

**SUPPLEMENTAL REPORT FOR THE
INTERIM STATUS CLOSURE PLAN AT THE
TA-16 SURFACE IMPOUNDMENT**

77/16

prepared for

**New Mexico Health and Environment Department
Environmental Improvement Division - Hazardous Waste Section**

by the

**Environmental Surveillance Group (HSE-8)
Solid Waste and Remedial Action Section**

**Los Alamos National Laboratory
Los Alamos, New Mexico
RCRA Number NM-0890010515**

February 6, 1989



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VOLUME II OF II

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1.0 INTRODUCTION

In a letter dated January 5, 1989, Mr. Jack Ellvinger, Chief, Hazardous Waste Bureau, New Mexico Environmental Improvement Division (NMEID), informed the U.S. Department of Energy (DOE) that their interim status closure plan for the Technical Area (TA) 16 surface impoundment was disapproved. Under New Mexico Hazardous Waste Management Regulations (NMHWMR-5), Part VI, Section 265.112(d)(4), DOE was given 30 days to respond to this NMEID letter with a revised closure plan, or to submit a new closure plan. The original closure plan, submitted in November 1986 (IT, Inc., 1986), should be discarded. DOE has sequestered the original closure plan and is submitting a revised plan for the impoundment. This supplemental report is intended to provide additional background information to support this revised closure plan.

This supplemental report was originally submitted by DOE on December 7, 1988, to the NMEID in response to a letter dated September 30, 1988, from the Hazardous Waste Section, NMEID, to DOE. A copy of that letter, including the DOE response, is contained in Appendix D of this report, along with other background correspondence. This supplemental report provides additional information to support DOE responses to the NMEID comments made in their January 5, 1989, denial letter. Hence, the DOE transmittal letter and appropriate attachments correcting the Supplemental Report are intended to be part of this document.

DOE desires to close the TA-16 surface impoundment in accordance with the requirements of NMHWMR-5, Part VI, Sections 265.110 through 120, 228, and 382 for clean closure. As such this document is a supplement to the revised closure plan, and is intended to provide additional information to the NMEID and interested readers.

Section 2 of this report contains a supplement to the revised sampling and data analyses plan, while Section 3 describes the waste removal and disposition plan. Appendix A, extracted from an unrelated closure plan previously submitted to the NMEID, describes the geology near the TA-16 impoundment site. Appendix B was originally intended to contain volumetric moisture data collected from the neutron probe access well located immediately south of the surface impoundment (i.e., well P-00 in Appendix A). However this information is still being collected and verified as of this writing. The gravimetric moisture data collected from well P-00 core samples are contained in Appendix A. Appendix C summarizes all chemical analyses data from the present site that have been collected to date; they have been condensed to a more readable form than the raw data. The correspondence contained in Appendix D of this report has been systematically ordered by date. This background information provides a more complete picture of the situation at the TA-16 site where the surface impoundment is located. Appendix E contains all of the raw chemical data used to construct the Appendix C tables. Finally, Appendix F contains historical data for trace metal concentrations in soils at LANL.

2.0 SAMPLING AND DATA ANALYSIS PLAN

2.1 Historical Sampling

2.1.1 Impoundment Fluids

Table C-1 in Appendix C of this report contains all sampling data obtained from the NPDES outfall, surface impoundment fluids, and impoundment sludges. As can be seen from these data, barium concentrations in the surface impoundment exceeded 100 milligrams per liter (mg/l) sometime between August 1985 and January 1986. There were never any other metals from the EP toxicity test procedure (NMHWMR-5, Part II, Section 261.24, Table 1, and Appendix II) that exceeded the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, mandated concentration limits; hence, excessive barium is the only metal that, by definition, makes the surface impoundment fluids and other components hazardous wastes.

As a convenience to the reader, the correspondence contained in Appendix D summarizes and documents corrective actions taken by Los Alamos National Laboratory (LANL) when this elevated barium concentration level was first discovered. It should be noted that the surface impoundment was never intended to be a hazardous waste disposal facility. It was inadvertently contaminated with barium because of excessive surface evaporation, and by impoundment influent that contained more than de minimus concentrations of barium. This evaporation and influent combined to further concentrate the barium that was present to the point that it exceeded 100 mg/l.

In addition to the above sampling, the surface impoundment fluids were tested on January 26, 1987, for priority pollutant volatile and semi-volatile concentration levels. At that time two water samples (sample numbers 87.02604 and 87.02605) were recovered and sent to Rocky Mountain Analytical Laboratory (RMAL), Arvada, Colorado, along with a third water sample that was intentionally spiked (LANL HSE-9) with known concentrations of selected contaminants for internal quality control purposes (sample number 87.02606). Two duplicate split samples were also collected at that time for volatile organic analyses at LANL HSE-9 (samples 87.02600 and 87.02601, pages 77 and 143-144); note that the LANL HSE-9 laboratory data sheets only list those compounds exceeding detection limits. The RMAL chemical analyses report is summarized in Appendix C (i.e., Table C-2, pages 78-79); the complete laboratory report is contained in Appendix E (pages 145-155). These analytical laboratory reports also contain quality assurance and quality control results. Fifty-seven separately identifiable priority pollutant semi-volatile compounds were analyzed by RMAL in each of the three samples, along with six RMAL spiked quality control compounds. Except for the HSE-9 and RMAL added quality control constituents, none of these semi-volatile compounds were detected by RMAL. RMAL did, however, detect small amounts of explosive trinitrotoluene (TNT) compounds in all three samples that were not on the priority pollutant list. Furthermore, the HSE-9

laboratory found concentration levels above detection limits for the volatile compounds 1,1,1-trichloroethane and toluene (see Table C-1, Appendix C).

2.1.2 Soils Below NPDES Outfall 055

On February 11, 1987, three sediment samples were collected from the ephemeral stream channel below NPDES Outfall Number EPA-05A055, and one background soil sample was collected. Sample locations, sample numbers, and chemical analytical results are contained in Table C-3-1 (Appendix C, pages 80 and 82). These samples indicated that the outfall, which had previously drained the surface impoundment, showed barium concentrations of 26 mg/l within three feet of the outfall. However, barium concentrations dropped to 6.6 mg/l at a distance of ten feet downstream of the outfall, and 2.7 mg/l at a distance of forty feet.

2.1.3 Neutron Moisture Access Well Data

Five of the seventeen boreholes drilled around the TA-16 Area P landfill and surface impoundment were completed as aluminum cased neutron moisture access wells. These wells are identified as P-00, P-12A, P-13, P-14, and P-16; a location map, drilling logs, and well completion reports for all boreholes are contained in Appendix A. At the time that these wells were drilled, core samples were collected for gravimetric moisture content determinations. These data are contained in Appendix A. Once the neutron moisture probe has been recalibrated, then direct volumetric moisture content readings will be collected from each of these neutron access wells. These data should be available sometime in late 1989.

2.2 Soil Sampling Plan

2.2.1 Soils Below the Impoundment Liner

During the period of October 26-30, 1987, the surface impoundment liner was removed. Surface impoundment fluid removal and liner decontamination procedures are described in Section 3.0 of this report. On November 2, 1987, five discrete soil samples from immediately below the liner were collected; these were individually composited samples recovered from the surface down to a depth of approximately twelve inches. In addition, two background surface soil samples were recovered approximately five hundred feet to the east and west of the surface impoundment structure. Table C-3-2 (Appendix C, pages 81-82) illustrates these sample locations, and chemical analyses performed; complete laboratory results are contained in Appendix E (pages 165-180). These soil samples indicated that no metals in excess of EP toxicity limits were present in samples recovered from locations below the liner. In fact, these soil samples indicated that all EP toxicity metals, except cadmium in sample 87.0278, were at or below detection limits. The 0.18 mg/l cadmium level in sample 87.0278 has been shown to be naturally occurring (see DOE response number 10, dated February 6, 1989, in Appendix D, pages 104f-104g; and background

soil and vegetation cadmium concentration data from Sigma Mesa in Appendix F, pages 221-225). The cadmium data for 36 soil samples collected on Sigma Mesa (see page 225 of the Supplemental Report) indicate a mean cadmium concentration level of 169.72 ppb, with a standard deviation of 96.20 ppb. The computed 95 percent confidence intervals for these 36 samples indicate that the computed mean cadmium concentration level lies between 201.15 and 138.29 ppb. The 180 ppb cadmium level recorded in sample 87.0278 clearly lies between these confidence limits, and is representative of background cadmium levels in soils within Los Alamos County.

In addition these samples from below the impoundment liner further indicated that all but three volatile or semi-volatile organic compounds in the EPA Contract Laboratory List were below minimum detection limits (Tables C-4 and C-5, pages 83-87). Complete laboratory results for the organic analyses are contained in Appendix E (pages 181-220). The three remaining organic compounds were not analyzed because of laboratory instrument problems; however, these same three compounds were not previously detected in impoundment fluids (see Table C-2, Appendix C, pages 78-79). Historical chemical analyses of water samples recovered from the impoundment during 1987 are listed in Tables C-1 and C-2 (Appendix C) for reference purposes, and served as guidance for those potential indicator contaminants that might have been present if the liner had ever leaked.

It is important to note that the soil analyses contained in Table C-3-2, and in Tables C-4 and C-5, are from samples recovered at locations below the liner, and demonstrate that no contaminant leakage occurred. Furthermore, no visible evidence of impoundment leakage was observed by HSE-8 personnel when the liner was removed. In fact the sample locations below the liner (see page 82) were selected to approximately correspond to apparent soil discolorations and liner seams in order to maximize the probability of detecting potential contamination.

2.2.2 Future Soil Sampling Plan

The soil sampling investigation plan is detailed in the revised closure plan (IT, Inc., 1989), and has not been repeated here.

