	2.62	2.65	2.95	2.15	1.62	0.57	0.61

Normal Mean Monthly Temperature (° F) - Clovis, NM NOAA data (1910-1998)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
37.0	41.2	47.2	56.6	65.5	74.4	77.6	76.1	69.2	58.5	46.3	38.3

TABLE D-3
SUMMARY OF MULTIMED® INPUT PARAMETERS
CANNON AFB SWMUs 31, 77, AND 127

Parameter	Units	Value	Comments
Source-Specific			
Infiltration rate	m/yr	0.038	= 1.5 in/yr
Recharge rate	m/yr	0.038	= 1.5 in/yr
Area	m^2	1,000	≈ 100' x 100'
Length	m	derived	model-calculated (=area$^{1/2}$)
Width	m	derived	model-calculated (=area$^{1/2}$)
Initial concentration	mg/L	1.0	
Source decay constant	1/yr	varies	Table E-4
Duration of pulse	yr	100	
Spread of contaminant source	m	derived	model-calculated (=width/6)
Chemical-Specific			
Normalized organic carbon dist. coefficient, K_{oc}	mL/g	varies	Table E-4
Distribution coefficient, K_d	mL/g	varies	Table E-4 - model-calculated or input directly
Biodegradation coefficient (sat. zone)	1/yr	0.0	
Unsaturated Flow			
Saturated hydraulic conductivity	cm/hr	21.0	HELP texture no. 2 (sand)
Porosity		0.437	HELP texture no. 2 (sand)
Air entry pressure head	m	0.0726	Rawls et al. 1992 (sand)
Number of layers		1	
Thickness of layer	m	67	= 220 feet
Residual water content		0.020	Rawls et al. 1992 (sand)
Van Genuchten alpha coefficient	1/cm	0.145	Carsel and Parrish 1988 (sand)
Van Genuchten beta coefficient		2.68	Carsel and Parrish 1988 (sand)
Unsaturated Transport			
Longitudinal dispersivity	m	1.0	maximum value for deep unsat. zones
Percent organic matter	%	0.07	Carsel et al. 1988 (0.9-1.2 m Class A soil)
Bulk density	g/cm^3	1.49	= specific gravity * (1 - porosity)
Biological decay coefficient	1/yr	varies	Table E-4
Aquifer-Specific			
Porosity		0.40	
Particle diameter	cm	0.2	
Bulk density	g/cm^3	1.59	= specific gravity * (1 - porosity)
Aquifer thickness	m	37	= 120 feet
Mixing zone depth	m	derived	model-calculated
Hydraulic conductivity	m/yr	3,200	= 1.0 x 10^{-2} cm/sec
Hydraulic gradient		0.0015	= 7.5 feet/mile
Groundwater seepage velocity	m/yr	12	calc. by Darcy's Law
Retardation coefficient		derived	model-calculated
Longitudinal dispersivity	m	0.10	= 0.1 * well distance
Transverse dispersivity	m	0.033	= 0.333 * longitudinal dispersivity
Vertical dispersivity	m	0.0056	= 0.056 * longitudinal dispersivity
Aquifer temperature	° C	12	
pH		6.8	
Organic carbon content, f_{oc}		0.0004	calc. using % organic matter = 0.07
Well distance from site	m	1.0	
Angle off center	degrees	0.0	
Well vertical distance	m	0.0	

TABLE D-4
SUMMARY OF MULTIMED INPUT PARAMETERS FOR SPECIFIC CHEMICALS
CANNON AFB SWMUs 31, 77, AND 127

Parameter	Units	Value	Comments
Volatile Organic Compounds			
Source decay constant	1/yr	0.35	half-life = 2 years
Normalized organic carbon dist. coefficient, K_{oc} - benzene	mL/g	58.9	USEPA 1996
Normalized organic carbon dist. coefficient, K_{oc} - xylenes	mL/g	363	USEPA 1996 (o-xylene)
Distribution coefficient, Kd	mL/g	derived	model-calculated (=K_{oc}*f_{oc})
Biological decay coefficient (unsaturated zone)	1/yr	0.35	half-life = 2 years
Semivolatile Organic Compounds			
Source decay constant	1/yr	0.069	half-life = 10 years
Normalized organic carbon dist. coefficient, K_{oc} - benzo(a)anthracene	mL/g	398,000	USEPA 1996
Normalized organic carbon dist. coefficient, K_{oc} - benzo(a)pyrene	mL/g	1,020,000	USEPA 1996
Normalized organic carbon dist. coefficient, K_{oc} - benzo(b)fluoranthene	mL/g	1,230,000	USEPA 1996
Normalized organic carbon dist. coefficient, K_{oc} - dibenzo(a,h)anthracene	mL/g	3,800,000	USEPA 1996
Normalized organic carbon dist. coefficient, K_{oc} - indeno(1,2,3)pyrene	mL/g	3,470,000	USEPA 1996
Distribution coefficient, K_d	mL/g	derived	model-calculated (=K_{oc}*f_{oc})
Biological decay coefficient (unsaturated zone)	1/yr	0.069	half-life = 10 years
Metals			
Source decay constant	1/yr	0.0069	half-life = 100 years
Normalized organic carbon dist. coefficient, K_{oc}	mL/g	0.0	
Distribution coefficient, K_d - arsenic	mL/g	29	USEPA 1996 (As^{3+} at pH=6.8)
Distribution coefficient, K_d - chromium	mL/g	19	USEPA 1996 (Cr^{6+} at pH=6.8)
Distribution coefficient, K_d - lead	mL/g	8,000	USEPA 1992 (Pb^{2+})
Biological decay coefficient (unsaturated zone)	1/yr	0.0	

TABLE D-5
SUMMARY OF MULTIMED OUTPUT
CANNON AFB SWMUs 31, 77, AND 127

Model Run	Chemical	Source Conditions			Active Transport Processes			C_i (mg/L)	Unsaturated Zone Output		Saturated Zone Output	
		Steady-State	Pulse*	Decay**	Dispersion	Adsorption	Biodegradation		$(C_u)_{max}$ (mg/L)	AF	$(C_s)_{max}$ (mg/L)	DAF
127SB	Benzene	✓			✓			1.0	1.0	1.0	0.166	6.0
127SBB	Benzene	✓			✓		✓	1.0	5.1E-18	2.0E+17	8.4E-29	1.2E+28
127PSB	Benzene		✓		✓	✓		1.0	0.88	1.1	0.125	8.0
127PSBB	Benzene		✓		✓	✓	✓	1.0	5.2E-18	1.9E+17	0.0	-
127DSB	Benzene			✓	✓	✓		1.0	0.032	31	0.0051	196
127DSBB	Benzene			✓	✓	✓	✓	1.0	3.4E-19	2.9E+18	0.0	-
127SX	Xylenes	✓			✓			1.0	1.0	1.0	0.166	6.0
127SBX	Xylenes	✓			✓		✓	1.0	1.2E-35	8.6E+34	0.0	-
127PSX	Xylenes		✓		✓	✓		1.0	0.40	2.5	0.044	23
127PSBX	Xylenes		✓		✓	✓	✓	1.0	3.8E-36	2.6E+35	1.1E-38	9.1E+37
127DSX	Xylenes			✓	✓	✓		1.0	0.0114	88	0.00178	561
127DSBX	Xylenes			✓	✓	✓	✓	1.0	0.0	-	0.0	-
127SBA	Benzo(a)anthracene	✓			✓			1.0	1.0	1.0	0.166	6.0
127SBBA	Benzo(a)anthracene	✓			✓		✓	1.0	0.0	-	0.0	-
127PSBA	Benzo(a)anthracene		✓		✓	✓		1.0	0.00050	2,003	0.000068	14,607
127PSBBA	Benzo(a)anthracene		✓		✓	✓	✓	1.0	0.0	-	0.0	-
127DSBA	Benzo(a)anthracene			✓	✓	✓		1.0	0.000069	14,543	-	-
127DSBBA	Benzo(a)anthracene			✓	✓	✓	✓	1.0	0.0	-	0.0	-
127SBP	Benzo(a)pyrene	✓			✓			1.0	1.0	1.0	0.166	6.0
127SBBP	Benzo(a)pyrene	✓			✓		✓	1.0	0.0	-	0.0	-
127PSBP	Benzo(a)pyrene		✓		✓	✓		1.0	0.000195	5,131	0.000027	37,439
127PSBBP	Benzo(a)pyrene		✓		✓	✓	✓	1.0	0.0	-	0.0	-
127DSBP	Benzo(a)pyrene			✓	✓	✓		1.0	0.000027	37,258	-	-
127DSBBP	Benzo(a)pyrene			✓	✓	✓	✓	1.0	0.0	-	0.0	-
127SBF	Benzo(b)fluoranthene	✓			✓			1.0	1.0	1.0	0.166	6.0
127SBBF	Benzo(b)fluoranthene	✓			✓		✓	1.0	0.0	-	0.0	-
127PSBF	Benzo(b)fluoranthene		✓		✓	✓		1.0	0.0001616	6,188	0.000022	45,147
127PSBBF	Benzo(b)fluoranthene		✓		✓	✓	✓	1.0	0.0	-	0.0	-
127DSBF	Benzo(b)fluoranthene			✓	✓	✓		1.0	0.000022	44,944	-	-
127DSBBF	Benzo(b)fluoranthene			✓	✓	✓	✓	1.0	0.0	-	0.0	-
127SDA	Dibenzo(a,h)anthracene	✓			✓			1.0	1.0	1.0	0.166	6.0
127SBDA	Dibenzo(a,h)anthracene	✓			✓		✓	1.0	0.0	-	0.0	-
127PSDA	Dibenzo(a,h)anthracene		✓		✓	✓		1.0	0.000052	19,113	0.0000072	139,470
127PSBDA	Dibenzo(a,h)anthracene		✓		✓	✓	✓	1.0	0.0	-	0.0	-
127DSDA	Dibenzo(a,h)anthracene			✓	✓	✓		1.0	0.0000072	138,812	-	-
127DSBDA	Dibenzo(a,h)anthracene			✓	✓	✓	✓	1.0	0.0	-	0.0	-

TABLE D-5
SUMMARY OF MULTIMED OUTPUT
CANNON AFB SWMUs 31, 77, AND 127

Model Run	Chemical	Source Conditions			Active Transport Processes			C_i (mg/L)	Unsaturated Zone Output		Saturated Zone Output	
		Steady-State	Pulse*	Decay**	Dispersion	Adsorption	Biodegradation		$(C_u)_{max}$ (mg/L)	AF	$(C_s)_{max}$ (mg/L)	DAF
127SIP	Indeno(1,2,3)pyrene	✓			✓			1.0	1.0	1.0	0.166	6.0
127SBIP	Indeno(1,2,3)pyrene	✓			✓		✓	1.0	0.0	-	0.0	-
127PSIP	Indeno(1,2,3)pyrene		✓		✓	✓		1.0	0.000057	17,446	0.0000079	127,307
127PSBIP	Indeno(1,2,3)pyrene		✓		✓	✓	✓	1.0	0.0	-	0.0	-
127DSIP	Indeno(1,2,3)pyrene			✓	✓	✓		1.0	0.0000079	126,759	-	-
127DSBIP	Indeno(1,2,3)pyrene			✓	✓	✓	✓	1.0	0.0	-	0.0	-
127SAS	Arsenic	✓			✓			1.0	1.0	1.0	0.166	6.0
127PSAS	Arsenic		✓		✓	✓		1.0	0.0027	365	0.00038	2,658
127DSAS	Arsenic			✓	✓	✓		1.0	0.0038	265	-	-
127SCR	Chromium	✓			✓			1.0	1.0	1.0	0.166	6.0
127PSCR	Chromium		✓		✓	✓		1.0	0.0042	240	0.00057	1,741
127DSCR	Chromium			✓	✓	✓		1.0	0.0058	174	-	-
127SPB	Lead	✓			✓			1.0	1.0	1.0	0.166	6.0
127PSPB	Lead		✓		✓	✓		1.0	0.00000996	100,402	0.000001366	732,064
127DSPB	Lead			✓	✓	✓		1.0	0.00001369	73,046	-	-

* Pulse duration = 100 years.

** Decay half-life = 2 years for VOCs, 10 years for SVOCs, and 100 years for metals.

C_i = initial concentration at source

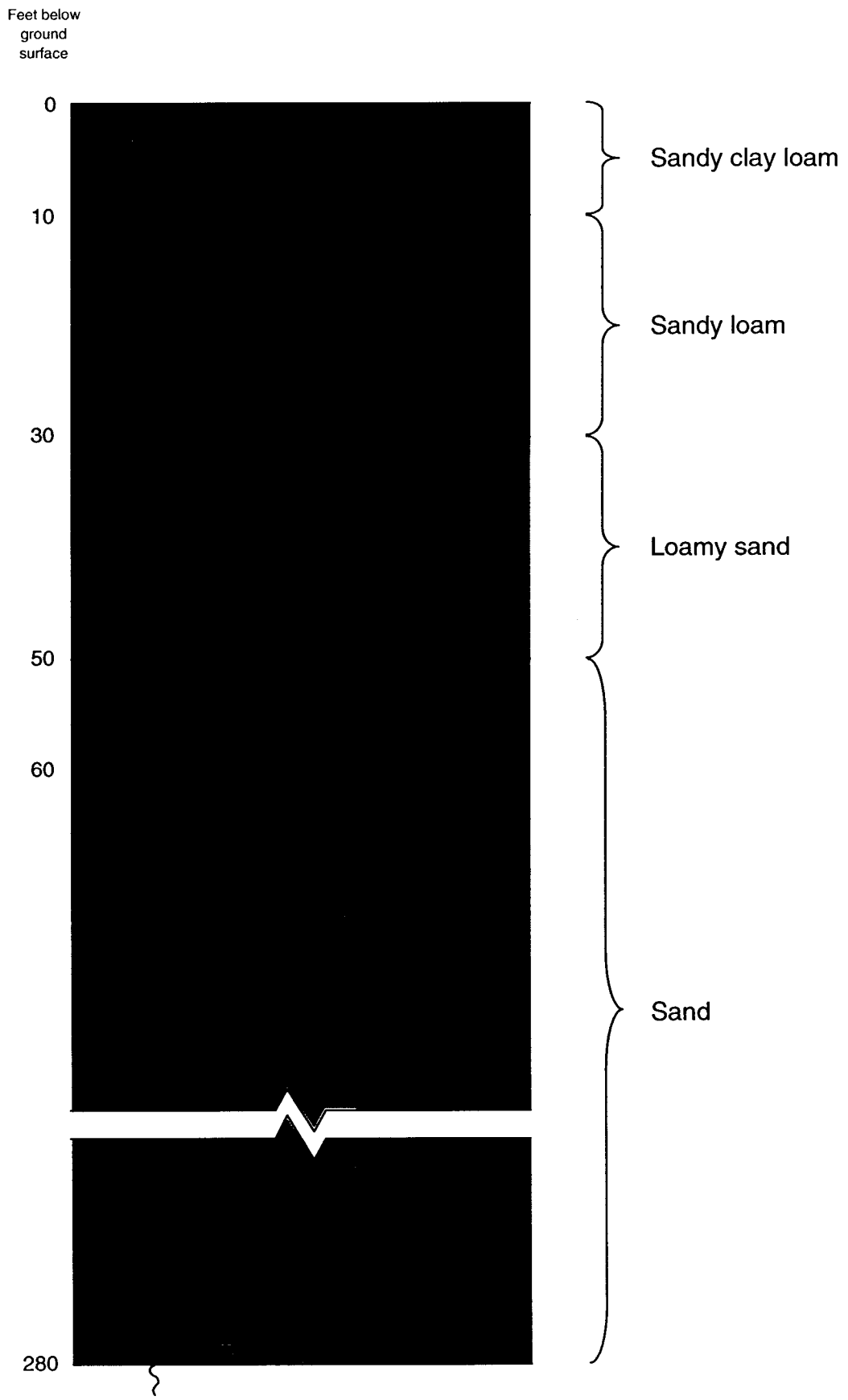
$(C_u)_{max}$ = maximum concentration at bottom of unsaturated zone