2.3 Ground-Water Monitoring Plan

A ground-water monitoring plan has not been included in the revised closure plan because a ground-water waiver is on file at the LANL HSE-8 office. This waiver demonstration is in writing, and has been certified by both a qualified geotechnical engineer and a qualified geologist in accordance with NMHWMR-5, Part VI, Section 265.90(c).

3.0 WASTE REMOVAL AND DISPOSITION PLAN

3.1 Waste Removal and Disposition

During the month of September 1987, contaminated fluids and residue were physically removed from the surface impoundment by personnel from the WX-3 group. This operational management decision was made because of DOE safety requirements governing the handling of potentially explosive materials, and to prevent the escape of hazardous waste fluids from the impoundment since further utilization of this structure was not being considered. A small capacity, portable, gasoline powered, hydraulically actuated, diaphragm pump, with a four inch suction inlet and a three inch discharge line, was used to remove contaminated fluids from the TA-16 surface impoundment. This HSE-7 pump is dedicated to handling hazardous wastes, and has a routine maintenance and cleaning schedule. These fluids were routed through the pressure sand filters (Structure Numbers TA-16-401 and 406) to remove any HE contaminated residue. They were then pumped to the NPDES water treatment facility upstream of Outfall EPA-05A055 for treatment before final discharge to the canyon under NPDES permit numbers NM0028355 and NM0028576. This treatment facility was installed to reduce chemical oxygen demand (COD) to below NPDES permit limits prior to discharge, in addition to removing organic constituents that were potentially present in impoundment fluids. This NPDES wastewater treatment unit is not part of this closure plan. Since the surface impoundment was nearly full at the beginning of these fluid removal operations, it is estimated that approximately 18,610 gallons of contaminated water was pumped from the impoundment.

The HE contaminated sludges that remained in the surface impoundment after fluid removal were carefully pumped from the impoundment bottom using the same septic tank vacuum truck designated for other TA-16 area HE sump cleaning procedures. Approximately 100 to 150 gallons of sludge were removed from the impoundment bottom, and placed in the same sand filters previously used to pre-treat the impoundment fluids. These sludges were then hot-air dried for several days, before in-place thermal treatment. After thermal treatment, the remaining ash deposits were then sealed in metal 55-gallon drums, and shipped to TA-54 Area L for storage, treatment, and final disposal.

3.2 Liner and Equipment Decontamination

During the week of October 26-30, 1987, the remaining surface impoundment liner was then washed and flushed with clean tap water, taking care to contain these wash-down fluids in the empty impoundment. These wash fluids were then pumped through the sand filters, and to the outfall water treatment facility for treatment before final NPDES discharge down the canyon. The same diaphragm pump previously employed for the waste fluids was also used in this cleaning fluid transfer process. This washing and flushing process was repeated several times to insure that the liner, transfer pump, and hoses were completely cleaned. Periodic field testing for the

presence of HE residue on the liner or in the fluid transfer equipment was done by WX-12 personnel; however, no recorded documentation was apparently saved by WX-3 to verify this field testing. According to WX-3 personnel, both the pump inlet and discharge lines were systemically rinsed and tested to insure that they were free of HE residue. The vacuum truck was not decontaminated immediately after pumping impoundment sludges, but instead was later subjected to routine WX-3 maintenance cleaning procedures. After cleaning, the plastic liner was carefully removed from the surface impoundment bottom, and stacked on the ground next to the excavated impoundment structure. To date the liner is still awaiting verification of final decontamination.

Personnel in the WX-12 Group at LANL will sample the liner for potentially explosive residue. At the same time, personnel from HSE-8 will sample the liner for volatile and semi-volatile organic compounds, and metals characteristic of EP toxicity. If WX-12 determines that the liner is still contaminated with explosives, then WX-3 and HSE-8 will provide the NMEID with adequate documentation of explosives contamination, including chemical analyses and a photographic record of field testing activities. The liner will then be removed for thermal treatment at TA-16 in accordance with NMHWMR-5, Part VI, Section 265.382. After thermal treatment, the remaining ash deposits will be sealed in metal 55-gallon drums, and shipped to TA-54 Area L for storage, treatment, and final disposal.

If WX-3 certifies in writing that the liner is not contaminated with explosive residue, then the liner will be considered by LANL as equipment contaminated by hazardous wastes. If the HSE-8 sample analyses demonstrate that the liner was successfully decontaminated before its removal from the impoundment, then it will be reclaimed for subsequent utilization in unrelated LANL activities, or will be disposed of as solid waste. If these same HSE-8 analyses demonstrate that the liner is still contaminated with hazardous wastes, then it will be disposed of as a hazardous waste. In this later event, additional soil sampling will be conducted for those soils presently underlying the liner, and appropriate actions will be taken (i.e., determination of the extent of potentially contaminated soils, soil removal, etc.). Detailed procedures that will be followed in the final liner disposition are contained in the revised closure plan document (IT, Inc., 1989).

3.3 Future Soils Disposition

To date no contaminated soils below the surface impoundment liner have been identified. However additional soil sampling below the former impoundment excavation will be conducted, as described in the revised closure plan (IT, Inc., 1989). Furthermore, if it is determined that the liner was not completely decontaminated of hazardous wastes, then soil samples will also be collected from below the present liner storage location. Procedures and contaminant indicator parameters for these additional sampling efforts are outlined in the revised closure plan (IT, Inc., 1989).

In the event that any soils below the former impoundment excavation or at the present liner storage location contain metals in excess of EP toxicity limits, or statistically significant quantities of volatile or semi-volatile compounds that are above detection limits, then these soils will be excavated, handled, and disposed as hazardous wastes. After final NMEID approval of the closure plan for the surface impoundment, and after any contaminated subsoils or tuff have been removed, the surface impoundment excavation structure will be back-filled with clean crushed tuff and top soil, recontoured to its approximate original topographic shape, and reseeded with native grasses. This reclamation procedure is fully described in the revised closure plan (IT, Inc., 1989).

4.0 APPENDICES

APPENDIX A. Geology of Technical Area 16 Area P

**Extracted from Appendix D
TA-16 Area P Landfill Closure and Post-Closure Plan
January 1988**

Appendix D: Geology and In-Situ Moisture Content of
Technical Area 16 Area P.

Fred Brown

(extracted from Brown et al., 1987)

I. REGIONAL GEOLOGY

The regional geology of Los Alamos has been previously reported in detail (i.e., Smith and Bailey, 1966; Purtymun, 1974; Gardner and Goff, 1986). In summary, Los Alamos National Laboratory is located on the eastern flank of the Jemez Mountains, an area dominated by volcanic deposits associated with the formation and collapse of the Valle and Toledo Calderas. Eruptive activity culminated with the deposition of a large volume (about 400 km³) of Quaternary Bandelier Tuff, a rhyolitic tuff ranging in thickness from 30 to 1000 ft. The Bandelier Tuff is composed of a series of ashfall and ashflow tuffs (ignimbrites) unconformably resting on Chino Mesa Basalt and Puye Conglomerate of the Santa Fe Group. Depth to the main aquifer in the vicinity of Area P is about 1230 ft (Purtymun, 1984). See Figure D1.

Deposits of Bandelier Tuff form broad plateaus that encircle the Jemez Mountains and dip gently away from the Valle

Caldera. The plateau on the eastern side of the Jemez Mountains, the Pajarito Plateau, consists of a series of east to southeast trending mesas separated by deeply incised canyons. The Bandelier Tuff itself consists of upper (Tshirege) and lower (Otowí) members, each containing a prominent ashfall bed at the base. Generally, the upper (Tshirege) member is the more densely welded of the two, and welding tends to increase with proximity to caldera sources (Bailey et al. 1969; Gardner et al., 1986).

The Bandelier Tuff dips 2 to 5 degrees towards the east. Four fault zones have been recognized in the Pajarito Plateau: the Pajarito, Water Canyon, Guaje Mt., and Rendija Canyon Fault Zones (Dransfield and Gardner, 1985). The Water Canyon Fault Zone, which extends through TA-16, trends roughly north to northeast, with about 30 to 100 ft of down-to-the-east displacement. Approximately 10 to 15 ft of displacement can be seen in the subsurface adjacent to Area-P, with little-or-no surface expression apparent.

II. GEOLOGY OF AREA P

Area P lies near the eastern margin of the Jemez Mountains, in the saddle of a short east-west trending mesa. The Water Canyon Fault Zone cuts through the tuff approximately 500 ft to the east. To the north the Canon de Valle has cut through the fault scarp, draining an area on the west of the Sierra

de los Valles flanks. To the south is a small unnamed canyon containing intermittent discharge from local outfalls. The main technical centers of TA-16 are located west of Area P (See Figure D2).

The mesa is capped by approximately 800 ft of Bandelier Tuff (Purtymun, 1968). Five distinct units, composed of groups of ashflows, have been recognized in the Tshirege Member of the Bandelier Tuff (Griggs, 1964; Smith and Bailey, 1966), of which two units were encountered during drilling operations at Area P (Brown, 1987). In addition, scattered outcrops of El Cajete Pumice occur in the area.

In order to establish the subsurface geology of Area P a series of 17 boreholes (numbered P-0 through P-16) was drilled in the summer of 1987. Drilling was done with a CME-55 rotary drilling rig and four-inch conventional auger. Continuous auger cuttings were retrieved for moisture analysis, and one set of continuous core was recovered using six-inch hollow stem auger and split spoon core barrels.