AF = attenuation factor for unsaturated zone (= C_i / $(C_u)_{max}$)

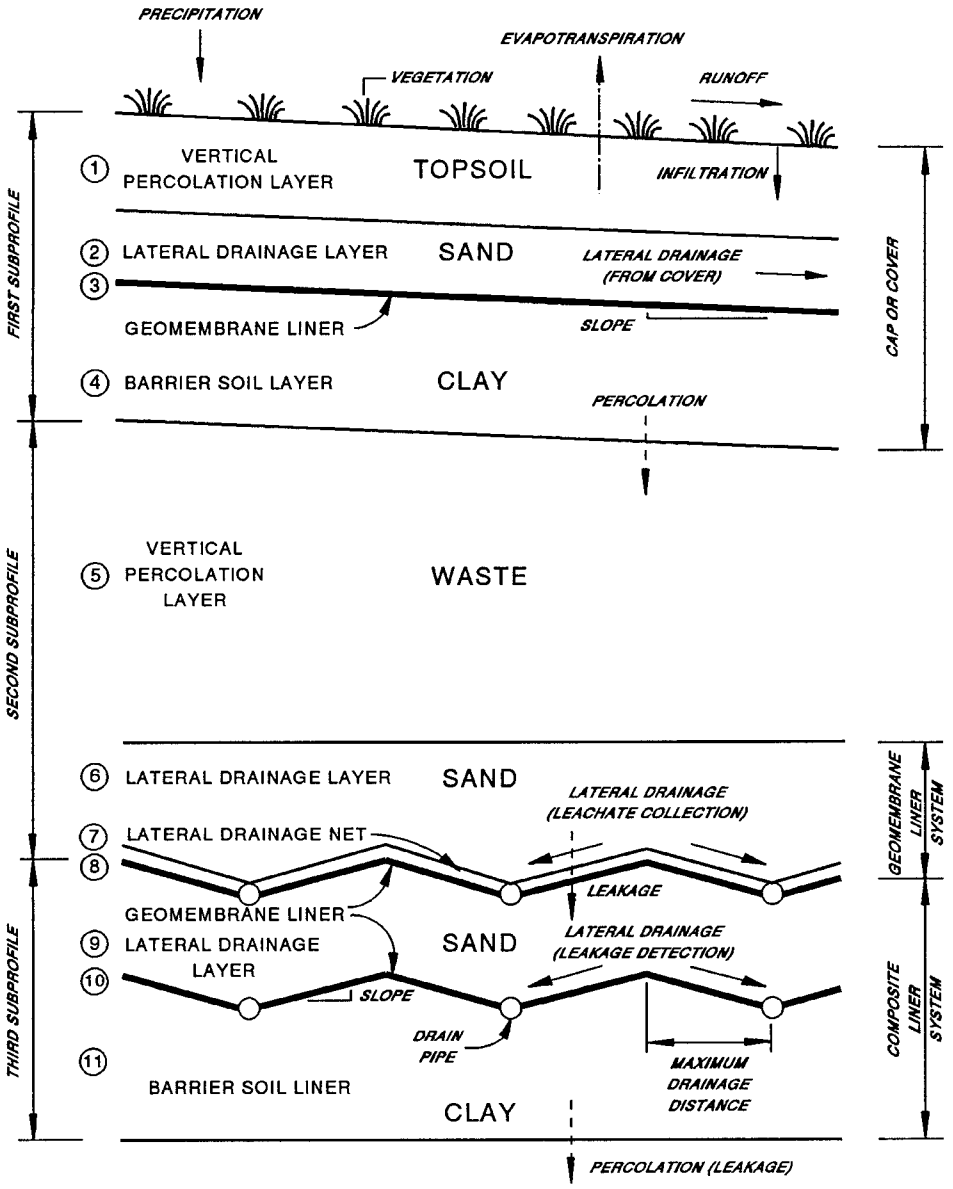
$(C_s)_{max}$ = maximum concentration at water table 1.0 m downgradient of source

DAF = dilution-attenuation factor at water table 1.0 m downgradient of source (= C_i / $(C_s)_{max}$)

"-" indicates concentration was not calculated by model or factor is not applicable



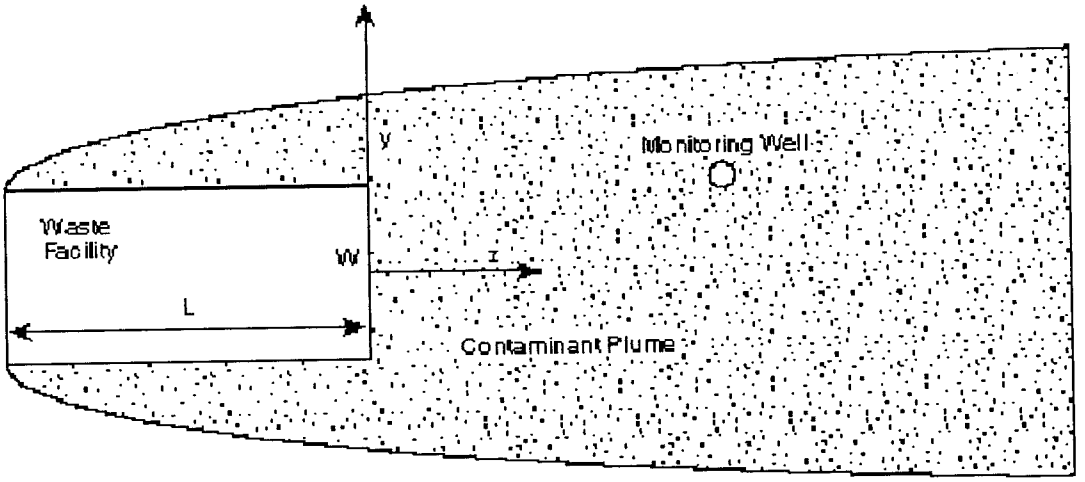
DRN. BY: JMR	DATE: 8/18/99	SWMUs 31, 77, and 127 VADOSE ZONE MODEL SCHEMATIC	FIG. NO.: D-1
PROJ. NO.: 45FM9602CC.00	REVISION: 0	CANNON AFB, NEW MEXICO	



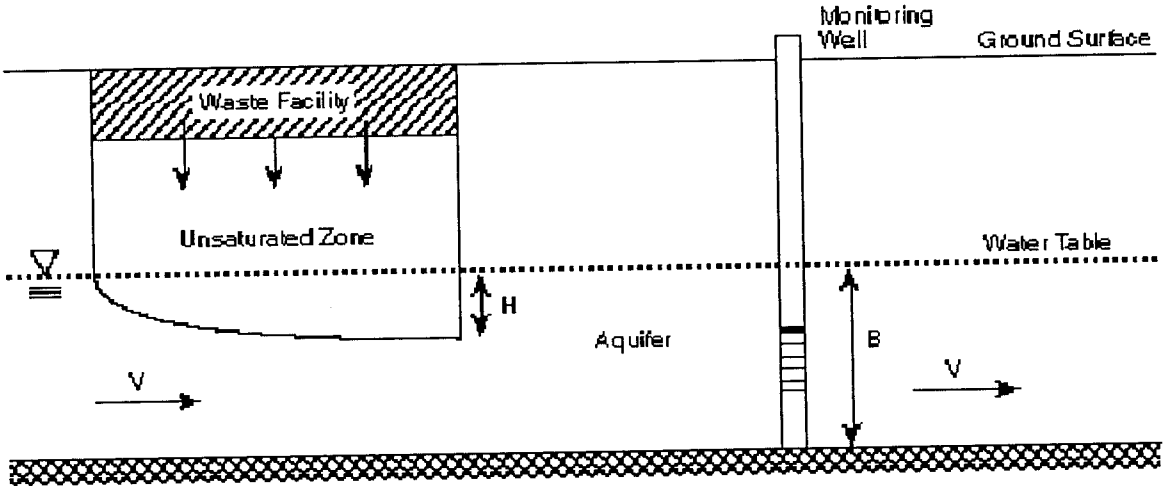
Source: Schroeder et al. 1994

DRN. BY: JMR	DATE: 8/18/99	TYPICAL LANDFILL PROFILE FOR USE WITH HELP MODEL	FIG. NO.: D-2
PROJ. NO.: 45FM9602CC.00	REVISION: 0		

PLAN VIEW

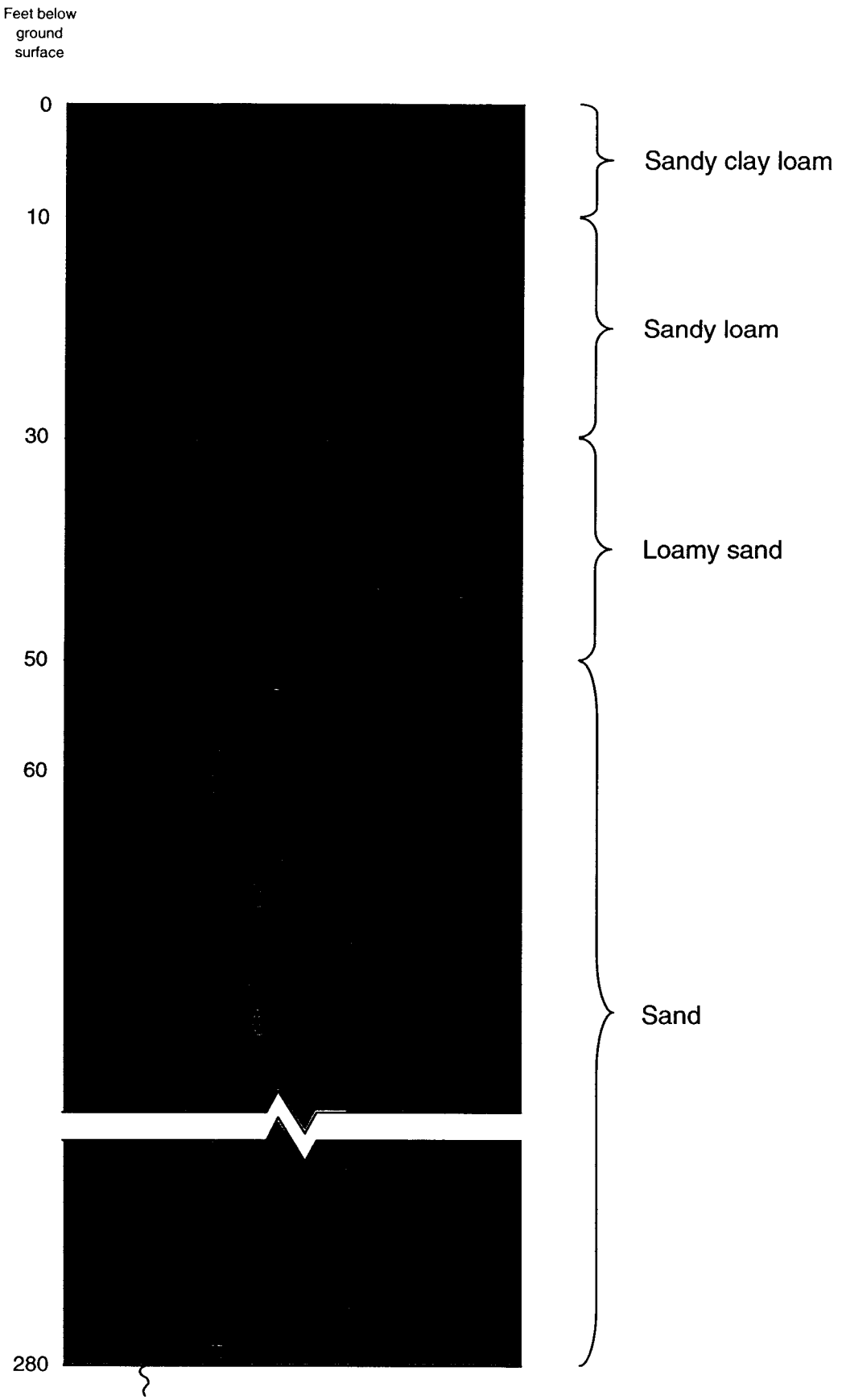


SECTION VIEW



Source: Salhotra et al. 1995

DRN. BY: JMR	DATE: 6/29/99	SCHEMATIC OF WASTE FACILITY AND LEACHATE MIGRATION FOR MULTIMED SIMULATION	FIG. NO.: D-3
PROJ. NO.: 45FM9602CC.00	REVISION: 0		



DRN. BY: JMR	DATE: 6/29/99	SWMUs 31, 77, and 127 VADOSE ZONE MODEL SCHEMATIC	FIG. NO.:
PROJ. NO.: 45FM9602CC.00	REVISION: 0	CANNON AFB, NEW MEXICO	D-1

ATTACHMENT D-1
HELP OUTPUT

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**               HELP MODEL VERSION 3.01   (14 OCTOBER 1994)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\CLOVIS.D4
TEMPERATURE DATA FILE:       C:\HELP3\CLOVIS.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\CLOVIS.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\3177127.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\3177127.D10
OUTPUT DATA FILE:            C:\HELP3\3177127s.OUT


TIME:  10:26     DATE:   6/ 3/1999


******************************************************************************

     TITLE:  Cannon AFB CMS SWMUs 31/77/127 - 0'-60' Soil Zone

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  10
          THICKNESS                   =    120.00   INCHES
          POROSITY                    =      0.3980 VOL/VOL
          FIELD CAPACITY              =      0.2440 VOL/VOL
          WILTING POINT               =      0.1360 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2342 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.119999997000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  1.80
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

```
                    LAYER  2
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER   6
THICKNESS                    =    240.00   INCHES
POROSITY                     =      0.4530 VOL/VOL
FIELD CAPACITY               =      0.1900 VOL/VOL
WILTING POINT                =      0.0850 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1900 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.720000011000E-03 CM/SEC

                    LAYER  3
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER   4
THICKNESS                    =    240.00   INCHES
POROSITY                     =      0.4370 VOL/VOL
FIELD CAPACITY               =      0.1050 VOL/VOL
WILTING POINT                =      0.0470 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1058 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.170000002000E-02 CM/SEC

                    LAYER  4
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER   2
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.4370 VOL/VOL
FIELD CAPACITY               =      0.0620 VOL/VOL
WILTING POINT                =      0.0240 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0620 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.579999993000E-02 CM/SEC

         GENERAL DESIGN AND EVAPORATIVE ZONE DATA
         ----------------------------------------

NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
         SOIL DATA BASE USING SOIL TEXTURE #10 WITH A
         POOR STAND OF GRASS, A SURFACE SLOPE OF  1.%
         AND A SLOPE LENGTH OF  100. FEET.
```

SCS RUNOFF CURVE NUMBER	=	90.40	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	0.500	ACRES
EVAPORATIVE ZONE DEPTH	=	18.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.220	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	7.164	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.448	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	106.552	INCHES
TOTAL INITIAL WATER	=	106.552	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