Borehole logging of lithology was done on the basis of four characteristics: (1) color (Goddard et al., 1984), (2) degree of welding, (3) shape and abundance of pumice lapilli, and (4) distribution of lithic fragments. Four distinct types of welding were recognized during drilling operations:

1. Non-welded: high porosity, low cohesion of glassy fragments and crumbly texture. In core samples this can be recognized by disaggregation and little or no flattening of pumice lapilli.

2. Moderately welded: less porosity, moderate cohesion, brittle texture and slight deformation of glassy fragments. In core samples this texture crumbles easily in the hand and contains some noticeably flattened pumice lapilli.

3. Welded: low porosity, good cohesion, brittle texture and noticeable deformation of glassy fragments. This texture normally requires a hammer to break, and the majority of pumice fragments are noticeably flattened.

4. Densely welded: texture noticeably impedes or halts drilling; little or no penetration; poor core recovery.

Two major lithologic units have been recognized at Area P (person. comm., W. Purtymun, 1987). Unit 3, the uppermost unit encountered during drilling operations, consists of four individual ashflows that appear to have cooled as a single unit. These ashflows are herein designated as Subunits 3a, 3b, 3c and 3d (bottom to top). Unit 3 rests conformably above Unit 2, the lowermost unit encountered. In

the vicinity of Area P dip is negligible, and the units are essentially horizontal and of uniform thickness.

Subunit 3a consists of a welded dark yellowish brown tuff, with rare pumice lapilli (slightly flattened), and abundant pebble sized red porphyritic latite and grey rhyolite lithic fragments. The contact between Subunit 3a and Unit 2 tends to be densely welded. East of the Water Canyon Fault this unit appears to be non-welded.

Subunit 3b consists of a welded pale yellowish brown tuff, with common grey and red pumice lapilli, (noticeably flattened), and rare pebble sized rhyolite lithic fragments. This unit weathers to a dark brown, and contains abundant clayey pumice lapilli to the north-west.

Subunit 3c consists of a moderately welded brownish grey to yellowish brown tuff, with common grey pumice lapilli (noticeably flattened), and rare pebble sized rhyolite lithic fragments. Clay filled vertical fractures are common throughout this subunit. The contact between 3c and 3d tends to be densely welded.

Subunit 3d outcrops along the higher rim of the saddle, and consists of a moderately welded yellowish brown tuff, with rare pebble sized rhyolite lithic fragments and common

grey pumice lapilli. Subunit 3d is overlain by scattered deposits of El Cajete Pumice.

Locally, Unit 2 consists of a welded to densely welded tuff, light grey to pinkish grey in color, with common pumice lapilli and pebble sized rhyolite fragments. Due to dense welding the drill bit was only able to penetrate the upper 5 to 10 ft of Unit 2. See Figure D3.

III. IN-SITU MOISTURE CONTENT

Hydrologic characteristics of tuff depend primarily on the degree of welding, with porosity and hydraulic conductivity decreasing as the degree of welding increases. At Los Alamos, saturated hydraulic conductivity for a moderately welded tuff ranges from 0.1 to 1.7 ft/day, and for a welded tuff ranges from 0.009 to 0.26 ft/day (Abeele et al., 1981). Samples of tuff recovered during drilling operations at Area P were not saturated.

Gravimetric moisture determinations were conducted to obtain a direct measurement of in-situ water content of the tuff. Samples were taken from drill cuttings every 5 or 10 ft, and moisture determinations were made by weighing samples immediately after collection and after oven-drying 24 hrs at 105 degrees C.

Although gravimetric moisture determinations are relatively easy to perform, care must be taken to insure that the heat produced by drilling does not bias the samples collected. In the few cases where drill cuttings were noticeably warm to the touch, or water vapor was noticed coming from the borehole, samples were not collected for analysis. Care was also taken to maintain the drying oven at 105 degrees C to ensure that no structural water was driven off.

Table D1 provides a summary of gravimetric data collected for Unit 3, and indicates a low overall moisture content for Area P. Although a range of 1.9 to 24.7% is considered low, this value slightly exceeds the gravimetric moisture content determined for technical areas further to the east (5-11% for TA-33, Abrahams 1963; 2-20% for TA-54; Kearl et al., 1986). This increase may be due to increased rainfall at TA-16 caused by orographic effects adjacent to the Jemez Mountains.

Unit	Mean (%)	STD	Range (%)
3d	5.2	3.6	2.2-17.7
3c	6.1	3.5	1.9-24.7
3b	5.7	2.1	2.3-11.4
3a	3.8	1.4	2.3-5.8
Total Unit	5.8	3.0	1.9-24.7

Table D1: Average Gravimetric Moisture Content. STD = Standard Deviation.

The energy relationship with moisture content for the Tshirege Member of the Bandelier Tuff was worked out for volumetric moisture content by Abrahams (1963). Volumetric values can be converted to gravimetric values by using the average bulk density of the tuff. Repeated neutron and gamma probe calibration runs have established an average bulk density for the Tshirege Member of 1.4 g/cm^3 . In addition, the density of ten random samples was obtained after drying by weighing crushed tuff of a known volume. Average density for the ten samples was 1.47 g/cm^3 , with a standard deviation of 0.12.

TA-16 Area P lies in the vadose zone of the Bandelier Tuff, a zone defined by Everett et al. (1984) as existing beneath the topsoil and above the water table, in which moisture in pore spaces coexists with air or in which geological materials are unsaturated. Based on the results of Abrahams (1963), saturation of the Tshirege Member of the Bandelier Tuff, and thus groundwater, occurs when gravimetric moisture content is about 29%. When moisture content is below 7% there is no movement of water; between 7 to 21% moisture is redistributed by diffusion; between 21 to 29% moisture distribution is by gravity and capillarity, and above 29% movement is by gravity drainage (Figure D4). From Table D1 it can be seen that the primary mechanism for moisture

distribution at Area P is diffusion. There is no evidence for the existence of groundwater at Area P.

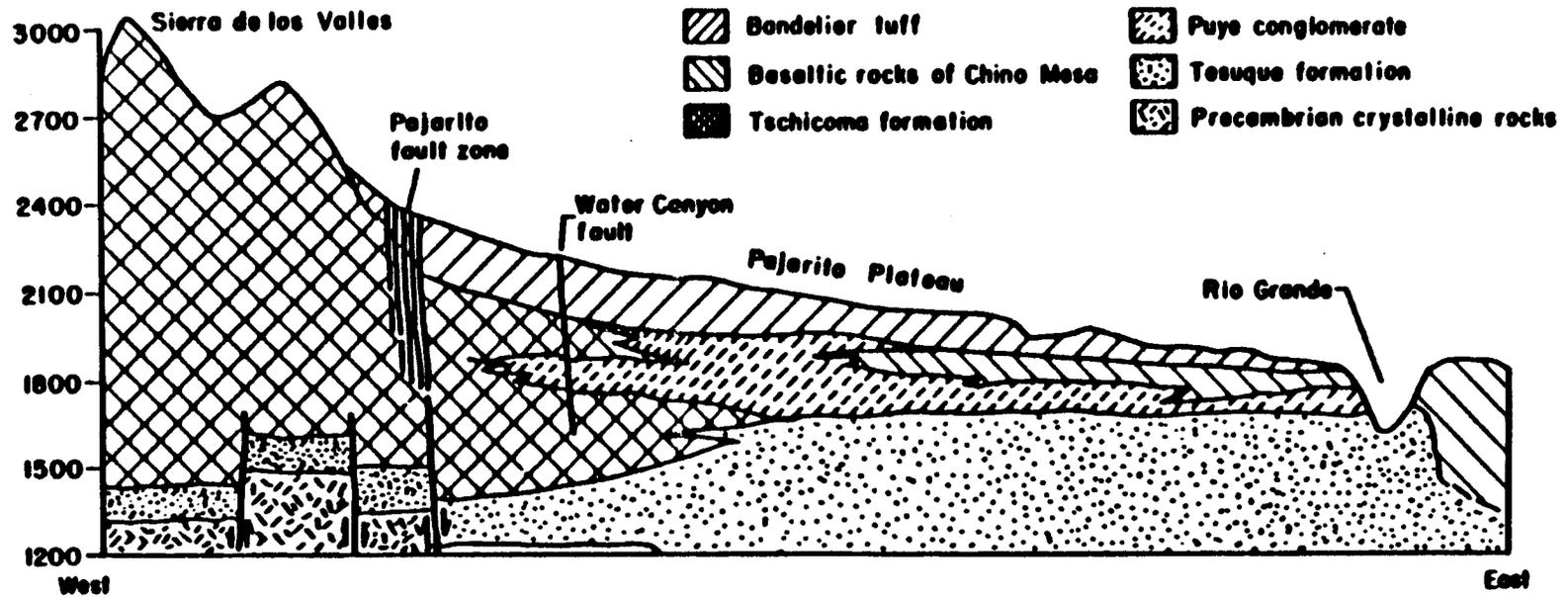


Figure D1. Geologic cross section through the Pajarito Plateau.

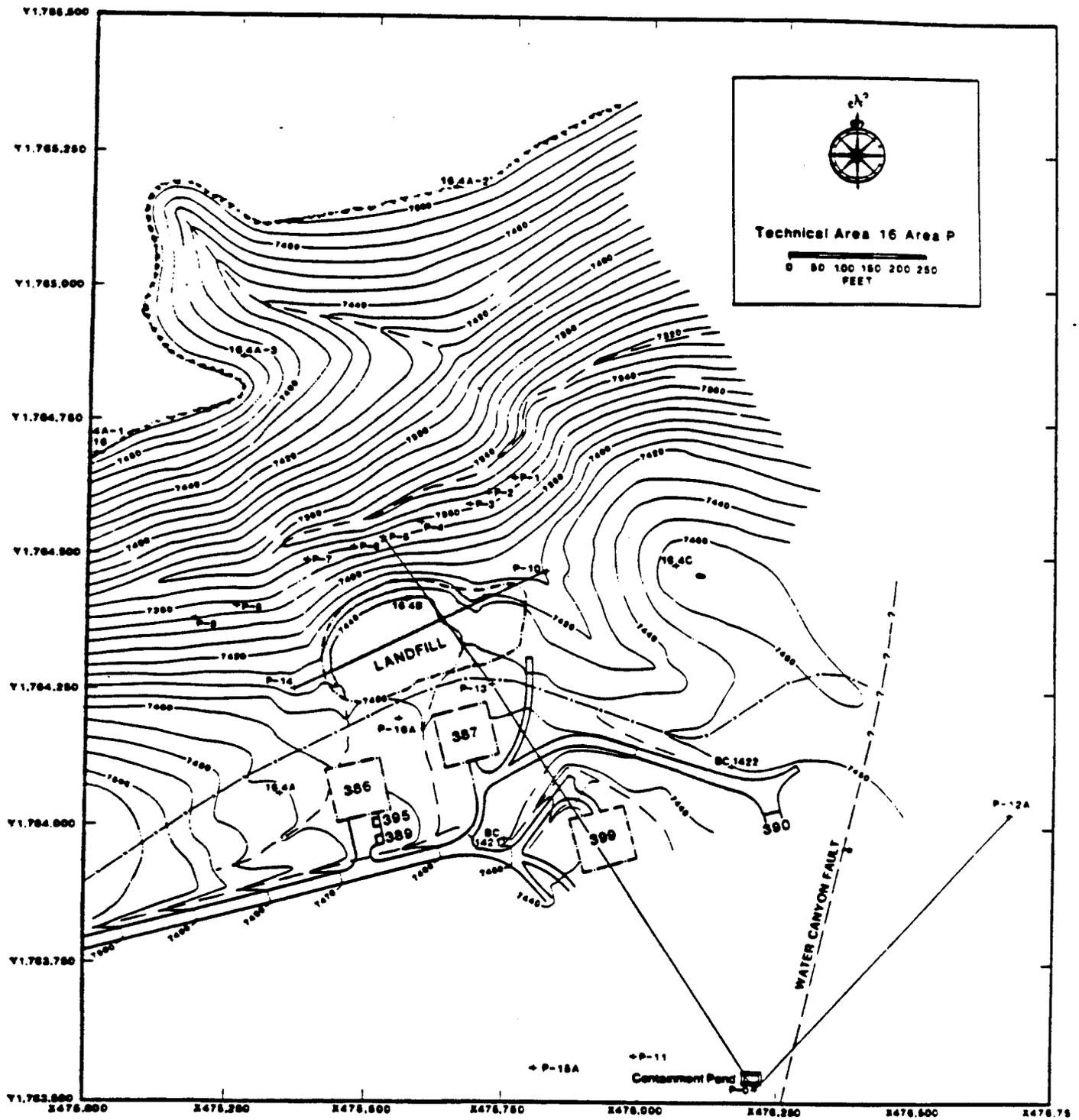


Figure D2. Site map of Technical Area 16 Area P. Boreholes are numbered P-0 through P-16A, and marked with crosses.

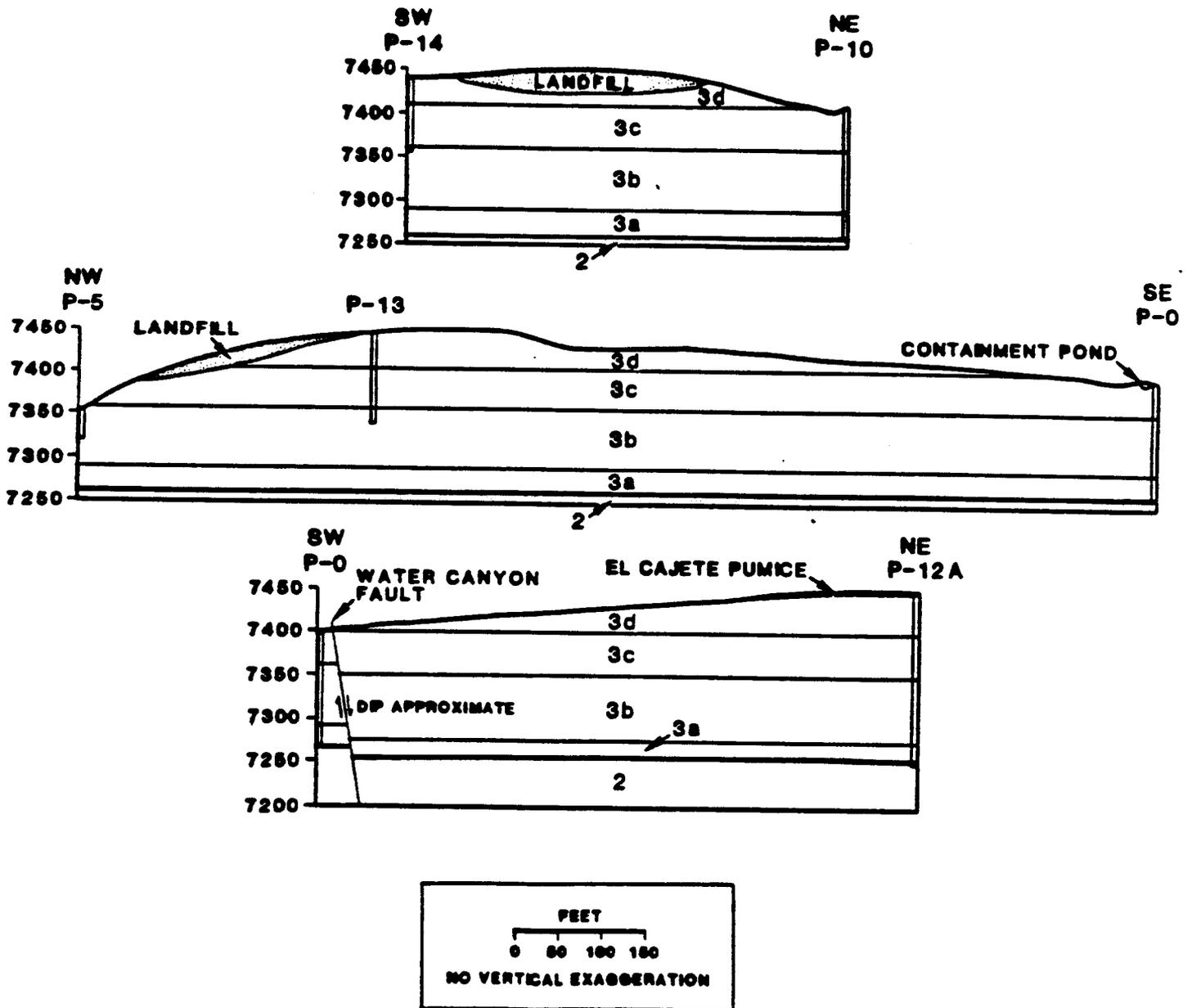


Figure D3. Geologic cross sections through Area P. Section lines are shown in Figure D2.

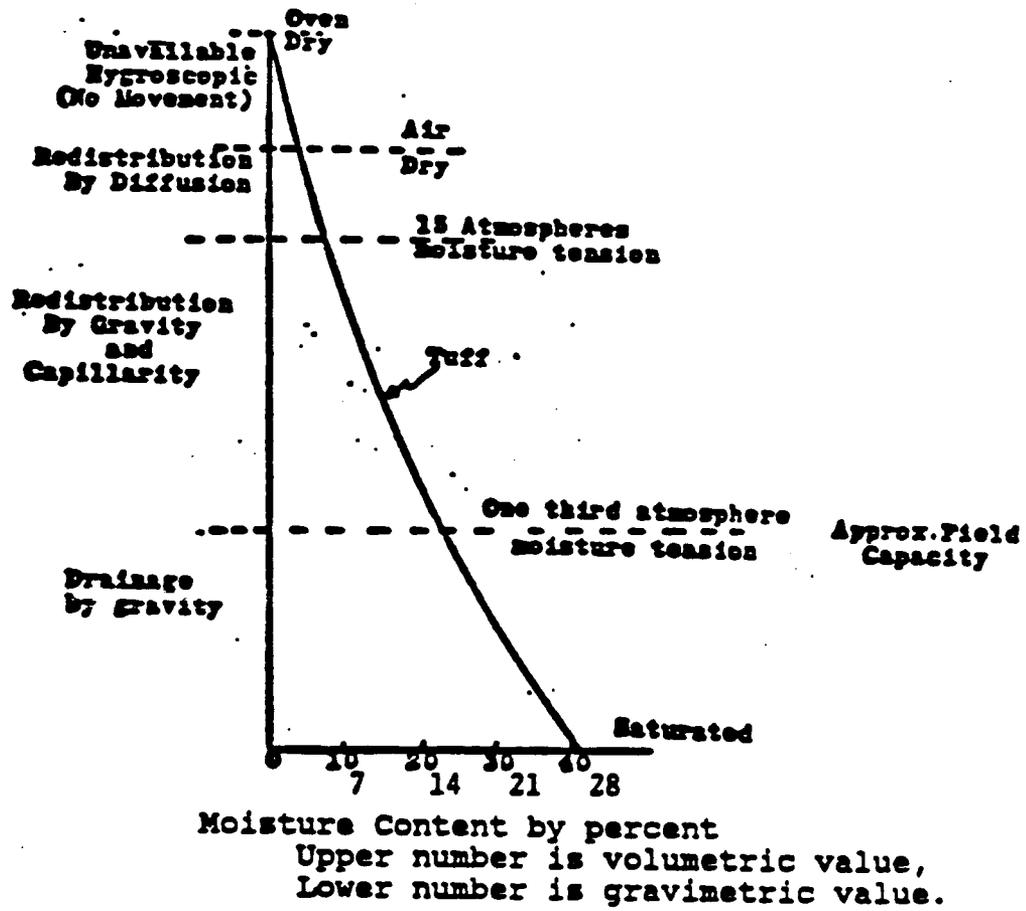


Figure D4. Energy relationship with moisture content of Bandelier Tuff (modified from Abrahams, 1963).