MAXIMUM LEAF AREA INDEX	=	1.00
START OF GROWING SEASON (JULIAN DATE)	=	95
END OF GROWING SEASON (JULIAN DATE)	=	303
AVERAGE ANNUAL WIND SPEED	=	13.70 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.43	0.43	0.60	1.05	2.09	2.62
2.65	2.95	2.15	1.62	0.57	0.61

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
37.00	41.20	47.20	56.60	65.50	74.40
77.60	76.10	69.20	58.50	46.30	38.30

SUMMARY OUTPUT

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

STATION LATITUDE = 34.42 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 100

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.42	0.45	0.59	1.01	2.17	2.52
	2.62	2.90	2.13	1.88	0.59	0.60
STD. DEVIATIONS	0.36	0.34	0.43	0.76	1.20	1.23
	1.34	1.79	1.43	1.61	0.60	0.58
RUNOFF						
TOTALS	0.001	0.000	0.003	0.032	0.116	0.205
	0.141	0.305	0.243	0.201	0.009	0.009
STD. DEVIATIONS	0.006	0.002	0.013	0.087	0.196	0.299
	0.198	0.456	0.354	0.397	0.030	0.035
EVAPOTRANSPIRATION						
TOTALS	0.461	0.356	0.405	0.693	1.918	2.910
	2.527	1.978	2.018	1.680	0.652	0.507
STD. DEVIATIONS	0.333	0.221	0.289	0.580	0.963	0.989
	1.187	1.152	0.948	1.031	0.565	0.396
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0286	0.0274	0.0296	0.0288	0.0310	0.0315
	0.0325	0.0323	0.0298	0.0291	0.0273	0.0274
STD. DEVIATIONS	0.0302	0.0294	0.0320	0.0297	0.0308	0.0310
	0.0319	0.0316	0.0305	0.0289	0.0281	0.0304

****

SUMMARY OUTPUT

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 100

	INCHES		CU. FEET	PERCENT
PRECIPITATION	17.88	(3.604)	32444.9	100.00
RUNOFF	1.264	(0.7991)	2293.73	7.070
EVAPOTRANSPIRATION	16.105	(2.9721)	29230.50	90.093
PERCOLATION/LEAKAGE THROUGH FROM LAYER 4	0.35533	(0.33076)	644.921	1.98774
CHANGE IN WATER STORAGE	0.152	(0.7933)	275.79	0.850

****

****

PEAK DAILY VALUES FOR YEARS 1 THROUGH 100

	(INCHES)	(CU. FT.)
PRECIPITATION	3.24	5880.600
RUNOFF	1.684	3056.8267
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.005196	9.43148
SNOW WATER	1.32	2396.3718

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2986

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1165

****

****

FINAL WATER STORAGE AT END OF YEAR 100

LAYER	(INCHES)	(VOL/VOL)
1	28.3945	0.2366
2	45.6093	0.1900
3	35.4677	0.1478
4	12.2753	0.1023
SNOW WATER	0.000	

****
****

ATTACHMENT D-2
MULTIMED OUTPUT

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Steady State - Sorption
Chemical simulated is Benzene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	58.9	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzene

	CONSTANT PARMS FOR MATERIAL 1	
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Steady State - Sorption/Biodegradation
Chemical simulated is Benzene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	58.9	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.8423E-28

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Steady State - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.5054E-17

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Pulse Source - Sorption
Chemical simulated is Benzene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0		1
NTSTPS - Number of time values concentration calc		20
DUMMY - Not presently used		1
ISOL - Type of scheme used in unsaturated zone		1
N - Stehfest terms or number of increments		18
NTEL - Points in Lagrangian interpolation		3
NGPTS - Number of Gauss points		104
NIT - Convolution integral segments		2
IBOUND - Type of boundary condition		2
ITSGEN - Time values generated or input		1
TMAX - Max simulation time	--	0.0
WTFUN - Weighting factor	--	1.2
Used only for Numerical Model	--	0.0
Used only for Numerical Model	--	0.0
Used only for Numerical Model	--	0.0
Used only for Numerical Model	--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

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CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	58.9	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1253

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

AT TIME = 0.9277E+02 CONC = 0.4187E-02
AT TIME = 0.1213E+03 CONC = -.3552E-02
AT TIME = 0.1451E+03 CONC = 0.1309E+00
AT TIME = 0.1649E+03 CONC = 0.3453E+00
AT TIME = 0.1814E+03 CONC = 0.5288E+00
AT TIME = 0.1914E+03 CONC = 0.6344E+00
AT TIME = 0.2014E+03 CONC = 0.7350E+00
AT TIME = 0.2114E+03 CONC = 0.8194E+00
AT TIME = 0.2214E+03 CONC = 0.8724E+00
AT TIME = 0.2314E+03 CONC = 0.8838E+00
AT TIME = 0.2414E+03 CONC = 0.8521E+00
AT TIME = 0.2514E+03 CONC = 0.7841E+00
AT TIME = 0.2614E+03 CONC = 0.6908E+00
AT TIME = 0.2714E+03 CONC = 0.5847E+00
AT TIME = 0.2814E+03 CONC = 0.4764E+00
AT TIME = 0.2979E+03 CONC = 0.3130E+00
AT TIME = 0.3178E+03 CONC = 0.1631E+00
AT TIME = 0.3415E+03 CONC = 0.5355E-01
AT TIME = 0.3701E+03 CONC = -.3798E-02
AT TIME = 0.5232E+03 CONC = 0.2718E-02

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Pulse Source - Sorption/Biodegradation
Chemical simulated is Benzene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	58.9	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

1

TIME CONCENTRATION

-.278E+02	0.00000E+00
-.572E-05	0.00000E+00

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Pulse Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00

6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00
9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00

57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00
60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.9277E+02  CONC = 0.3918E-17
AT TIME = 0.1213E+03  CONC = 0.5188E-17
AT TIME = 0.1451E+03  CONC = 0.5078E-17
AT TIME = 0.1649E+03  CONC = 0.4875E-17
AT TIME = 0.1814E+03  CONC = 0.2565E-17
AT TIME = 0.1914E+03  CONC = 0.1239E-17
AT TIME = 0.2014E+03  CONC = 0.3913E-18
AT TIME = 0.2114E+03  CONC = -.2377E-19
AT TIME = 0.2214E+03  CONC = -.1608E-18
AT TIME = 0.2314E+03  CONC = -.1579E-18
AT TIME = 0.2414E+03  CONC = -.1040E-18
AT TIME = 0.2514E+03  CONC = -.4481E-19
AT TIME = 0.2614E+03  CONC = 0.1163E-20
AT TIME = 0.2714E+03  CONC = 0.3011E-19
AT TIME = 0.2814E+03  CONC = 0.4427E-19
AT TIME = 0.2979E+03  CONC = 0.4643E-19
AT TIME = 0.3178E+03  CONC = 0.3332E-19
AT TIME = 0.3415E+03  CONC = 0.1522E-19
AT TIME = 0.3701E+03  CONC = 0.1072E-20
AT TIME = 0.5232E+03  CONC = -.2227E-20
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Decay Source - Sorption
Chemical simulated is Benzene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	58.9	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.5090E-02 (t = 182 yr)

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzene

CONSTANT PARMS FOR MATERIAL 1		
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Steady State - Sorption
Chemical simulated is Benzo(a)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.398E+06	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.9277E+02 CONC = -.1167E-02
AT TIME = 0.1149E+03 CONC = 0.1299E-02
AT TIME = 0.1371E+03 CONC = 0.1647E-01
AT TIME = 0.1593E+03 CONC = 0.2985E-01
AT TIME = 0.1814E+03 CONC = 0.3194E-01
AT TIME = 0.5232E+03 CONC = 0.3406E-03

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Decay Source - Sorption/Biodegradation
Chemical simulated is Benzene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	58.9	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000 (t = 182 yr)

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzene - Decay Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.9277E+02 CONC = 0.3447E-18
AT TIME = 0.1149E+03 CONC = 0.8586E-19
AT TIME = 0.1371E+03 CONC = -.1949E-19
AT TIME = 0.1593E+03 CONC = -.2231E-19
AT TIME = 0.1814E+03 CONC = -.6249E-20
AT TIME = 0.5232E+03 CONC = -.1520E-21

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Steady State - Sorption
Chemical simulated is Xylenes

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	363.	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Xylenes

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Steady State - Sorption/Biodegradation
Chemical simulated is Xylenes

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

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CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	363.	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

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SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Steady State - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Xylenes

CONSTANT PARMS FOR MATERIAL 1		
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1157E-34

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Pulse Source - Sorption
Chemical simulated is Xylenes

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	363.	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.4363E-01

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Xylenes

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

AT TIME = 0.2586E+03	CONC = 0.5282E-02
AT TIME = 0.3382E+03	CONC = -.9958E-02
AT TIME = 0.4045E+03	CONC = 0.1421E+00
AT TIME = 0.4598E+03	CONC = 0.3223E+00
AT TIME = 0.5058E+03	CONC = 0.3988E+00
AT TIME = 0.5158E+03	CONC = 0.4035E+00
AT TIME = 0.5258E+03	CONC = 0.4043E+00
AT TIME = 0.5358E+03	CONC = 0.4015E+00
AT TIME = 0.5458E+03	CONC = 0.3953E+00
AT TIME = 0.5558E+03	CONC = 0.3862E+00
AT TIME = 0.5658E+03	CONC = 0.3747E+00
AT TIME = 0.5758E+03	CONC = 0.3610E+00
AT TIME = 0.5858E+03	CONC = 0.3456E+00
AT TIME = 0.5958E+03	CONC = 0.3289E+00
AT TIME = 0.6058E+03	CONC = 0.3112E+00
AT TIME = 0.6519E+03	CONC = 0.2253E+00
AT TIME = 0.7071E+03	CONC = 0.1331E+00
AT TIME = 0.7734E+03	CONC = 0.5650E-01
AT TIME = 0.8530E+03	CONC = 0.9787E-02
AT TIME = 0.1235E+04	CONC = -.7072E-03

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Pulse Source - Sorption/Biodegradation
Chemical simulated is Xylenes

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	363.	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1102E-37

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Pulse Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Xylenes

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.2586E+03  CONC = 0.3833E-35
AT TIME = 0.3382E+03  CONC = -.4651E-36
AT TIME = 0.4045E+03  CONC = 0.2855E-37
AT TIME = 0.4598E+03  CONC = 0.9481E-37
AT TIME = 0.5058E+03  CONC = 0.5993E-37
AT TIME = 0.5158E+03  CONC = 0.5116E-37
AT TIME = 0.5258E+03  CONC = 0.4274E-37
AT TIME = 0.5358E+03  CONC = 0.3501E-37
AT TIME = 0.5458E+03  CONC = 0.2794E-37
AT TIME = 0.5558E+03  CONC = 0.2135E-37
AT TIME = 0.5658E+03  CONC = 0.1573E-37
AT TIME = 0.5758E+03  CONC = 0.1075E-37
AT TIME = 0.5858E+03  CONC = 0.6553E-38
AT TIME = 0.5958E+03  CONC = 0.3098E-38
AT TIME = 0.6058E+03  CONC = 0.2322E-40
AT TIME = 0.6519E+03  CONC = -.8326E-38
AT TIME = 0.7071E+03  CONC = -.1010E-37
AT TIME = 0.7734E+03  CONC = -.7389E-38
AT TIME = 0.8530E+03  CONC = -.3863E-38
AT TIME = 0.1235E+04  CONC = 0.7850E-39
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Decay Source - Sorption
Chemical simulated is Xylenes

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1
1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	363.	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1782E-02 (t = 506 yr!)

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Xylenes

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.2586E+03 CONC = -.4687E-03
AT TIME = 0.3204E+03 CONC = 0.7107E-03
AT TIME = 0.3822E+03 CONC = 0.6373E-02
AT TIME = 0.4440E+03 CONC = 0.1099E-01
AT TIME = 0.5058E+03 CONC = 0.1142E-01
AT TIME = 0.1235E+04 CONC = 0.5941E-04

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Decay Source - Sorption/Biodegradation
Chemical simulated is Xylenes

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

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UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	363.	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.350	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Xylenes - Decay Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Xylenes

CONSTANT PARMS FOR MATERIAL 1		
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.2586E+03 CONC = 0.0000E+00
AT TIME = 0.3204E+03 CONC = 0.0000E+00
AT TIME = 0.3822E+03 CONC = 0.0000E+00
AT TIME = 0.4440E+03 CONC = 0.0000E+00
AT TIME = 0.5058E+03 CONC = 0.0000E+00
AT TIME = 0.1235E+04 CONC = 0.0000E+00

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Steady State - Sorption/Biodegradation
Chemical simulated is Benzo(a)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.398E+06	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Steady State - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.0000E+00

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

1

TIME CONCENTRATION

```
                                                    ----      -------------
                                                     -.474E+05 0.00000E+00
                                                     -.117E-01 0.00000E+00
```

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Pulse Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)anthracene

	CONSTANT PARMS FOR MATERIAL 1	
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00

6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00
9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00

57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00
60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.2171E+06  CONC = 0.0000E+00
AT TIME = 0.2839E+06  CONC = 0.0000E+00
AT TIME = 0.3396E+06  CONC = 0.0000E+00
AT TIME = 0.3860E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4247E+06  CONC = 0.0000E+00
AT TIME = 0.4248E+06  CONC = 0.0000E+00
AT TIME = 0.4248E+06  CONC = 0.0000E+00
AT TIME = 0.4634E+06  CONC = 0.0000E+00
AT TIME = 0.5098E+06  CONC = 0.0000E+00
AT TIME = 0.5655E+06  CONC = 0.0000E+00
AT TIME = 0.6323E+06  CONC = 0.0000E+00
AT TIME = 0.9321E+06  CONC = 0.0000E+00
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.102E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)pyrene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Steady State - Sorption/Biodegradation
Chemical simulated is Benzo(a)pyrene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.102E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Steady State - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)pyrene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.0000E+00

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Pulse Source - Sorption
Chemical simulated is Benzo(a)pyrene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.102E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.2671E-04

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U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Decay Source - Sorption
Chemical simulated is Benzo(a)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.398E+06	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.2171E+06 CONC = -.2967E-05
AT TIME = 0.2690E+06 CONC = 0.5255E-05
AT TIME = 0.3209E+06 CONC = 0.4008E-04
AT TIME = 0.3728E+06 CONC = 0.6723E-04
AT TIME = 0.4247E+06 CONC = 0.6876E-04
AT TIME = 0.9321E+06 CONC = -.7200E-06

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Decay Source - Sorption/Biodegradation
Chemical simulated is Benzo(a)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.398E+06	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Decay Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.2171E+06 CONC = 0.0000E+00
AT TIME = 0.2690E+06 CONC = 0.0000E+00
AT TIME = 0.3209E+06 CONC = 0.0000E+00
AT TIME = 0.3728E+06 CONC = 0.0000E+00
AT TIME = 0.4247E+06 CONC = 0.0000E+00
AT TIME = 0.9321E+06 CONC = 0.0000E+00

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Steady State - Sorption
Chemical simulated is Benzo(a)pyrene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)pyrene