TABLE D-2
DATA FROM DRILLING CORES RECOVERED AT WELL P-16A

RESULTS OF HEAVY METALS ANALYSES:

EPA EXTRACT CONCENTRATIONS (in milligrams/liter)

PARAMETER	CORE DEPTHS (in feet)					UNCERTANTY (mg/l)
	10	50	55	60	81	
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	<0.05	0.07	0.09	0.09	<0.05	<0.05
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Mercury	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Selenium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

VOLUMETRIC MOISTURE CONTENT OF CORE LOGS RECOVERED FROM WELL
P-16A

Depth	% Moisture
0.5 ft	5.6 %
5.5 ft	16.0 %
10.5 ft	10.1 %
15.5 ft	13.8 %
20.5 ft	13.1 %

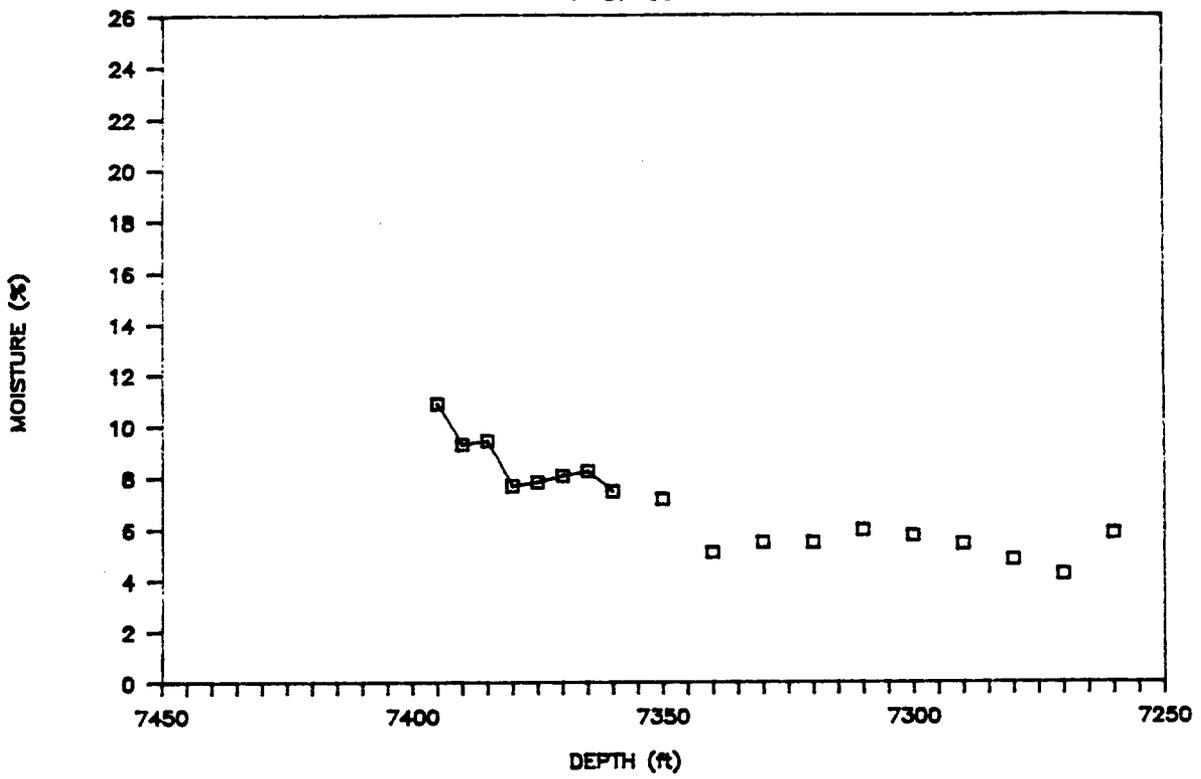
AVERAGE GRAVIMETRIC MOISTURE CONTENT (%) FROM FIFTEEN
DIFFERENT CORE LOGS AT TA-16 AREA P LANDFILL

GEOLOGIC UNIT	MEAN MOISTURE (%)	STD	RANGE (%)
3 d	5.2	3.6	2.2 - 17.7
3 c	6.1	3.5	1.9 - 24.7
3 b	5.7	2.1	2.3 - 11.4
3 a	3.8	1.4	2.3 - 5.8
Total for Unit	5.8	3.0	1.9 - 24.7

Notes: (1) See Figure D-3 for Geologic Unit Cross Section
(2) STD = standard deviation.

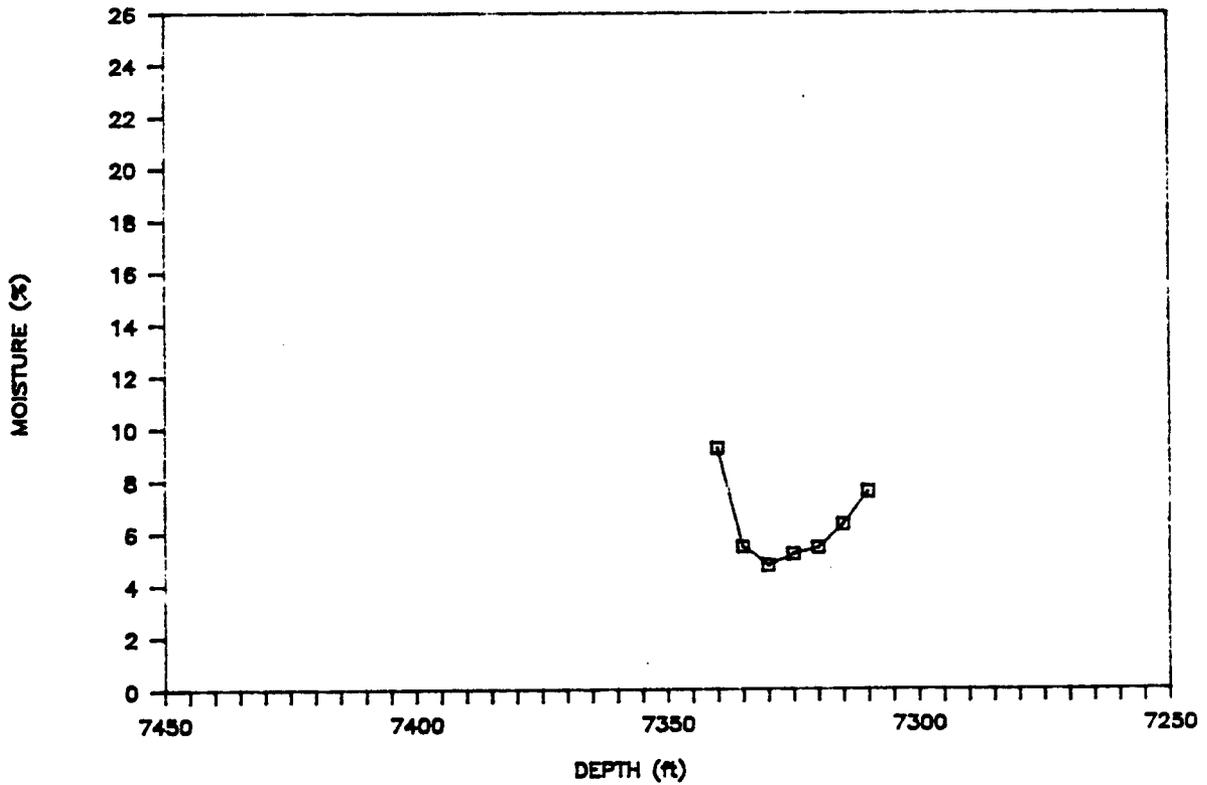
GRAVIMETRIC MOISTURE

P-87-00



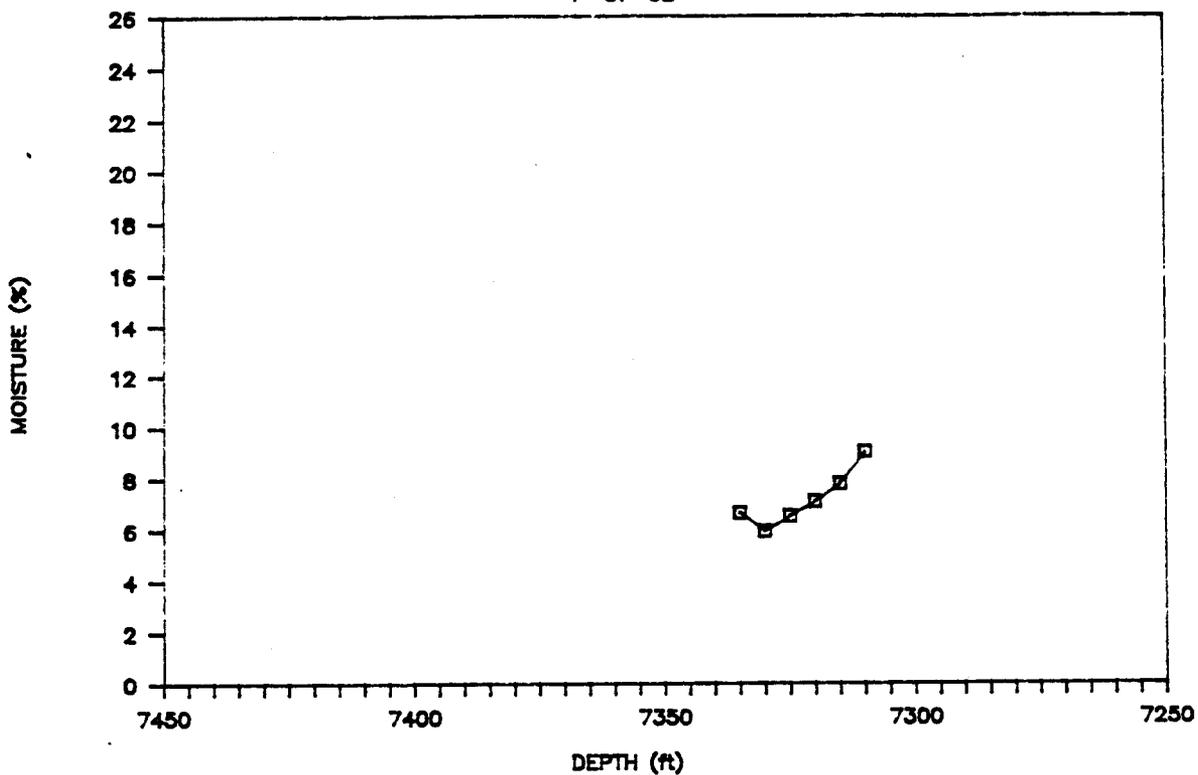
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P-87-01



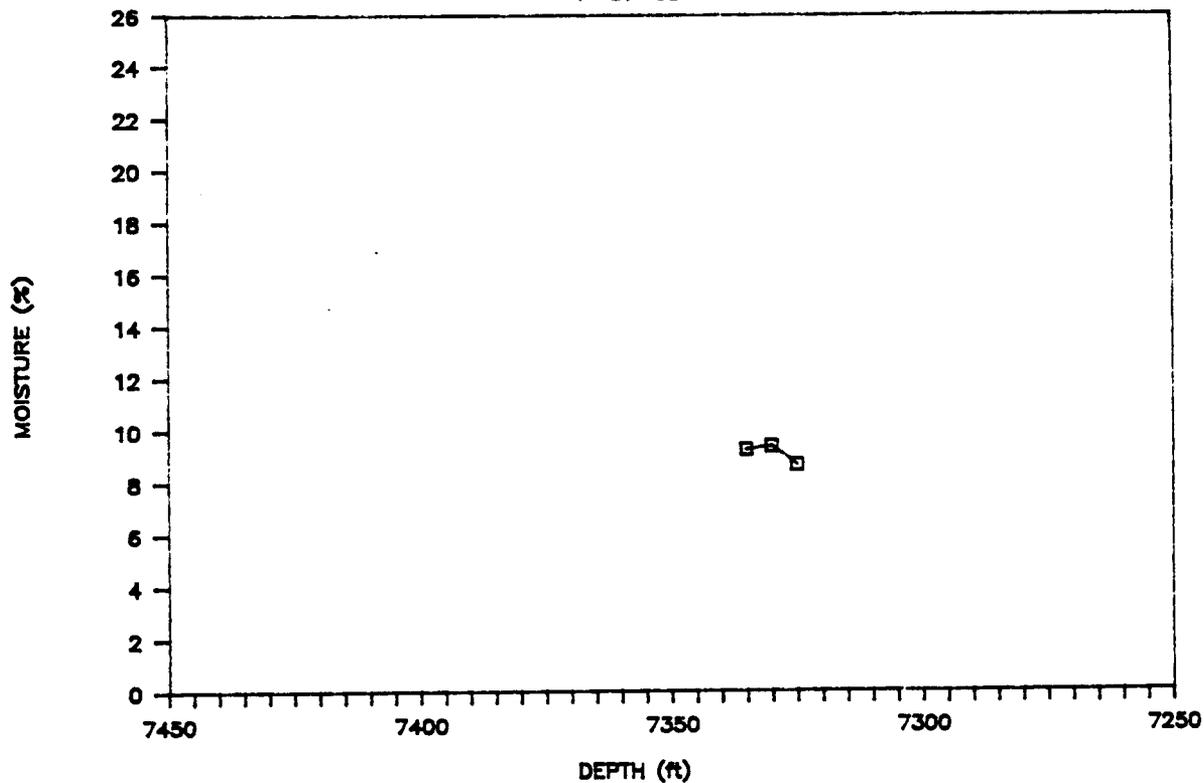
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P-87-02



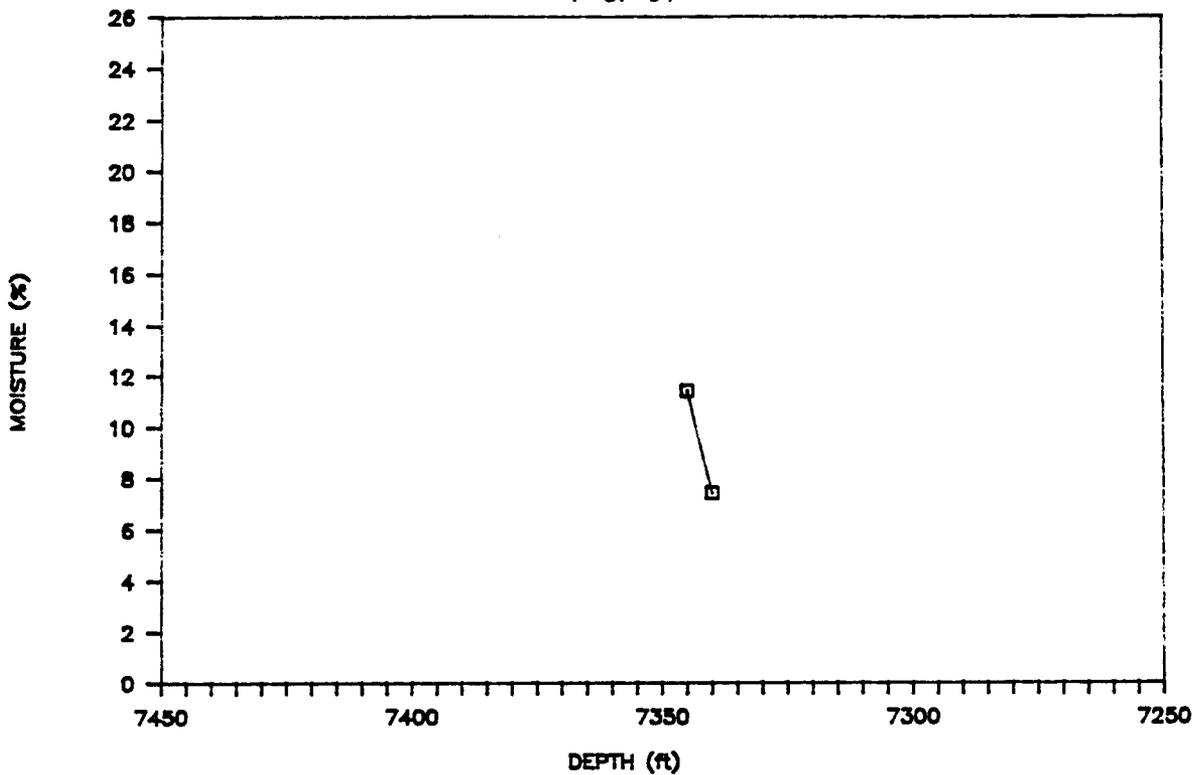
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P-87-03



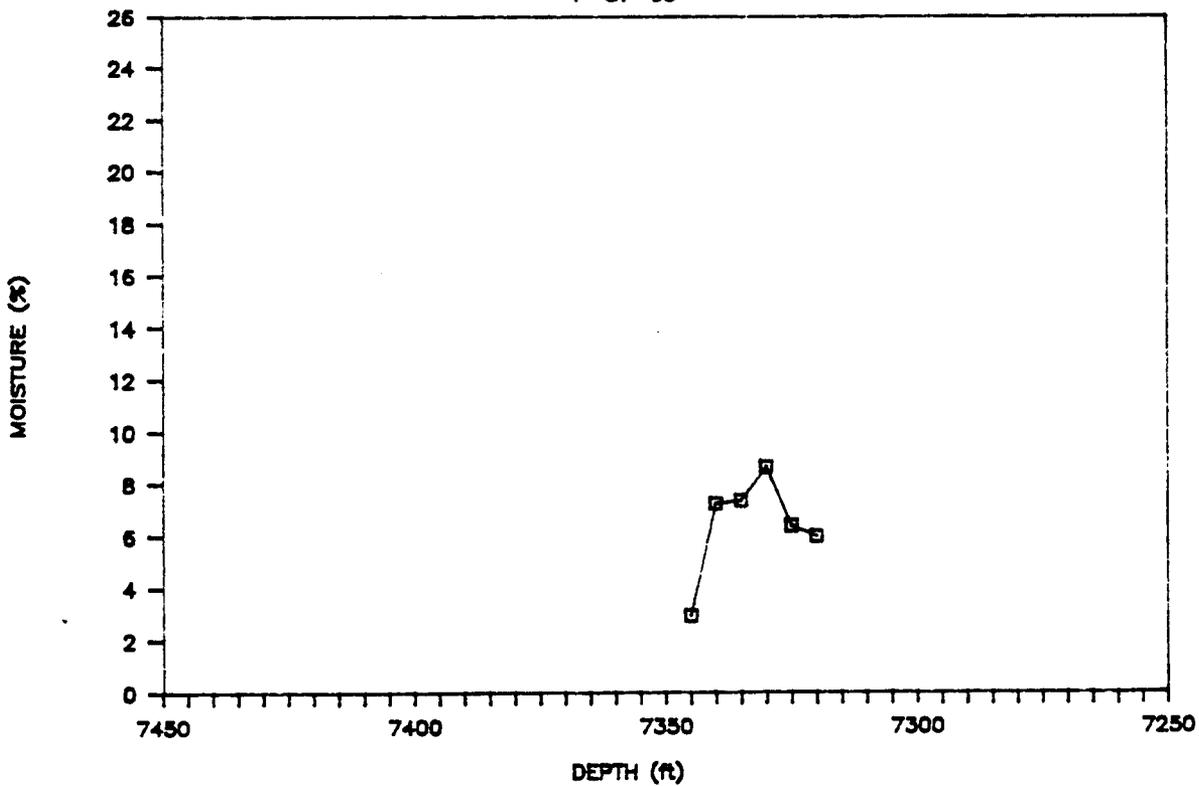
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P-87-04