	CONSTANT PARMS FOR MATERIAL 1	
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.5564E+06  CONC = -.1095E-04
AT TIME = 0.7276E+06  CONC = 0.3437E-04
AT TIME = 0.8702E+06  CONC = 0.1509E-03
AT TIME = 0.9891E+06  CONC = 0.1949E-03
AT TIME = 0.1088E+07  CONC = 0.1844E-03
AT TIME = 0.1088E+07  CONC = 0.1843E-03
AT TIME = 0.1088E+07  CONC = 0.1844E-03
AT TIME = 0.1088E+07  CONC = 0.1844E-03
AT TIME = 0.1088E+07  CONC = 0.1844E-03
AT TIME = 0.1088E+07  CONC = 0.1844E-03
AT TIME = 0.1088E+07  CONC = 0.1844E-03
AT TIME = 0.1088E+07  CONC = 0.1844E-03
AT TIME = 0.1088E+07  CONC = 0.1843E-03
AT TIME = 0.1088E+07  CONC = 0.1844E-03
AT TIME = 0.1187E+07  CONC = 0.1492E-03
AT TIME = 0.1306E+07  CONC = 0.9916E-04
AT TIME = 0.1449E+07  CONC = 0.4937E-04
AT TIME = 0.1620E+07  CONC = 0.1452E-04
AT TIME = 0.2388E+07  CONC = -.2341E-05
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Pulse Source - Sorption/Biodegradation
Chemical simulated is Benzo(a)pyrene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.102E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

1

TIME CONCENTRATION

```
                                                    ----      -------------
                                                    -.122E+06 0.00000E+00
                                                    -.781E-02 0.00000E+00
```

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Pulse Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)pyrene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

```
-------------------------------------------------------
  RUN   NLAYER
  NO.
     1     1
```

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00

6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00
9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
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30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
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34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
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44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
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46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00

57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00
60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
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64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
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RUN NO. 1

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AT TIME = 0.1088E+07  CONC = 0.0000E+00
AT TIME = 0.1088E+07  CONC = 0.0000E+00
AT TIME = 0.1187E+07  CONC = 0.0000E+00
AT TIME = 0.1306E+07  CONC = 0.0000E+00
AT TIME = 0.1449E+07  CONC = 0.0000E+00
AT TIME = 0.1620E+07  CONC = 0.0000E+00
AT TIME = 0.2388E+07  CONC = 0.0000E+00
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Decay Source - Sorption
Chemical simulated is Benzo(a)pyrene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.102E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Pulse Source - Sorption
Chemical simulated is Benzo(a)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

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UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.398E+06	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.6846E-04

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)anthracene

	CONSTANT PARMS FOR MATERIAL 1	
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.2171E+06  CONC = -.2800E-04
AT TIME = 0.2839E+06  CONC = 0.8791E-04
AT TIME = 0.3396E+06  CONC = 0.3866E-03
AT TIME = 0.3860E+06  CONC = 0.4993E-03
AT TIME = 0.4247E+06  CONC = 0.4725E-03
AT TIME = 0.4247E+06  CONC = 0.4725E-03
AT TIME = 0.4247E+06  CONC = 0.4725E-03
AT TIME = 0.4247E+06  CONC = 0.4725E-03
AT TIME = 0.4247E+06  CONC = 0.4724E-03
AT TIME = 0.4247E+06  CONC = 0.4724E-03
AT TIME = 0.4247E+06  CONC = 0.4724E-03
AT TIME = 0.4247E+06  CONC = 0.4724E-03
AT TIME = 0.4247E+06  CONC = 0.4724E-03
AT TIME = 0.4248E+06  CONC = 0.4723E-03
AT TIME = 0.4248E+06  CONC = 0.4723E-03
AT TIME = 0.4634E+06  CONC = 0.3823E-03
AT TIME = 0.5098E+06  CONC = 0.2540E-03
AT TIME = 0.5655E+06  CONC = 0.1268E-03
AT TIME = 0.6323E+06  CONC = 0.3734E-04
AT TIME = 0.9321E+06  CONC = -.2986E-05
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)anthracene - Pulse Source - Sorption/Biodegradation
Chemical simulated is Benzo(a)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1
1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.398E+06	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)pyrene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.5564E+06 CONC = -.1158E-05
AT TIME = 0.6893E+06 CONC = 0.2052E-05
AT TIME = 0.8223E+06 CONC = 0.1565E-04
AT TIME = 0.9552E+06 CONC = 0.2624E-04
AT TIME = 0.1088E+07 CONC = 0.2684E-04
AT TIME = 0.2388E+07 CONC = -.2813E-06

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Decay Source - Sorption/Biodegradation
Chemical simulated is Benzo(a)pyrene

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1
1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.102E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(a)pyrene - Decay Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(a)pyrene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.5564E+06 CONC = 0.0000E+00
AT TIME = 0.6893E+06 CONC = 0.0000E+00
AT TIME = 0.8223E+06 CONC = 0.0000E+00
AT TIME = 0.9552E+06 CONC = 0.0000E+00
AT TIME = 0.1088E+07 CONC = 0.0000E+00
AT TIME = 0.2388E+07 CONC = 0.0000E+00

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Steady State - Sorption
Chemical simulated is Benzo(b)fluoranthene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.123E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(b)fluoranthene

CONSTANT PARMS FOR MATERIAL 1		
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Steady State - Sorption/Biodegradation
Chemical simulated is Benzo(b)fluoranthene

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.123E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Steady State - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(b)fluoranthene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.0000E+00

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Pulse Source - Sorption
Chemical simulated is Benzo(b)fluoranthene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1
1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

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CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.123E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.2215E-04

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(b)fluoranthene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.6709E+06  CONC = -.9080E-05
AT TIME = 0.8773E+06  CONC = 0.2850E-04
AT TIME = 0.1049E+07  CONC = 0.1252E-03
AT TIME = 0.1193E+07  CONC = 0.1616E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1312E+07  CONC = 0.1529E-03
AT TIME = 0.1432E+07  CONC = 0.1238E-03
AT TIME = 0.1575E+07  CONC = 0.8216E-04
AT TIME = 0.1747E+07  CONC = 0.4103E-04
AT TIME = 0.1953E+07  CONC = 0.1216E-04
AT TIME = 0.2880E+07  CONC = -.1956E-05
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Pulse Source - Sorption/Biodegradation
Chemical simulated is Benzo(b)fluoranthene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.123E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

1

TIME CONCENTRATION

-.147E+06	0.00000E+00
0.156E-01	0.00000E+00

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Pulse Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(b)fluoranthene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00

6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00
9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00

57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00
60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.6709E+06  CONC = 0.0000E+00
AT TIME = 0.8773E+06  CONC = 0.0000E+00
AT TIME = 0.1049E+07  CONC = 0.0000E+00
AT TIME = 0.1193E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1312E+07  CONC = 0.0000E+00
AT TIME = 0.1432E+07  CONC = 0.0000E+00
AT TIME = 0.1575E+07  CONC = 0.0000E+00
AT TIME = 0.1747E+07  CONC = 0.0000E+00
AT TIME = 0.1953E+07  CONC = 0.0000E+00
AT TIME = 0.2880E+07  CONC = 0.0000E+00
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Decay Source - Sorption
Chemical simulated is Benzo(b)fluoranthene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.123E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(b)fluoranthene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.6709E+06 CONC = -.9603E-06
AT TIME = 0.8312E+06 CONC = 0.1702E-05
AT TIME = 0.9915E+06 CONC = 0.1298E-04
AT TIME = 0.1152E+07 CONC = 0.2176E-04
AT TIME = 0.1312E+07 CONC = 0.2225E-04
AT TIME = 0.2880E+07 CONC = -.2333E-06

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Decay Source - Sorption/Biodegradation
Chemical simulated is Benzo(b)fluoranthene

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.123E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Benzo(b)fluoranthene - Decay Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Benzo(b)fluoranthene

CONSTANT PARMS FOR MATERIAL 1		
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.6709E+06 CONC = 0.0000E+00
AT TIME = 0.8312E+06 CONC = 0.0000E+00
AT TIME = 0.9915E+06 CONC = 0.0000E+00
AT TIME = 0.1152E+07 CONC = 0.0000E+00
AT TIME = 0.1312E+07 CONC = 0.0000E+00
AT TIME = 0.2880E+07 CONC = 0.0000E+00

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Steady State - Sorption
Chemical simulated is Dibenzo(a,h)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

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CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.380E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

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AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Dibenzo(a,h)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Steady State - Sorption/Biodegradation
Chemical simulated is Dibenzo(a,h)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.380E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Steady State - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Dibenzo(a,h)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.0000E+00

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Pulse Source - Sorption
Chemical simulated is Dibenzo(a,h)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.380E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.7170E-05

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Dibenzo(a,h)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.2073E+07  CONC = -.2941E-05
AT TIME = 0.2710E+07  CONC = 0.9231E-05
AT TIME = 0.3242E+07  CONC = 0.4053E-04
AT TIME = 0.3685E+07  CONC = 0.5232E-04
AT TIME = 0.4054E+07  CONC = 0.4945E-04
AT TIME = 0.4054E+07  CONC = 0.4951E-04
AT TIME = 0.4054E+07  CONC = 0.4952E-04
AT TIME = 0.4054E+07  CONC = 0.4950E-04
AT TIME = 0.4054E+07  CONC = 0.4949E-04
AT TIME = 0.4054E+07  CONC = 0.4950E-04
AT TIME = 0.4054E+07  CONC = 0.4948E-04
AT TIME = 0.4054E+07  CONC = 0.4946E-04
AT TIME = 0.4054E+07  CONC = 0.4947E-04
AT TIME = 0.4054E+07  CONC = 0.4947E-04
AT TIME = 0.4054E+07  CONC = 0.4949E-04
AT TIME = 0.4423E+07  CONC = 0.4008E-04
AT TIME = 0.4865E+07  CONC = 0.2658E-04
AT TIME = 0.5397E+07  CONC = 0.1338E-04
AT TIME = 0.6035E+07  CONC = 0.3822E-05
AT TIME = 0.8896E+07  CONC = 0.6767E-06
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Pulse Source - Sorption/Biodegradation
Chemical simulated is Dibenzo(a,h)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.380E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

1

TIME CONCENTRATION

```
                                                    ----      -------------
                                                    -.453E+06 0.00000E+00
                                                    0.313E-01 0.00000E+00
```

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Pulse Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Dibenzo(a,h)anthracene

```
                                        CONSTANT PARMS FOR MATERIAL  1
                                        -------- ----- --- --------
Saturated hydraulic conductivity           cm/hr          21.0
Unsaturated zone porosity                  --            0.437
Air entry pressure head                    m             0.726E-01
Depth of the unsaturated zone              m              67.0
Residual water content                     --            0.200E-01
Brook and Corey exponent,EN                --            0.000
ALFA coefficient                          1/cm           0.145
Van Genuchten exponent, ENN                --              2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

-------------------------------------------------------
 RUN   NLAYER
 NO.
   1     1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER  1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING


VADOSE FLOW MODEL RESULTS FOR RUN NO.     1

                 STEADY-STATE UNSATURATED FLOW MODEL RESULTS
          NODE       DARCY        WATER
          DEPTH     VELOCITY   SATURATION     HEAD
          -----     --------   ----------     ----
  1     0.000E+00   0.380E-01   0.144E+00  -0.264E+00
  2     0.100E+01   0.380E-01   0.144E+00  -0.264E+00
  3     0.200E+01   0.380E-01   0.144E+00  -0.264E+00
  4     0.300E+01   0.380E-01   0.144E+00  -0.264E+00
  5     0.400E+01   0.380E-01   0.144E+00  -0.264E+00
```

6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00
9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00

57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00
60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.2073E+07  CONC = 0.0000E+00
AT TIME = 0.2710E+07  CONC = 0.0000E+00
AT TIME = 0.3242E+07  CONC = 0.0000E+00
AT TIME = 0.3685E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4054E+07  CONC = 0.0000E+00
AT TIME = 0.4423E+07  CONC = 0.0000E+00
AT TIME = 0.4865E+07  CONC = 0.0000E+00
AT TIME = 0.5397E+07  CONC = 0.0000E+00
AT TIME = 0.6035E+07  CONC = 0.0000E+00
AT TIME = 0.8896E+07  CONC = 0.0000E+00
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Decay Source - Sorption
Chemical simulated is Dibenzo(a,h)anthracene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.380E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Dibenzo(a,h)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.2073E+07 CONC = -.3109E-06
AT TIME = 0.2568E+07 CONC = 0.5511E-06
AT TIME = 0.3063E+07 CONC = 0.4200E-05
AT TIME = 0.3558E+07 CONC = 0.7043E-05
AT TIME = 0.4054E+07 CONC = 0.7204E-05
AT TIME = 0.8896E+07 CONC = -.7555E-07

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Decay Source - Sorption/Biodegradation
Chemical simulated is Dibenzo(a,h)anthracene

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1
1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.380E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Dibenzo(a,h)anthracene - Decay Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Dibenzo(a,h)anthracene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.2073E+07 CONC = 0.0000E+00
AT TIME = 0.2568E+07 CONC = 0.0000E+00
AT TIME = 0.3063E+07 CONC = 0.0000E+00
AT TIME = 0.3558E+07 CONC = 0.0000E+00
AT TIME = 0.4054E+07 CONC = 0.0000E+00
AT TIME = 0.8896E+07 CONC = 0.0000E+00

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Steady State - Sorption
Chemical simulated is Indeno(1,2,3)pyrene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0		1
NTSTPS - Number of time values concentration calc		20
DUMMY - Not presently used		1
ISOL - Type of scheme used in unsaturated zone		1
N - Stehfest terms or number of increments		18
NTEL - Points in Lagrangian interpolation		3
NGPTS - Number of Gauss points		104
NIT - Convolution integral segments		2
IBOUND - Type of boundary condition		1
ITSGEN - Time values generated or input		1
TMAX - Max simulation time	--	0.0
WTFUN - Weighting factor	--	1.2
Used only for Numerical Model	--	0.0
Used only for Numerical Model	--	0.0
Used only for Numerical Model	--	0.0
Used only for Numerical Model	--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.347E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Indeno(1,2,3)pyrene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED - (Version 2.00 Beta - October 1996)

1
Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Steady State - Sorption/Biodegradation
Chemical simulated is Indeno(1,2,3)pyrene

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1
UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system
1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.347E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Steady State - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Indeno(1,2,3)pyrene

CONSTANT PARMS FOR MATERIAL 1		
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.0000E+00

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Pulse Source - Sorption
Chemical simulated is Indeno(1,2,3)pyrene

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1
1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.347E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.7855E-05

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Indeno(1,2,3)pyrene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.1893E+07  CONC = -.3221E-05
AT TIME = 0.2475E+07  CONC = 0.1011E-04
AT TIME = 0.2960E+07  CONC = 0.4438E-04
AT TIME = 0.3365E+07  CONC = 0.5732E-04
AT TIME = 0.3702E+07  CONC = 0.5421E-04
AT TIME = 0.3702E+07  CONC = 0.5418E-04
AT TIME = 0.3702E+07  CONC = 0.5421E-04
AT TIME = 0.3702E+07  CONC = 0.5419E-04
AT TIME = 0.3702E+07  CONC = 0.5420E-04
AT TIME = 0.3702E+07  CONC = 0.5424E-04
AT TIME = 0.3702E+07  CONC = 0.5420E-04
AT TIME = 0.3702E+07  CONC = 0.5420E-04
AT TIME = 0.3702E+07  CONC = 0.5422E-04
AT TIME = 0.3702E+07  CONC = 0.5418E-04
AT TIME = 0.3702E+07  CONC = 0.5423E-04
AT TIME = 0.4039E+07  CONC = 0.4387E-04
AT TIME = 0.4443E+07  CONC = 0.2916E-04
AT TIME = 0.4928E+07  CONC = 0.1476E-04
AT TIME = 0.5510E+07  CONC = 0.4656E-05
AT TIME = 0.8123E+07  CONC = -.7312E-06
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Pulse Source - Sorption/Biodegradation
Chemical simulated is Indeno(1,2,3)pyrene