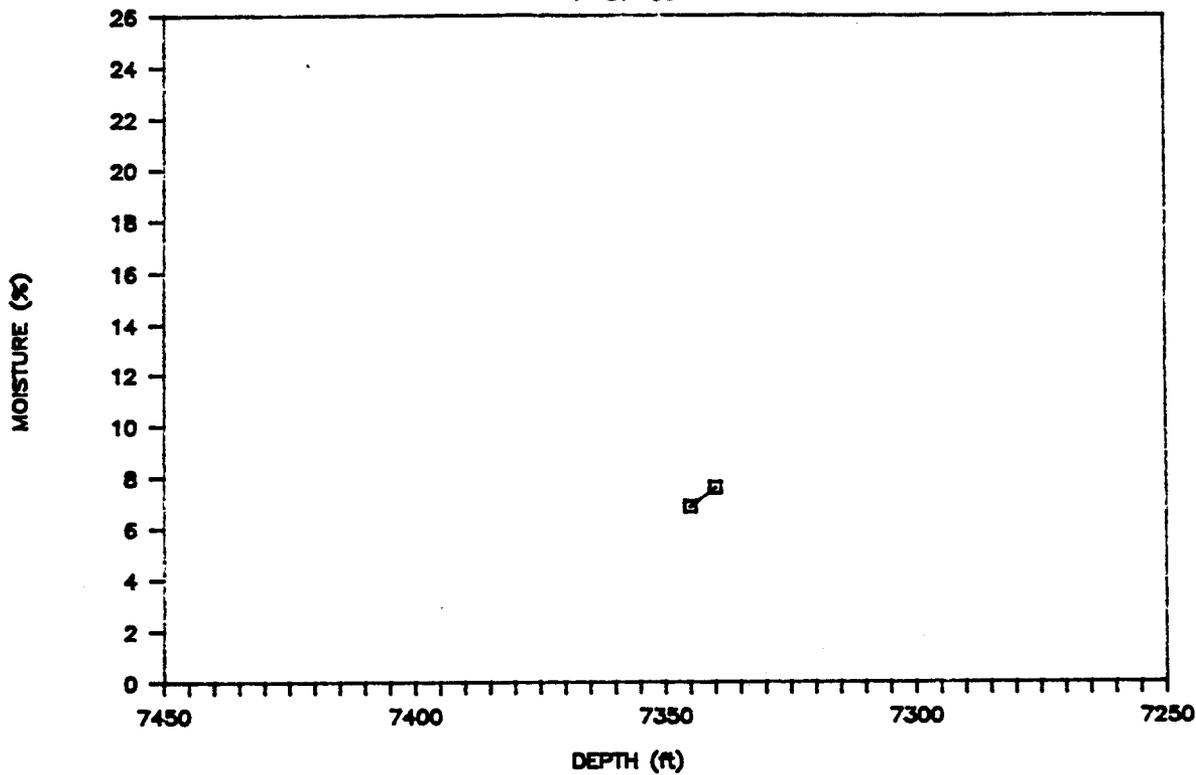
GRAVIMETRIC MOISTURE

P-87-05



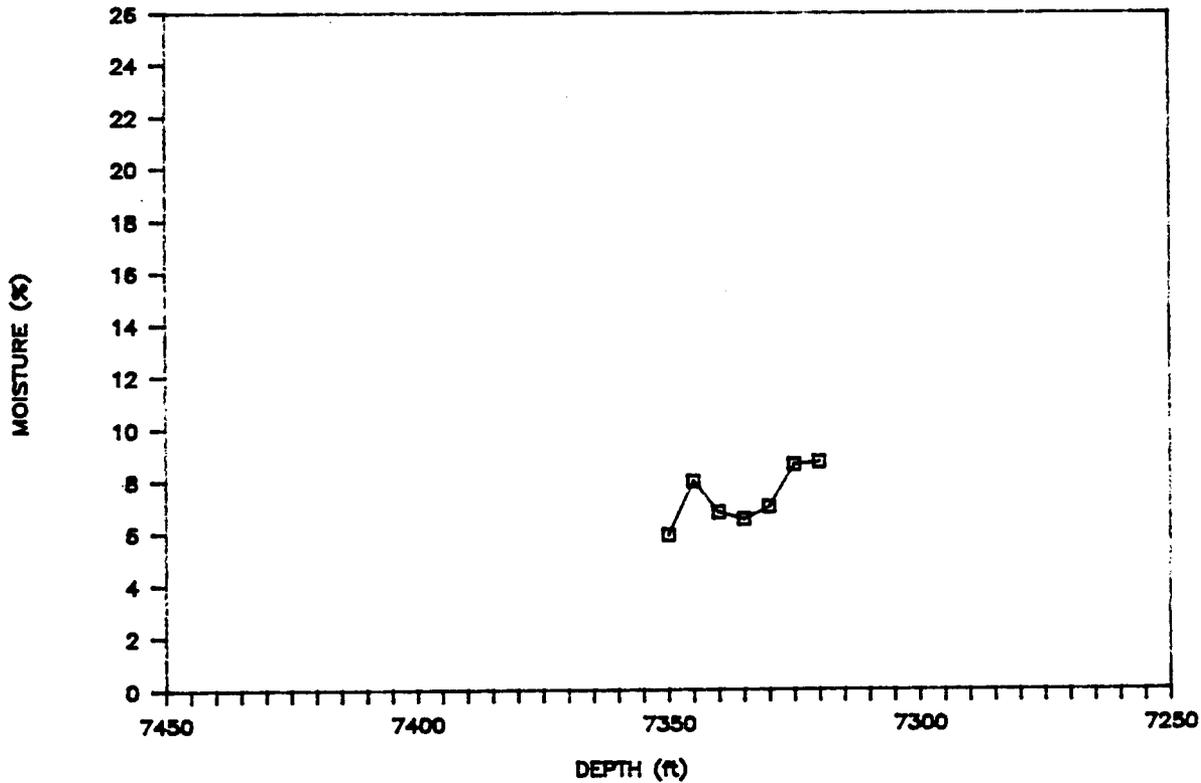
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P-87-06