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1
1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

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CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.347E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

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AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Decay Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Indeno(1,2,3)pyrene

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.1893E+07 CONC = 0.0000E+00
AT TIME = 0.2345E+07 CONC = 0.0000E+00
AT TIME = 0.2797E+07 CONC = 0.0000E+00
AT TIME = 0.3249E+07 CONC = 0.0000E+00
AT TIME = 0.3702E+07 CONC = 0.0000E+00
AT TIME = 0.8123E+07 CONC = 0.0000E+00

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Arsenic - Steady State - Sorption
Chemical simulated is Arsenic

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

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UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.725E+05	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	29.0	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Arsenic - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Arsenic

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Arsenic - Pulse Source - Sorption
Chemical simulated is Arsenic

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS - Number of time values concentration calc			20
DUMMY - Not presently used			1
ISOL - Type of scheme used in unsaturated zone			1
N - Stehfest terms or number of increments			18
NTEL - Points in Lagrangian interpolation			3
NGPTS - Number of Gauss points			104
NIT - Convolution integral segments			2
IBOUND - Type of boundary condition			2
ITSGEN - Time values generated or input			1
TMAX - Max simulation time	--		0.0
WTFUN - Weighting factor	--		1.2
Used only for Numerical Model	--		0.0
Used only for Numerical Model	--		0.0
Used only for Numerical Model	--		0.0
Used only for Numerical Model	--		0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.725E+05	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	29.0	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.3762E-03

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Arsenic - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Arsenic

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.3960E+05  CONC = -.1515E-03
AT TIME = 0.5179E+05  CONC = 0.4756E-03
AT TIME = 0.6194E+05  CONC = 0.2114E-02
AT TIME = 0.7040E+05  CONC = 0.2737E-02
AT TIME = 0.7745E+05  CONC = 0.2593E-02
AT TIME = 0.7746E+05  CONC = 0.2592E-02
AT TIME = 0.7747E+05  CONC = 0.2592E-02
AT TIME = 0.7748E+05  CONC = 0.2591E-02
AT TIME = 0.7749E+05  CONC = 0.2591E-02
AT TIME = 0.7750E+05  CONC = 0.2590E-02
AT TIME = 0.7751E+05  CONC = 0.2590E-02
AT TIME = 0.7752E+05  CONC = 0.2589E-02
AT TIME = 0.7753E+05  CONC = 0.2589E-02
AT TIME = 0.7754E+05  CONC = 0.2588E-02
AT TIME = 0.7755E+05  CONC = 0.2588E-02
AT TIME = 0.8460E+05  CONC = 0.2093E-02
AT TIME = 0.9307E+05  CONC = 0.1389E-02
AT TIME = 0.1032E+06  CONC = 0.6939E-03
AT TIME = 0.1154E+06  CONC = 0.2032E-03
AT TIME = 0.1701E+06  CONC = -.1951E-04
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Arsenic - Decay Source - Sorption
Chemical simulated is Arsenic

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.347E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

1

TIME CONCENTRATION

```
                                                    ----      -------------
                                                    -.413E+06 0.00000E+00
                                                    0.313E-01 0.00000E+00
```

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Pulse Source - Sorption/Biodegradation

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Indeno(1,2,3)pyrene

	CONSTANT PARMS FOR MATERIAL 1	
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00

6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00
9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00

57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00
60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.1893E+07  CONC = 0.0000E+00
AT TIME = 0.2475E+07  CONC = 0.0000E+00
AT TIME = 0.2960E+07  CONC = 0.0000E+00
AT TIME = 0.3365E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.3702E+07  CONC = 0.0000E+00
AT TIME = 0.4039E+07  CONC = 0.0000E+00
AT TIME = 0.4443E+07  CONC = 0.0000E+00
AT TIME = 0.4928E+07  CONC = 0.0000E+00
AT TIME = 0.5510E+07  CONC = 0.0000E+00
AT TIME = 0.8123E+07  CONC = 0.0000E+00
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Decay Source - Sorption
Chemical simulated is Indeno(1,2,3)pyrene

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.347E+07	-999.	0.000	-999.
Distribution coefficient	--	DERIVED	420.	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

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SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-01	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

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AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Indeno(1,2,3)pyrene

	CONSTANT PARMS FOR MATERIAL 1	
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.1893E+07 CONC = -.3404E-06
AT TIME = 0.2345E+07 CONC = 0.6036E-06
AT TIME = 0.2797E+07 CONC = 0.4600E-05
AT TIME = 0.3249E+07 CONC = 0.7713E-05
AT TIME = 0.3702E+07 CONC = 0.7889E-05
AT TIME = 0.8123E+07 CONC = -.8273E-07

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Indeno(1,2,3)pyrene - Decay Source - Sorption/Biodegradation
Chemical simulated is Indeno(1,2,3)pyrene

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

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UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

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UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

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CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.725E+05	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	29.0	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

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SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-02	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

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AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.3960E+05 CONC = -.1604E-03
AT TIME = 0.4907E+05 CONC = 0.2703E-03
AT TIME = 0.5853E+05 CONC = 0.2169E-02
AT TIME = 0.6799E+05 CONC = 0.3672E-02
AT TIME = 0.7745E+05 CONC = 0.3775E-02
AT TIME = 0.1701E+06 CONC = -.4028E-04

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Chromium - Steady State - Sorption
Chemical simulated is Chromium

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
------- ------
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
---- --- --------
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.475E+05	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	19.0	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Chromium - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Chromium

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Chromium - Pulse Source - Sorption
Chemical simulated is Chromium

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.475E+05	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	19.0	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	STD DEV	LIMITS MIN	MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.5743E-03

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Chromium - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Chromium

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.2597E+05  CONC = -.2291E-03
AT TIME = 0.3396E+05  CONC = 0.7192E-03
AT TIME = 0.4061E+05  CONC = 0.3220E-02
AT TIME = 0.4616E+05  CONC = 0.4174E-02
AT TIME = 0.5079E+05  CONC = 0.3956E-02
AT TIME = 0.5080E+05  CONC = 0.3955E-02
AT TIME = 0.5081E+05  CONC = 0.3954E-02
AT TIME = 0.5082E+05  CONC = 0.3953E-02
AT TIME = 0.5083E+05  CONC = 0.3951E-02
AT TIME = 0.5084E+05  CONC = 0.3950E-02
AT TIME = 0.5085E+05  CONC = 0.3949E-02
AT TIME = 0.5086E+05  CONC = 0.3948E-02
AT TIME = 0.5087E+05  CONC = 0.3947E-02
AT TIME = 0.5088E+05  CONC = 0.3945E-02
AT TIME = 0.5089E+05  CONC = 0.3944E-02
AT TIME = 0.5551E+05  CONC = 0.3189E-02
AT TIME = 0.6106E+05  CONC = 0.2115E-02
AT TIME = 0.6772E+05  CONC = 0.1056E-02
AT TIME = 0.7570E+05  CONC = 0.3094E-03
AT TIME = 0.1116E+06  CONC = -.2827E-04
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Chromium - Decay Source - Sorption
Chemical simulated is Chromium

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.475E+05	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	19.0	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-02	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Chromium - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Chromium

CONSTANT PARMS FOR MATERIAL 1

Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.2597E+05 CONC = -.2428E-03
AT TIME = 0.3217E+05 CONC = 0.3980E-03
AT TIME = 0.3838E+05 CONC = 0.3285E-02
AT TIME = 0.4458E+05 CONC = 0.5587E-02
AT TIME = 0.5079E+05 CONC = 0.5761E-02
AT TIME = 0.1116E+06 CONC = -.6200E-04

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Lead - Steady State - Sorption
Chemical simulated is Lead

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was steady-state
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		1
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.200E+08	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	0.800E+04	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1664

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Lead - Steady State - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Lead

CONSTANT PARMS FOR MATERIAL 1		
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1 STEADY-STATE CONC 0.1000E+01

1

DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Lead - Pulse Source - Sorption
Chemical simulated is Lead

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.200E+08	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	0.800E+04	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.1366E-05

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Lead - Pulse Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Lead

CONSTANT PARMS FOR MATERIAL 1		
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	0.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1

```
AT TIME = 0.1091E+08  CONC = -.5591E-06
AT TIME = 0.1426E+08  CONC = 0.1754E-05
AT TIME = 0.1706E+08  CONC = 0.7704E-05
AT TIME = 0.1939E+08  CONC = 0.9963E-05
AT TIME = 0.2133E+08  CONC = 0.9378E-05
AT TIME = 0.2133E+08  CONC = 0.9433E-05
AT TIME = 0.2133E+08  CONC = 0.9402E-05
AT TIME = 0.2133E+08  CONC = 0.9418E-05
AT TIME = 0.2133E+08  CONC = 0.9464E-05
AT TIME = 0.2133E+08  CONC = 0.9401E-05
AT TIME = 0.2133E+08  CONC = 0.9403E-05
AT TIME = 0.2133E+08  CONC = 0.9383E-05
AT TIME = 0.2133E+08  CONC = 0.9413E-05
AT TIME = 0.2133E+08  CONC = 0.9389E-05
AT TIME = 0.2133E+08  CONC = 0.9375E-05
AT TIME = 0.2328E+08  CONC = 0.7610E-05
AT TIME = 0.2561E+08  CONC = 0.5050E-05
AT TIME = 0.2840E+08  CONC = 0.2473E-05
AT TIME = 0.3176E+08  CONC = 0.9785E-06
AT TIME = 0.4682E+08  CONC = 0.1260E-05
```

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

MULTIMED - (Version 2.00 Beta - October 1996)

1

Run options
--- -------

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Lead - Decay Source - Sorption
Chemical simulated is Lead

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration input by user
Run was transient
Reject runs if Y coordinate outside plume
Do not reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY

1 67.00 1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	21.0	-999.	0.100E-10	0.100E+05
Unsaturated zone porosity	--	CONSTANT	0.437	-999.	0.100E-08	0.990
Air entry pressure head	m	CONSTANT	0.726E-01	-999.	0.000	-999.
Depth of the unsaturated zone	m	CONSTANT	67.0	-999.	0.100E-08	-999.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.200E-01	-999.	0.100E-08	1.00
Brook and Corey exponent,EN	--	CONSTANT	0.000	-999.	0.000	10.0
ALFA coefficient	1/cm	CONSTANT	0.145	-999.	0.000	1.00
Van Genuchten exponent, ENN	--	CONSTANT	2.68	-999.	1.00	5.00

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

Currently Not Used in Multimed Version 2.0			1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		3
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0
Used only for Numerical Model		--	0.0

Used only for Numerical Model -- 0.0

OPTIONS CHOSEN
--- ---
Analytical unsaturated zone model
Stehfest numerical inversion algorithm
Exponentially decaying continuous source
Computer generated times for computing concentrations
1

DATA FOR MATERIAL 1
--- --- ---
VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Longitudinal dispersivity of material	m	CONSTANT	1.00	-999.	0.100E-02	0.100E+05
Percent organic matter	--	CONSTANT	0.700E-01	-999.	0.000	100.
Bulk density of soil for material	g/cc	CONSTANT	1.49	-999.	0.100E-01	5.00
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000
Parameter not used by the Analytical Model		CONSTANT	0.000	0.000	0.000	0.000

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Dissolved phase decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Overall chemical decay coefficient	1/yr	DERIVED	-999.	-999.	0.000	0.100E+11
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	0.000	-999.
Reference temperature	C	CONSTANT	25.0	-999.	0.000	100.
Normalized distribution coefficient	ml/g	CONSTANT	0.200E+08	-999.	0.000	-999.
Distribution coefficient	--	CONSTANT	0.800E+04	-999.	0.000	0.100E+11
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	0.000	-999.
Air diffusion coefficient	cm2/s	CONSTANT	0.000	-999.	0.000	10.0
Reference temperature for air diffusion	C	CONSTANT	25.0	-999.	0.000	100.
Molecular weight	g/M	CONSTANT	0.000	-999.	0.000	-999.
Mole fraction of solute	--	CONSTANT	0.000	-999.	0.100E-08	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000	-999.	0.000	100.
Henry`s law constant	atm-m^3/M	CONSTANT	0.000	-999.	0.100E-09	1.00

Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000	1.00
Soil/Air Boundary Layer Thickness	cm	CONSTANT	-999.	-999.	0.000	-999.
Not currently used		CONSTANT	-999.	-999.	0.000	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.380E-01	-999.	0.100E-09	0.100E+11
Area of waste disposal unit	m^2	CONSTANT	0.100E+04	-999.	0.100E-01	-999.
Duration of pulse	yr	CONSTANT	100.	-999.	0.100E-08	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Recharge rate	m/yr	CONSTANT	0.380E-01	-999.	0.000	0.100E+11
Source decay constant	1/yr	CONSTANT	0.690E-02	-999.	0.000	-999.
Initial concentration at landfill	mg/l	CONSTANT	1.00	-999.	0.000	-999.
Length scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Width scale of facility	m	DERIVED	-999.	-999.	0.100E-08	0.100E+11
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.200	-999.	0.100E-08	100.
Aquifer porosity	--	CONSTANT	0.400	-999.	0.100E-08	0.990
Bulk density	g/cc	CONSTANT	1.59	-999.	0.100E-01	5.00
Aquifer thickness	m	CONSTANT	37.0	-999.	0.100E-08	0.100E+06
Source thickness (mixing zone depth)	m	DERIVED	-999.	-999.	0.100E-08	0.100E+06
Conductivity (hydraulic)	m/yr	CONSTANT	0.320E+04	-999.	0.100E-06	0.100E+09
Gradient (hydraulic)		CONSTANT	0.150E-02	-999.	0.100E-07	-999.
Groundwater seepage velocity	m/yr	DERIVED	12.0	-999.	0.100E-09	0.100E+09
Retardation coefficient	--	DERIVED	0.167E+04	-999.	1.00	0.100E+09
Longitudinal dispersivity	m	CONSTANT	0.100	-999.	0.100E-02	0.100E+05
Transverse dispersivity	m	CONSTANT	0.333E-01	-999.	0.100E-02	0.100E+05
Vertical dispersivity	m	CONSTANT	0.560E-02	-999.	0.100E-02	0.100E+05
Temperature of aquifer	C	CONSTANT	12.0	-999.	0.000	100.
pH	--	CONSTANT	6.80	-999.	0.300	14.0
Organic carbon content (fraction)		CONSTANT	0.400E-03	-999.	0.100E-05	1.00
Well distance from site	m	CONSTANT	1.00	-999.	1.00	-999.
Angle off center	degree	CONSTANT	0.000	-999.	0.000	360.
Well vertical distance	m	CONSTANT	0.000	-999.	0.000	1.00

CONCENTRATION AFTER SATURATED ZONE MODEL 0.0000

Cannon AFB SWMUs 31/77/127 - Vadose Zone

Lead - Decay Source - Sorption

VADOSE FLOW MODEL: INPUT PARAMETERS AND OUTPUT

SIMULATION RUN FOR Lead

	CONSTANT PARMS FOR MATERIAL 1	
Saturated hydraulic conductivity	cm/hr	21.0
Unsaturated zone porosity	--	0.437
Air entry pressure head	m	0.726E-01
Depth of the unsaturated zone	m	67.0
Residual water content	--	0.200E-01
Brook and Corey exponent,EN	--	0.000
ALFA coefficient	1/cm	0.145
Van Genuchten exponent, ENN	--	2.68

MONTE CARLO AND MODEL DERIVED PARMS ARE LISTED BELOW,
ONE LINE FOR EACH MATERIAL, FOR EXAMPLE:

RUN NO.	NLAYER
1	1

THESE ARE THE MONTE CARLO AND DERIVED VALUES USED
FOR THE FIRST ITERATION, LAYER 1
VALUES FOR OTHER ITERATIONS FOLLOW THE LAST CONSTANT PARM LISTING

VADOSE FLOW MODEL RESULTS FOR RUN NO. 1

STEADY-STATE UNSATURATED FLOW MODEL RESULTS

	NODE DEPTH	DARCY VELOCITY	WATER SATURATION	HEAD
1	0.000E+00	0.380E-01	0.144E+00	-0.264E+00
2	0.100E+01	0.380E-01	0.144E+00	-0.264E+00
3	0.200E+01	0.380E-01	0.144E+00	-0.264E+00
4	0.300E+01	0.380E-01	0.144E+00	-0.264E+00
5	0.400E+01	0.380E-01	0.144E+00	-0.264E+00
6	0.500E+01	0.380E-01	0.144E+00	-0.264E+00
7	0.600E+01	0.380E-01	0.144E+00	-0.264E+00
8	0.700E+01	0.380E-01	0.144E+00	-0.264E+00

9	0.800E+01	0.380E-01	0.144E+00	-0.264E+00
10	0.900E+01	0.380E-01	0.144E+00	-0.264E+00
11	0.100E+02	0.380E-01	0.144E+00	-0.264E+00
12	0.110E+02	0.380E-01	0.144E+00	-0.264E+00
13	0.120E+02	0.380E-01	0.144E+00	-0.264E+00
14	0.130E+02	0.380E-01	0.144E+00	-0.264E+00
15	0.140E+02	0.380E-01	0.144E+00	-0.264E+00
16	0.150E+02	0.380E-01	0.144E+00	-0.264E+00
17	0.160E+02	0.380E-01	0.144E+00	-0.264E+00
18	0.170E+02	0.380E-01	0.144E+00	-0.264E+00
19	0.180E+02	0.380E-01	0.144E+00	-0.264E+00
20	0.190E+02	0.380E-01	0.144E+00	-0.264E+00
21	0.200E+02	0.380E-01	0.144E+00	-0.264E+00
22	0.210E+02	0.380E-01	0.144E+00	-0.264E+00
23	0.220E+02	0.380E-01	0.144E+00	-0.264E+00
24	0.230E+02	0.380E-01	0.144E+00	-0.264E+00
25	0.240E+02	0.380E-01	0.144E+00	-0.264E+00
26	0.250E+02	0.380E-01	0.144E+00	-0.264E+00
27	0.260E+02	0.380E-01	0.144E+00	-0.264E+00
28	0.270E+02	0.380E-01	0.144E+00	-0.264E+00
29	0.280E+02	0.380E-01	0.144E+00	-0.264E+00
30	0.290E+02	0.380E-01	0.144E+00	-0.264E+00
31	0.300E+02	0.380E-01	0.144E+00	-0.264E+00
32	0.310E+02	0.380E-01	0.144E+00	-0.264E+00
33	0.320E+02	0.380E-01	0.144E+00	-0.264E+00
34	0.330E+02	0.380E-01	0.144E+00	-0.264E+00
35	0.340E+02	0.380E-01	0.144E+00	-0.264E+00
36	0.350E+02	0.380E-01	0.144E+00	-0.264E+00
37	0.360E+02	0.380E-01	0.144E+00	-0.264E+00
38	0.370E+02	0.380E-01	0.144E+00	-0.264E+00
39	0.380E+02	0.380E-01	0.144E+00	-0.264E+00
40	0.390E+02	0.380E-01	0.144E+00	-0.264E+00
41	0.400E+02	0.380E-01	0.144E+00	-0.264E+00
42	0.410E+02	0.380E-01	0.144E+00	-0.264E+00
43	0.420E+02	0.380E-01	0.144E+00	-0.264E+00
44	0.430E+02	0.380E-01	0.144E+00	-0.264E+00
45	0.440E+02	0.380E-01	0.144E+00	-0.264E+00
46	0.450E+02	0.380E-01	0.144E+00	-0.264E+00
47	0.460E+02	0.380E-01	0.144E+00	-0.264E+00
48	0.470E+02	0.380E-01	0.144E+00	-0.264E+00
49	0.480E+02	0.380E-01	0.144E+00	-0.264E+00
50	0.490E+02	0.380E-01	0.144E+00	-0.264E+00
51	0.500E+02	0.380E-01	0.144E+00	-0.264E+00
52	0.510E+02	0.380E-01	0.144E+00	-0.264E+00
53	0.520E+02	0.380E-01	0.144E+00	-0.264E+00
54	0.530E+02	0.380E-01	0.144E+00	-0.264E+00
55	0.540E+02	0.380E-01	0.144E+00	-0.264E+00
56	0.550E+02	0.380E-01	0.144E+00	-0.264E+00
57	0.560E+02	0.380E-01	0.144E+00	-0.264E+00
58	0.570E+02	0.380E-01	0.144E+00	-0.264E+00
59	0.580E+02	0.380E-01	0.144E+00	-0.264E+00

60	.590E+02	0.380E-01	0.144E+00	-0.264E+00
61	0.600E+02	0.380E-01	0.144E+00	-0.264E+00
62	0.610E+02	0.380E-01	0.144E+00	-0.264E+00
63	0.620E+02	0.380E-01	0.144E+00	-0.264E+00
64	0.630E+02	0.380E-01	0.144E+00	-0.264E+00
65	0.640E+02	0.380E-01	0.144E+00	-0.264E+00
66	0.650E+02	0.380E-01	0.149E+00	-0.263E+00
67	0.660E+02	0.380E-01	0.361E+00	-0.249E+00
68	0.670E+02	0.380E-01	0.100E+01	0.000E+00

CONCENTRATION AT BOTTOM OF VADOSE ZONE
RUN NO. 1
AT TIME = 0.1091E+08 CONC = -.5907E-06
AT TIME = 0.1351E+08 CONC = 0.1047E-05
AT TIME = 0.1612E+08 CONC = 0.7981E-05
AT TIME = 0.1873E+08 CONC = 0.1338E-04
AT TIME = 0.2133E+08 CONC = 0.1369E-04
AT TIME = 0.4682E+08 CONC = -.1436E-06

1 UNSATURATED ZONE TRANSPORT RESULTS

SERIAL NUMBER	TIME	DEPTH	CONCENTRATION	NORMALIZED CONCENTRATION

FOSTER WHEELER ENVIRONMENTAL CORPORATION

August 13, 1999
TERC-021.001-99X-019

Mr. Tom Zink, P.G.
U.S. Army Corps of Engineers
Attn: CENWO-MD-HA, 9th Floor
215 North 17th Street
Omaha, NE 68102-4978

Subject: TERC Contract No. DACW45-94-D-0003, Delivery Order 21, WAD 1;
Draft Letter Report for Voluntary Corrective Measure Implementation— SWMU 31,
Cannon Air Force Base, New Mexico

Dear Mr. Zink:

Foster Wheeler Environmental Corporation (Foster Wheeler) is submitting four (4) copies of the following draft letter report that presents the results of the voluntary corrective measure implemented at the Aerospace Ground Equipment (AGE) Maintenance Pad (Solid Waste Management Unit [SWMU] 31) at Cannon Air Force Base (AFB), New Mexico. This voluntary corrective measure implementation (CMI) was performed to achieve closure of the site per Cannon AFB's Resource Conservation and Recovery Act (RCRA) permit, issued by the New Mexico Environment Department (NMED) on behalf of the United States Environmental Protection Agency (EPA). At the direction of the United States Army Corps of Engineers (USACE) and Cannon AFB, Foster Wheeler excavated and disposed of the contaminated soil at SWMU 31 and restored the site. All work was conducted in accordance with the CMI Work Plan for SWMU 31 (USAF, 1999).

This letter report provides the objectives of the voluntary CMI, summarizes the site description and history, describes the field activities and sampling program conducted during February and March 1999, reports the analytical data results, and presents site conclusions. As directed by Cannon AFB, this report was developed with the intent that it would be included as an attachment to a Corrective Measure Study Report being prepared by Woodward Clyde.

143 UNION BOULEVARD, SUITE 1010, LAKEWOOD, CO 80228-1824
TEL: 303-988-2202 FAX: 303-980-3539

1.0 PROJECT OBJECTIVES

The CMI SWMU 31 project objectives include the following actions:

- Excavate contaminated soil from one area located in SWMU 31 (adjacent to soil boring SB-3101)
- Verify removal of contaminated soil
- Characterize excavated soils for disposal
- Perform site restoration (clean backfill and revegetation)

As specified by the approved CMI Work Plan (Foster Wheeler, 1999), a 10-ft-by-5-ft-by-2-ft-deep excavation around soil boring SB-3101 was completed; due to funding limitations for this project, excavation activities ceased at the limits defined by USACE. Verification samples were analyzed and contaminant concentrations compared to Cannon AFB background levels (Woodward Clyde, 1997) and the total recoverable petroleum hydrocarbon (TRPH) action level to confirm that contaminated soil has been removed from the site.

2.0 SITE BACKGROUND AND HISTORY

A brief summary of the site description and history is provided below. The site history and detailed descriptions of previous site activities have been presented in previous investigation reports (Woodward Clyde, 1994; 1995).

SWMU 31, the AGE Maintenance Pad, is located in an open concrete area adjacent to the southeast side of the AGE Maintenance Shop in Building 186. A washrack is located in a 45-square foot (ft) area beyond the southeast edge of the pad. The AGE Drainage Ditch (SWMU 34), located to the northeast of SWMU 31, carries runoff from the maintenance pad to the northeast. The maintenance pad has been active since 1971. Wash water associated with site activities along with surface and storm water runoff flows off the pad to the southeast and is potentially contaminated with JP-4, oils, and diesel fuel. However, the Appendix I Remedial Investigation of the soils lining the SWMU 34 AGE Ditch found negligible to nondetectable levels of the target contaminants in the soils sampled (Woodward Clyde, 1991; 1992).

Previous investigations conducted at SWMU 31 identified potential contaminants at the SWMU, including metals, JP-4, oils, and diesel fuel. As reported in the Phase I and Phase II RCRA

Facility Investigations (RFIs) for the Appendix III SWMUs at Cannon AFB (Woodward Clyde, 1994; 1995), TRPH and chromium were detected at concentrations exceeding their respective background or action levels at one location, and lead was detected above background levels at two locations in the area of the planned excavation. TRPH was detected in soil samples collected from 0 to 2 ft below ground surface (bgs) at soil boring SB-3101 (3,180 milligrams per kilogram [mg/kg]) and soil boring SB-3105 (696 mg/kg), compared to the NMED action level for TRPH of 1,000 mg/kg. Lead concentrations in the samples collected from 0 to 2 ft bgs at soil borings SB-3101 (930 mg/kg) and SB-3105 (42.7 mg/kg) exceeded the background level of 8.7 mg/kg. Chromium was also detected in these two samples at concentrations of 130 mg/kg (SB-3101) and 11.3 mg/kg (SB-3105), compared to the background level of 13.3 mg/kg.

3.0 FIELD ACTIVITIES

On February 17 and 18, 1999, site mobilization, excavation of contaminated soil, and verification and confirmation sampling were performed. As specified in the CMI Work Plan (Foster Wheeler, 1999), a backhoe was used to remove the contaminated soil from the 10-ft-by-5-ft-by-2-ft-deep excavation around soil boring SB-3101.

The excavation limits were surveyed by a New Mexico Registered Land Surveyor (Lydick Engineers) and transferred to site maps provided by Woodward Clyde. The attached Figure 1 depicts the location of the excavation at SWMU 31. The excavated soil was then deposited into a rolloff container for storage pending characterization sampling results. Closure/verification samples were collected as described in the Sampling and Analysis Plan provided in the CMI Work Plan (Foster Wheeler, 1999) and submitted for laboratory analysis. The locations of the closure verification samples are shown on Figure 1. Prior to backfilling, the excavated areas were taped and barricaded.

The analytical results for the verification soil samples collected from the excavated area are provided as an attachment to this report, and are also shown on the attached Figure 1. TRPH was not detected above the method reporting limit in any of the samples. Total lead concentrations exceeded the method reporting limit in only one sample, at a value of 10 mg/kg, and total chromium concentrations ranged from 3.9 to 11.4 mg/kg. Background concentrations for chromium and lead are 13.3 and 8.7 mg/kg, respectively. Therefore, Foster Wheeler recommended that the excavation be backfilled with clean fill from the Cannon AFB

maintenance yard (letter dated March 18, 1999). Cannon AFB and USACE approved this recommendation on March 22, 1999.

Soil generated during excavation activities was characterized to determine appropriate management and disposition. Waste management and characterization were performed in accordance with the CMI Work Plan (Foster Wheeler, 1999). Excavated soil was placed and stored in a rolloff container until disposal options were determined based on the characterization analysis.

Information obtained from Cannon AFB personnel and the USACE concerning the potential contaminants of concern for SWMU 31 were used as generator knowledge. Based on this information, the SWMU 31 characterization soil sample was analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals, and ignitibility, based on the previously reported detections of lead, chromium, and TRPH. The TCLP analysis reported barium at a concentration of 1560 micrograms per liter (μg/L), cadmium at a concentration of 5 μg/L, and chromium at a concentration of 69.5 μg/L. Lead was not detected in the characterization sample above the method reporting limit. The TCLP results verify there were no exceedances of the RCRA TCLP regulatory levels. The ignitibility of the characterization soil sample exceeded 200 degrees Fahrenheit indicating the material is not ignitable. Using the laboratory analytical data, a Material Profile and Certificate of Non-Hazardous Waste was completed for the soil excavated from SWMU 31 (letter dated March 18, 1999). Foster Wheeler recommended that the soil be classified as non-hazardous and disposed of at Safety-Kleen's Lone Mountain facility in Oklahoma. Cannon AFB and USACE approved this recommendation on March 20, 1999.

On March 24, 1999, transportation and disposal of the contaminated soil, site restoration, and demobilization was performed. The Uniform Hazardous Waste Manifest from Safety-Kleen is provided as an attachment to this letter report. The revegetation was performed using seeded grass similar to that found in adjacent areas. The remainder of the area was returned to its original condition. USACE and Cannon AFB performed the Final Acceptance Inspection of the site prior to demobilization.

4.0 CONCLUSIONS

Based on evaluation of the CMI analytical data, the contaminated soil from the 10-ft-by-5-ft-by-2-ft area adjacent to soil boring SB-3101 has been removed. The excavated soil was characterized as non-hazardous, and transported to Safety-Kleen's Lone Mountain facility and disposed of. Site restoration at SWMU 31 has been completed in accordance with the CMI Work Plan and project objectives have been achieved.

5.0 REFERENCES

Foster Wheeler (Foster Wheeler Environmental Corporation)
1999 Corrective Measure Implementation Work Plan FOR SWMU 31 (AGE Maintenance Pad) and SWMU 77 (Civil Engineering Container Storage Area) Cannon Air Force Base, Clovis, New Mexico

Woodward Clyde
1997 Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico.

1995 RCRA Facility Investigation, Appendix III SWMUs—Phase II, Cannon Air Force Base, New Mexico, Draft. Volume 1A, April 1995.

1994 RCRA Facility Investigation, Appendix III SWMUs—Phase I, Cannon Air Force Base, New Mexico, February.

1992 Remedial Investigation Report for 18 Solid Waste Management Units. Cannon Air Force Base; Clovis, New Mexico. October.

1991 Remedial Investigation Report for 18 Solid Waste Management Units, Cannon Air Force Base, New Mexico.

If you would like more detailed information or if you have any other questions or concerns, please call me at (505) 878-8905.

Sincerely,

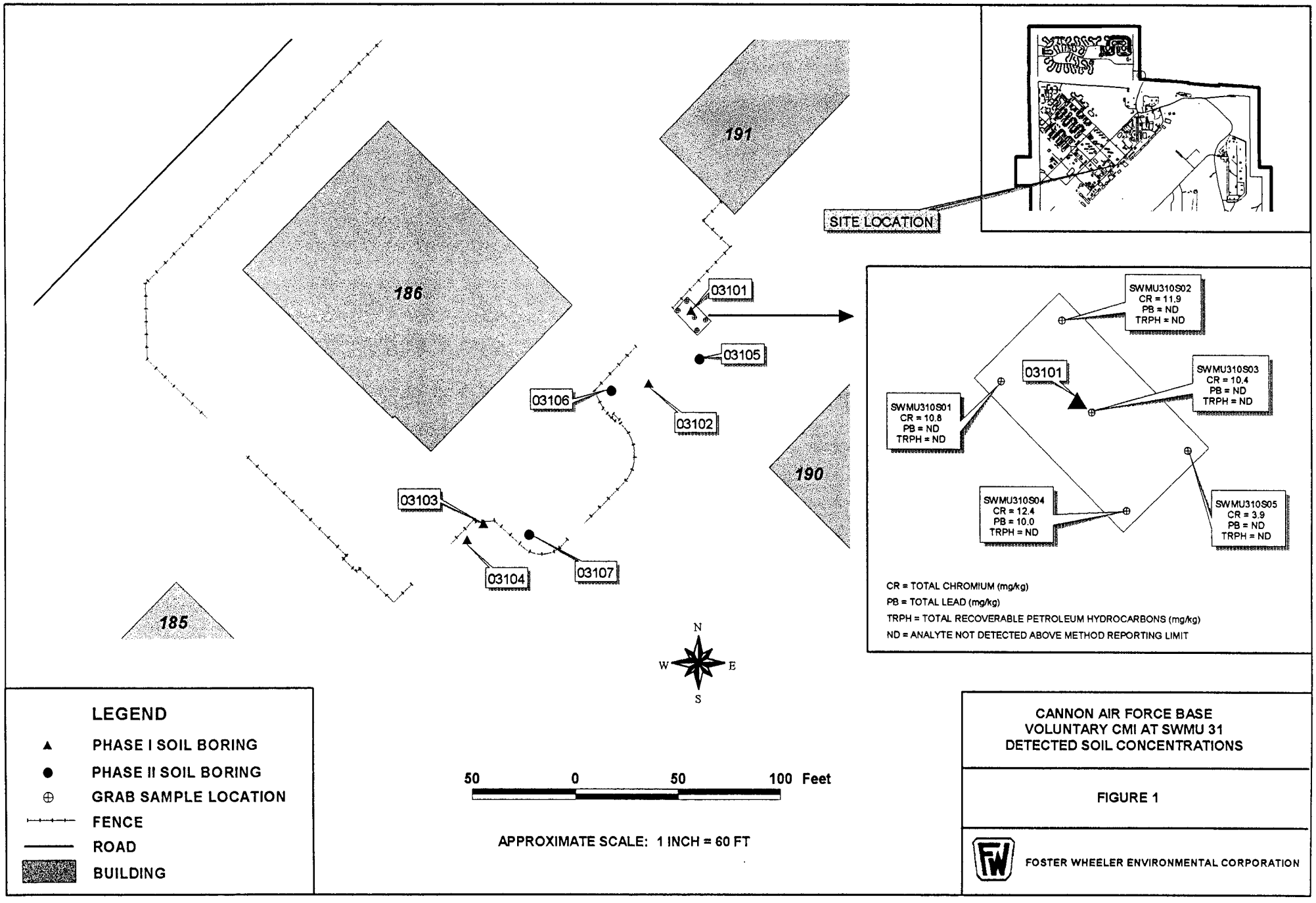
Pamela Moss for
Derek Johnson

Derek Johnson, P.E.
Delivery Order Manager, Cannon AFB

PM:DJ:bl

Attachments
cc: John Pike, Cannon AFB (3 copies)
Max Pastor, USACE – Cannon AFB (2 copies)
James Morning, FWENC Holloman AFB (1 copy)
Sina Seyedian, FWENC Denver (w/o attachments)
TERC-4 Project File

FIGURE 1


191
186
190
185
03101
03105
03106
03102
03103
03104
03107
SITE LOCATION
SWMU310S02
CR = 11.9
PB = ND
TRPH = ND
03101
SWMU310S03
CR = 10.4
PB = ND
TRPH = ND
SWMU310S01
CR = 10.8
PB = ND
TRPH = ND
SWMU310S04
CR = 12.4
PB = 10.0
TRPH = ND
SWMU310S05
CR = 3.9
PB = ND
TRPH = ND
CR = TOTAL CHROMIUM (mg/kg)
PB = TOTAL LEAD (mg/kg)
TRPH = TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/kg)
ND = ANALYTE NOT DETECTED ABOVE METHOD REPORTING LIMIT
N
W
E
S
LEGEND
PHASE I SOIL BORING
PHASE II SOIL BORING
GRAB SAMPLE LOCATION
FENCE
ROAD
BUILDING
50
0
50
100 Feet
APPROXIMATE SCALE: 1 INCH = 60 FT
CANNON AIR FORCE BASE
VOLUNTARY CMI AT SWMU 31
DETECTED SOIL CONCENTRATIONS
FIGURE 1
FOSTER WHEELER ENVIRONMENTAL CORPORATION

UNIFORM HAZARDOUS WASTE MANIFEST

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. Expires 9-30-99

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. NM7572124454 Manifest Document No. 99001

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

Generator's Name and Mailing Address
CANNON AIR FORCE BASE
506 NORTH D.J. INGRAM BLVD., CANNON AFB, NM 88103

4. Generator's Phone (505 784-6378

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name: NP ENVIRONMENTAL

6. US EPA ID Number: CAT000624247

C. State Transporter's ID

D. Transporter's Phone (805) 393-1151

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
SAFETY-KLEEN(LONE MOUNTAIN)INC
5E & 1N OF JCT 412 & 281
WAYNOKA, OK 73860-9622

10. US EPA ID Number: OKD065438376

G. State Facility's ID

H. Facility's Phone (580) 697-3500

	11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)	HM	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.	NON-REGULATED		001	CM	01600	P	NONE
b.							
c.							
d.							

J. Additional Descriptions for Materials Listed Above
Additional EPA Waste Codes a. b. c. d.

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
Approval Numbers a.LN99-0171 b. c. d.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Month Day Year 03 24 99

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Rinnie Stanley | Signature | Month Day Year 03 24 99

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month Day Year

19. Discrepancy Indication Space
See attached for generators signature
99-1320

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Ken Mitchell | Signature | Month Day Year 03 24 99

EPA Form 8700-200 (Rev. 9-88) Previous editions are obsolete.

PRINTED WITH SOY INK

ORIGINAL - RETURN TO GENERATOR

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. Expires 9-30-99

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. NM75721244541 Manifest Document No. 99001

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
CANNON AIR FORCE BASE
506 NORTH B.J. INGRAM BLVD., CANNON AFB, NM 88103

4. Generator's Phone (505) 784-6378

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name
NP ENVIRONMENTAL

6. US EPA ID Number CAT000624247

C. State Transporter's ID

D. Transporter's Phone (885) 393-1151

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
SAFETY-KLEEN(LONE MOUNTAIN)INC
5E & 1N OF JCT 412 & 281
WAYNOKA, OK 73860-9622

10. US EPA ID Number OKD065438376

G. State Facility's ID

H. Facility's Phone (580) 697-3500

11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)

	HM	11. US DOT Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.		NON-REGULATED	001	CM	01600	P	NONE
b.							
c.							
d.							

J. Additional Descriptions for Materials Listed Above
Additional EPA Waste Codes: a. b. c. d.

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15. Special Handling Instructions and Additional Information
Approval Numbers: a. LN99-0171 b. c. d.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: SANFORD D. HUTSELL
Signature: Sanford D. Hutsell
Month Day Year: 03 24 99

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Rinnie Stanley
Signature: Rinnie Stanley
Month Day Year: 03 24 99

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name:
Signature:
Month Day Year:

19. Discrepancy Indication Space
99-1320

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Ric Mitchell
Signature: Ric Mitchell
Month Day Year: 03 24 99

EPA Form 8700-22 (Rev. 9-88) Previous editions are obsolete.

ANALYTICAL DATA

LAUCKS TESTING LABORATORIES
SAMPLE DATA PACKET

FOSTER WHEELER ENVIRONMENTAL

LABORATORY No.: 9902484

SDG NO.: FCA01

MARCH 11, 1999

LAUCKS TESTING LABORATORIES
940 S. Harney
Seattle, WA 98108

To: Foster Wheeler Environmental
Project No. : 5155 0021 0001 A2000
Laboratory No. : 9902484
SDG No.: FCA01
Date of Report: March 11, 1999

SAMPLE RECEIPT, IDENTIFICATION, AND GENERAL COMMENTS:

Sample Receipt and Identification:

The samples submitted under the laboratory number(s) indicated above were identified and analyzed as tabulated below. The samples were collected and received on the dates noted on the enclosed chain-of-custody copies, Attachment A.

Client Sample Identification	Laucks Sample Identification	Testing Analytical Request
SWMU 31S01	9902484-01	2MET/TPH
SWMU 31S02	9902484-02	2MET/TPH
SWMU 31S03	9902484-03	2MET/TPH
SWMU 31S04	9902484-04	2MET/TPH
SWMU 31S05	9902484-05	2MET/TPH
SWMU 31S05D	9902484-06	2MET/TPH
SWMU 31S06 R	9902484-07	TCLP/IG
SWMU 31S07 Roll Off	9902484-08	HOLD
SWMU 31S08	9902484-09	HOLD
SWMU 31S09	9902484-10	HOLD
SWMU 31S10	9902484-11	HOLD
SWMU 31S11	9902484-12	HOLD

Analytical Request Key:

2MET =	Lead and Chromium (6010B)
TCLP =	TCLP Metals
TPH =	Total Petroleum Hydrocarbons (9071/418.1)
IG =	Ignitability (SW1020)
HOLD =	These samples were put on hold by the client.

Sample Receipt Comments:

There were no anomalies in the receipt of these samples.

Sample Identification on Forms:

When completing forms created through the CLP software, every attempt is made to use both your sample IDs as well as the laboratory sample IDs. The forms have varied default sizes to their sample identification fields, and are not amenable to alteration or editing. When it is not possible to use your complete sample ID because of field length limitations, Laucks will usually do one of two things: 1) use as much of your ID as will fit, beginning from the RIGHT hand side of the sample ID number; or 2) select some sub-set of your sample identifier if it is clearly a discrete number. In addition, all forms will contain our sample IDs, which can be cross-referenced from the table above.

GENERAL REMARKS ON INORGANIC ANALYSES:

The following comments describe general analysis conditions. For remarks specific to the samples reported in this case, see "SPECIFIC REMARKS ON INORGANIC ANALYSES."

ICP Metals:

The preparation blank for metals in soil is calculated to mg/kg by assuming a sample weight of 1.00g/100mL. Total solids of 100% are also assumed.

On the first timed and dated page of each ICP run, the data to be reported or rejected will be tabulated for that run.

Mercury:

Laucks purchases a 1000 mg/L Hg stock solution from Inorganic Ventures. The 1.0 mg/L working standard is made by diluting 100 µL to 100 mL with 2% HNO_3. The calibration curve is made by placing 0, 20, 50, 100, 200, 500 and 1000 µl of the working standard in BOD bottles and diluting up to 100 mL. The standard curve is equivalent to 0, 0.2, 0.5, 1.0, 2.0, 5.0 and 10.0 µg/L.

SPECIFIC REMARKS ON INORGANIC ANALYSES:

Holding Time Compliance:

Laucks calculates holding time compliance for inorganic determinations using the date on which reportable data were acquired.

Metals:

The holding time for metals is six months from the date of collection, excepting mercury, which is 28 days. All analyses were performed within holding time.

The holding time for TCLP metals extraction is 180 days (28 days for mercury). The subsequent holding time from TCLP extraction to preparative digestion & analysis is another 180 days (28 days for mercury). All preparations and analyses were within holding time.

Miscellaneous:

The following analytes do not have a Contract Laboratory Program holding time. The holding times tabulated below derive from the relevant EPA methods and are applicable when the sample was appropriately preserved and/or cooled. All samples submitted followed the preservation guidelines unless explicitly noted otherwise.

Analyte	Holding Time	Violations
418.1	28 days	None
Ignitability	10 days	None

ICP Metals:

No comments.

TCLP Metals:

No comments.

418.1:

No comments.

Flash Point:

No comments.

LAUCKS TESTING LABORATORIES
940 S. Harney
Seattle, WA 98108

ABBREVIATIONS

Several abbreviations can appear in our reports. The most commonly employed abbreviations are as follows:

U The analyte of interest was not detected to the limit of detection indicated.

SDL Sample Detection Limit. The SDL can vary from sample to sample, depending on sample size, matrix interferences, moisture content and other sample-specific conditions.

PQL Practical Quantitation Limit. The limit is drawn from the test method and usually represents the SDL multiplied by a matrix-specific factor.

DB Dry Basis. The value reported has been back-calculated to normalize for the moisture content of the sample.

AR As-Received. The value has not been normalized for moisture.

INORGANIC ANALYSES:

B The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). If the analyte was analyzed for but not detected, a "U" shall be entered.

E The reported value is estimated because of the presence of interference. An explanatory note shall be included under Comments on the Cover Page (if the problem applies to all samples) or on the specific Form I-IN (if it is an isolated problem).

M Duplicate injection precision not met.

N Spiked sample recovery not within control limits.

S The reported value was determined by the Method of Standard Additions (MSA)

W Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50 % of spike absorbance.

* Duplicate analysis not within control limits.

+ Correlation coefficient for the MSA is less than 0.995.

Entering "S", "W" or "+" is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

CRDL Client Requested Detection Limit, usually the limit of detection specified at your request. Might also be referred to as Contract required Detection Limit.

LAUCKS TESTING LABORATORIES
940 S. Harney
Seattle, WA 98108

RELEASE OF DATA

"I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his designee, as verified by the following signature."

Respectfully submitted,

Jenna Gorham	Mike Nelson
Project Manager	Technical Director
12 Mar 99	12 Mar 99
(DATE)	(DATE)

HOW TO CONTACT US:

All Laucks Testing Laboratories staff members can be reached at the same telephone and facsimile numbers: (206) 767-5060 by phone, (206) 767-5063 by FAX.

	Primary Contact	Alternate
Technical	Mike Nelson	
Administrative/billing	Jenna Gorham	
Package	Tom Marino	Rebecca James

REQUESTS FOR DUPLICATE COPIES:

This packet has been checked for accuracy. All pages are present and in sequential order. Please see Attachment B for a detailed record.

In the event that duplicate data copies are needed, Laucks will accommodate your request at a fee of twenty five cents ($0.25) per copy, plus shipping. If the data are in storage, there will also be a fee for retrieval.

LAUCKS TESTING LABORATORIES
940 S. Harney
Seattle, WA 98108

ATTACHMENT A

Chain-of-Custody Copies

THIS INFORMATION [illegible] BE USED FOR REPORTING/BILLING* (SEE BELOW)

COMPANY: Foster Wheeler Env
ADDRESS: 6605 Uptown Blvd
ALBQ NM 87110
ATTENTION: Derek Johnson
PROJECT NAME: Cannon AFB SWMU 31
PROJECT CONTACT: Pam Moss
TELEPHONE: 505 878 8900 FAX: 8933
JOB/P.O. NO.: 5155 0021 0001 A2000

CHAIN OF CUSTODY [illegible]ORD
12525
WORK ORDER ID# 9902484

SDG # FCA01
PAGE 1 OF 1

SUBMITTED AT:

Laucks Testing Laboratories, Inc.
☐ 940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
☐ 1106 Ledwich Ave., Yakima, WA 98902 (509) 248-1695 FAX 452-1289

TESTS TO PERFORM

LAB SA#	SAMPLE ID / LOCATION	DATE	TIME	MATRIX: WATER, SOIL OR SPECIFY	NO. OF CONTAINERS	TRPH	LEAD	Chromium	TCLP	Ignitability	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
1)	SWMU 31501	2-18	1134	Soil	1	X	X	X			
2)	SWMU 31502	2-18	1137	Soil	1	X	X	X			
3)	SWMU 31503	2-18	1139	Soil	1	X	X	X			
4)	SWMU 31504	2-18	1141	Soil	1	X	X	X			
5)	SWMU 31505	2-18	1144	Soil	1	X	X	X			
6)	SWMU 31505 D	2-18	1144	Soil	1	X	X	X			
7)	SWMU 31506 R	2-18	1150	Soil					X	X	Roll off
8)	SWMU 31507 Roll off	2-18	1150	Soil							Hold Pending
9)	SWMU 31508	2-18	1150	Soil							FW-Direction
10)	SWMU 31509	2-18	1150	Soil							
11)	SWMU 31510	2-18	1150	Soil							
12)	SWMU 31511	2-18	1150	Soil							

A. A standard turnaround time is assumed unless otherwise marked.

B. The laboratory may not be responsible for missed holding time for samples received with less than 50% of the analytical hold time remaining. Please contact the laboratory for further information.

INSTRUCTIONS
1. USE ONE LINE PER SAMPLE.
2. BE SPECIFIC IN TEST REQUESTS.
3. CHECK OFF TESTS TO BE PERFORMED FOR EACH SAMPLE.

*BILLING INFORMATION, IF DIFFERENT THAN ABOVE
NAME
ADDRESS
ATTN:
CITY, STATE, ZIP

* RUSH TURNAROUND IS SUBJECT TO PRIOR LABORATORY APPROVAL

TOTAL NO. OF CONTAINERS

TURNAROUND REQUEST
☒ STD. 10-14 WORKING DAYS
*☐ 24-48 HRS. (100% SUR)
*☐ 72 HRS. (75% SUR)
*☐ 5 DAYS (50% SUR)
☐ OTHER:
☐ TEMP:
USTOD: [illegible]

RELINQUISHED BY (SIGN AND PRINT)	DATE / TIME	RECEIVED BY (SIGN AND PRINT)	DATE / TIME
James Morning	2-18-99 1300	Fed X ticket 8006567620221	
		PAM R. JOHNSON	2/19/99 1145

Laucks
Testing Laboratories, Inc.

COOLER RECEIPT FORM

WORKORDER #: 9902484

Contractor Cooler _____

QA Lab Cooler # _____

Number of Coolers _____

Project: Cannon AFB SWMU 31

Date samples were received at the laboratory: 2/19/99

A. PRELIMINARY EXAMINATION PHASE: Date cooler was opened: 2/19/99

By: (print) PAM R. JOHNSON (sign) [signature]

1. Did cooler come with a shipping slip (airbill, etc.),>>>>>>>>>>>>>>>>>>>> YES NO
   If YES, record carrier name and airbill number: FedEx 8000567620221
2. Were custody seals on outside of cooler?>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>> YES NO
   How many and where: 1 F, 1B
   Seal date: 2/18/99 Seal name: See Attached
3. Were custody seals unbroken and intact at the date and time of arrival?>>>>>>> YES NO
4. Did you screen samples for radioactivity using the Geiger Counter?>>>>>>>> YES NO
5. Were custody papers sealed in a plastic bag and taped inside to the lid?>>>>>> YES NO
6. Were custody papers filled out properly (ink, signed, etc.)?>>>>>>>>>>>>>>> YES NO
7. Did you sign custody papers in the appropriate place?>>>>>>>>>>>>>>>>>>>> YES NO
8. Was project identifiable from custody papers? If YES, enter project name at top of this form.
9. If required, was enough cooling material present?>>>>Type of ice: bags YES NO
10. Have designated person initial here to acknowledge receipt of cooler: [signature] date 2/19/99

B. LOG-IN PHASE : Date samples were logged-in: 2/19/99

By (print) PAM R. JOHNSON (sign) [signature]

11. Describe type of packing in cooler: bubblewrap
12. Were all bottles sealed in separate plastic bags?>>>>>>>>>>>>>>>>>>>>>>>> YES NO
13. Did all bottles arrive unbroken and were labels in good condition?>>>>>>>> YES NO

LAUCKS TESTING LABORATORIES, INC.
940 South Harney St., Seattle, WA 98108
Phone (206) 767-5060 • FAX (206) 767-5063

CUSTODY SEAL

SIGNATURE [signature] DATE 2/18/99

LAUCKS TESTING LABORATORIES, INC.

COOLER RECEIPT FORM (continued)

14. Were all bottle labels complete (ID, date, time signature, preservative, etc.)? YES NO
15. Did all bottle labels agree with custody papers?>>>>>>>>>>>>>>>>>>>>>>>>YES NO
16. Were correct containers used for the tests indicated?>>>>>>>>>>>>>>>>>>>>YES NO
17. Were correct preservatives added to samples?>>>>>>>>>>>>>>>>>>>>>>>>>>~~YES~~ ~~NO~~ NA
18. Was a sufficient amount of sample sent for tests indicated?>>>>>>>>>>>>>>YES NO
19. Were bubbles absent in VOA samples: If NO, list by QA #:>>>>>>>>>>>>>>~~YES~~ ~~NO~~ NA
20. Was project manager called / faxed & status discussed? >>>>>>>>>>>>>>>>> YES NO

    If YES, give details below

21. Who was called / faxed? Pam Moss

    By whom? Jenna Gorham (date) 2/19/99

DESCREPANCIES:

TCLP for metals or Pesticides?

Pam Moss called 2/19/99 - TCLP metals only.

Laucks Testing Laboratories, Inc., Supplemental Sample Receipt Log

Work Order Number: 9902484
Assigned SDG Number: FLA01

	Temperature	pH of Bottle Types								
1										
2	2.0									
3										
4										
5	2.8									
6										
7										
8			Soils							
9										
10										
11	2.7									
12										

Allowable temperature and pH ranges (neutral pH defined as a value between 5 and 9)

Temperature	Allowable temperature range is 4± 2 degrees Celsius
Acid Preserved pH	pH must be less than 2
Base Preserved pH	pH must be greater than 12

TEMPLOG.DOT 2 02/21/95

TCLP Metals Data

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: 31S06R

Lab Name: LAUCKS TESTING LABS, INC. Contract: _____

Lab Code: LAUCKS Case No.: ___ SAS No.: ___ SDG No.: FCA01T

Matrix (soil/water): TCLP Lab Sample ID: 02484-07

Level (low/med): LOW Date Received: 02/19/99

% Solids: 0.0

ConcentrationUnits (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	25.	U		P
7440-39-3	Barium	1560.			P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.			P
7440-70-2	Calcium				
7440-47-3	Chromium	69.5			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	28.	U		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	1.	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	33.	U		P
7440-22-4	Silver	2.9	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				

Color Before: COLORLESS Clarity Before: CLEAR Texture: ___

Color After: COLORLESS Clarity After: CLEAR Artifacts: _

Comments:

ENT ID: SWMU 31S06 R

FORM I - IN

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: B02231

Lab Name: LAUCKS TESTING LABS, INC. Contract: _____

Lab Code: LAUCKS Case No.: ___ SAS No.: ___ SDG No.: FCA01T

Matrix (soil/water): TCLP Lab Sample ID: B0223-01

Level (low/med): LOW Date Received: ____

% Solids: 0.0

ConcentrationUnits (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	25. U			P
7440-39-3	Barium	531. B			P
7440-41-7	Beryllium				
7440-43-9	Cadmium	1.8 U			P
7440-70-2	Calcium				
7440-47-3	Chromium	4.8 U			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	28. U			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	10. U			AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	33. U			P
7440-22-4	Silver	2.9 U			P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: COLORLESS Clarity Before: CLEAR Texture: ___

Color After: COLORLESS Clarity After: CLEAR Artifacts: _

Comments:

CLIENT ID: TCLP BLANK EXTRACTION FLUID

FORM I - IN

Total Metals Data

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: A31S01

b Name: LAUCKS TESTING LABS, INC. Contract: _____

Lab Code: LAUCKS Case No.: ___ SAS No.: ___ SDG No.: FCA01S

Matrix (soil/water): SOIL Lab Sample ID: 02484-01

Level (low/med): LOW Date Received: 02/19/99

% Solids: 87.0

ConcentrationUnits (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium	10.8			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	9.9	B		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				

Color Before: BROWN Clarity Before: ___ Texture: FINE

Color After: BROWN Clarity After: ___ Artifacts: _

nments:

CLIENT ID: SWMU 31S01

FORM I - IN

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: B31S02

b Name: LAUCKS TESTING LABS, INC. Contract: _____

Lab Code: LAUCKS Case No.: ___ SAS No.: ___ SDG No.: FCA01S

Matrix (soil/water): SOIL Lab Sample ID: 02484-02

Level (low/med): LOW Date Received: 02/19/99

% Solids: 86.0

ConcentrationUnits (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium	11.9			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	9.9	B		P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				

Color Before: BROWN Clarity Before: ___ Texture: FINE

Color After: BROWN Clarity After: ___ Artifacts: _

mments:

LIENT ID: SWMU 31S02

FORM I - IN

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: C31S03

b Name: LAUCKS TESTING LABS, INC. Contract: _____

Lab Code: LAUCKS Case No.: ___ SAS No.: ___ SDG No.: FCA01S

Matrix (soil/water): SOIL Lab Sample ID: 02484-03

Level (low/med): LOW Date Received: 02/19/99

% Solids: 86.5

ConcentrationUnits (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium	10.4			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	8.3 B			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				

Color Before: BROWN Clarity Before: ___ Texture: FINE

Color After: BROWN Clarity After: ___ Artifacts: _

Comments:

IENT ID: SWMU 31S03

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U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: D31S04

ıb Name: LAUCKS TESTING LABS, INC. Contract: _____

Lab Code: LAUCKS Case No.: ___ SAS No.: ___ SDG No.: FCA01S

Matrix (soil/water): SOIL Lab Sample ID: 02484-04

Level (low/med): LOW Date Received: 02/19/99

% Solids: 88.0

ConcentrationUnits (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium	12.4			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	10.			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				

Color Before: BROWN Clarity Before: ___ Texture: FINE

Color After: BROWN Clarity After: ___ Artifacts: _

ımments:

CLIENT ID: SWMU 31S04

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U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: E31S05

) Name: LAUCKS TESTING LABS, INC. Contract: _____

Lab Code: LAUCKS Case No.: ___ SAS No.: ___ SDG No.: FCA01S

Matrix (soil/water): SOIL Lab Sample ID: 02484-05

Level (low/med): LOW Date Received: 02/19/99

% Solids: 88.0

ConcentrationUnits (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium	3.9			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	5.1 B			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				

Color Before: BROWN Clarity Before: ___ Texture: FINE

Color After: BROWN Clarity After: ___ Artifacts: _

nments:

CLIENT ID: SWMU 31S05

FORM I - IN

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: F31S05

ab Name: LAUCKS TESTING LABS, INC. Contract: _____

Lab Code: LAUCKS Case No.: ___ SAS No.: ___ SDG No.: FCA01S

Matrix (soil/water): SOIL Lab Sample ID: 02484-06

Level (low/med): LOW Date Received: 02/19/99

% Solids: 88.1

ConcentrationUnits (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium	4.8			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	7.4 B			P
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				

Color Before: BROWN Clarity Before: ___ Texture: FINE

Color After: BROWN Clarity After: ___ Artifacts: _

omments:

CLIENT ID: SWMU 31S05D

FORM I - IN

Flash Point Data

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs
SDG No. : FCA01
Matrix : SOIL

Sample ID : SWMU 31S06 R
Lab Sample ID: 9902484-07
Date Received: 02/19/99

Analyte	Result	Units	Prepped	Analyzed	Limit	Method
Flash Point (Setaflash)	>200.	degrees F	03/05/99	03/05/99	-	SW 1020

418.1 and Total Solids Data

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs
SDG No. : FCA01
Matrix : SOIL

Sample ID : SWMU 31S01
Lab Sample ID: 9902484-01
Date Received: 02/19/99

Analyte	Result	Units	Prepped	Analyzed	Limit	Method
TPH (418.1)	20. U	mg/kg DB	03/01/99	03/02/99	20.	EPA 418 1
Total Solids	87.0	%	02/23/99	02/24/99	0.1	SM209A

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs
SDG No. : FCA01
Matrix : SOIL

Sample ID : SWMU 31S02
Lab Sample ID: 9902484-02
Date Received: 02/19/99

Analyte	Result		Units	Prepped	Analyzed	Limit	Method
TPH (418.1)	20.	U	mg/kg DB	03/01/99	03/02/99	20.	EPA 418 1
Total Solids	86.0		%	02/23/99	02/24/99	0.1	SM209A

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs
SDG No. : FCA01
Matrix : SOIL

Sample ID : SWMU 31S03
Lab Sample ID: 9902484-03
Date Received: 02/19/99

Analyte	Result		Units	Prepped	Analyzed	Limit	Method
TPH (418.1)	20.	U	mg/kg DB	03/01/99	03/02/99	20.	EPA 418 1
Total Solids	86.5		%	02/23/99	02/24/99	0.1	SM209A

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs
SDG No. : FCA01
Matrix : SOIL

Sample ID : SWMU 31S04
Lab Sample ID: 9902484-04
Date Received: 02/19/99

Analyte	Result		Units	Prepped	Analyzed	Limit	Method
TPH (418.1)	20.	U	mg/kg DB	03/01/99	03/02/99	20.	EPA 418 1
Total Solids	88.0		%	02/23/99	02/24/99	0.1	SM209A

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs
SDG No. : FCA01
Matrix : SOIL

Sample ID : SWMU 31S05
Lab Sample ID: 9902484-05
Date Received: 02/19/99

Analyte	Result		Units	Prepped	Analyzed	Limit	Method
TPH (418.1)	20.	U	mg/kg DB	03/01/99	03/02/99	20.	EPA 418 1
Total Solids	88.0		%	02/23/99	02/24/99	0.1	SM209A

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs
SDG No. : FCA01
Matrix : SOIL

Sample ID : SWMU 31S05D
Lab Sample ID: 9902484-06
Date Received: 02/19/99

Analyte	Result		Units	Prepped	Analyzed	Limit	Method
TPH (418.1)	20.	U	mg/kg DB	03/01/99	03/02/99	20.	EPA 418 1
Total Solids	88.1		%	02/23/99	02/24/99	0.1	SM209A