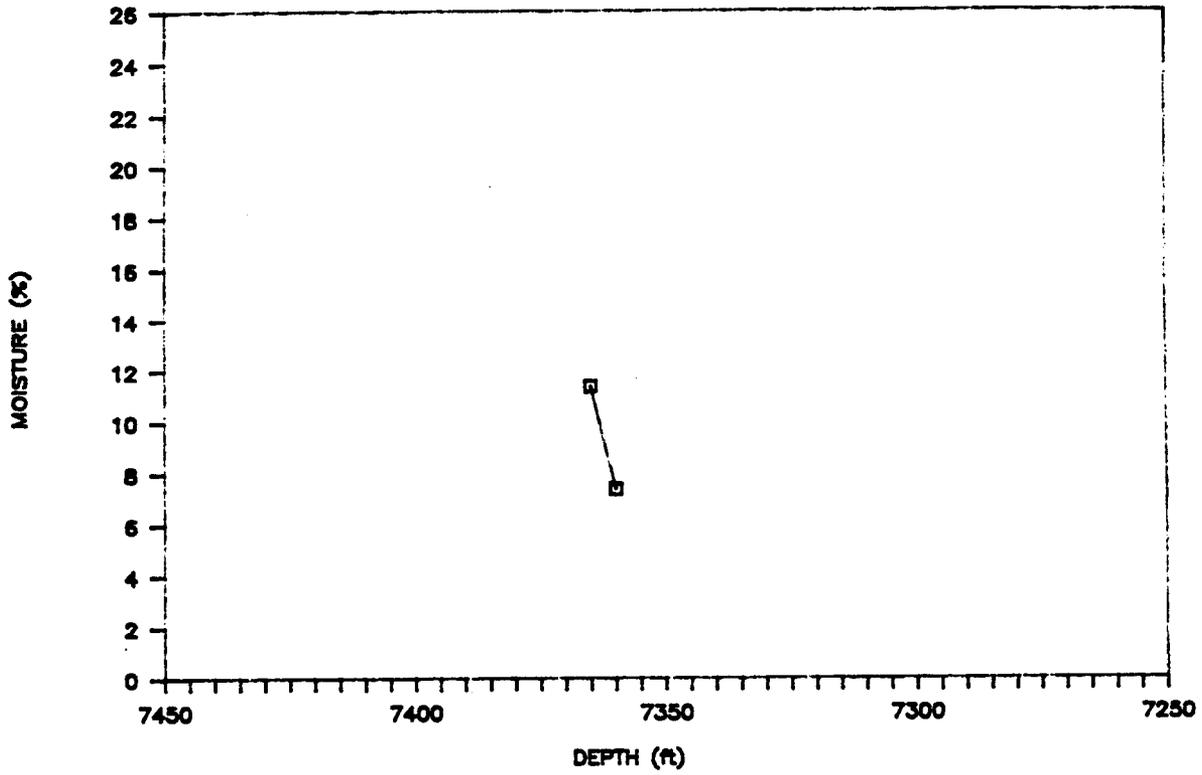
GRAVIMETRIC MOISTURE

P-87-07



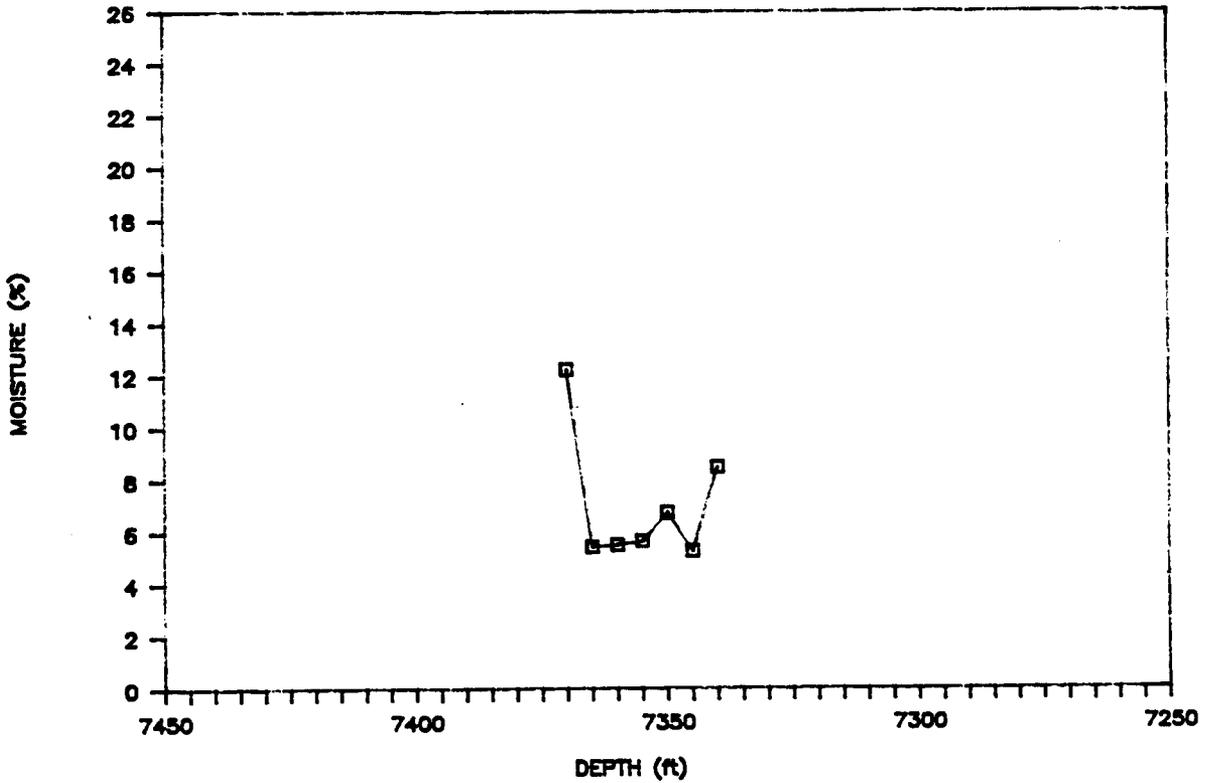
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P-87-08



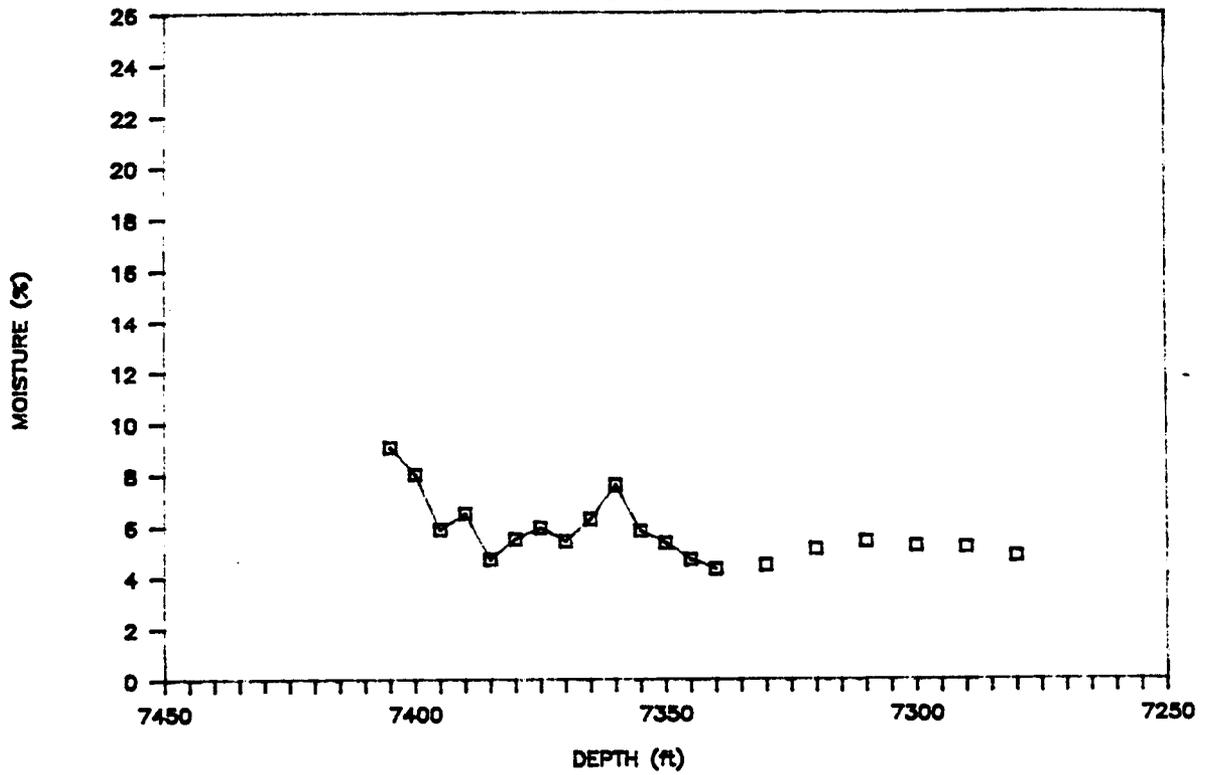
GRAVIMETRIC MOISTURE

P-87-09



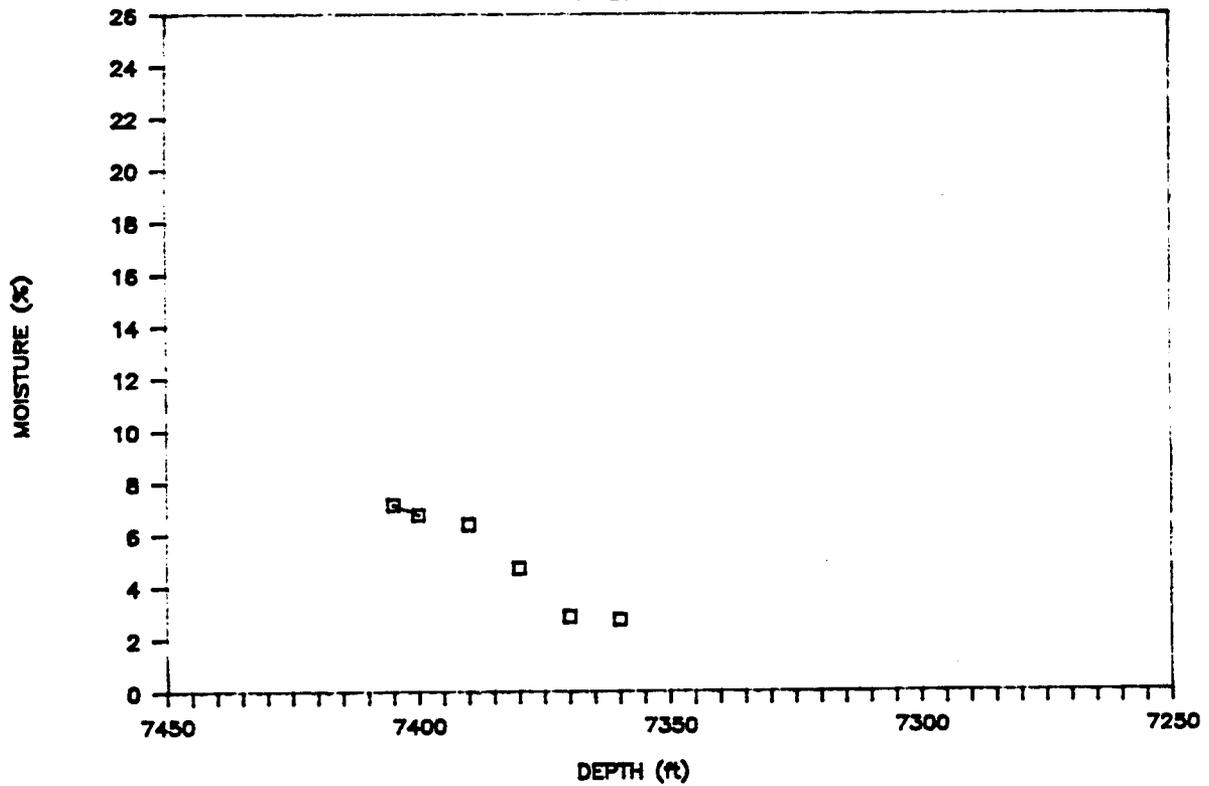
GRAVIMETRIC MOISTURE

P-87-10



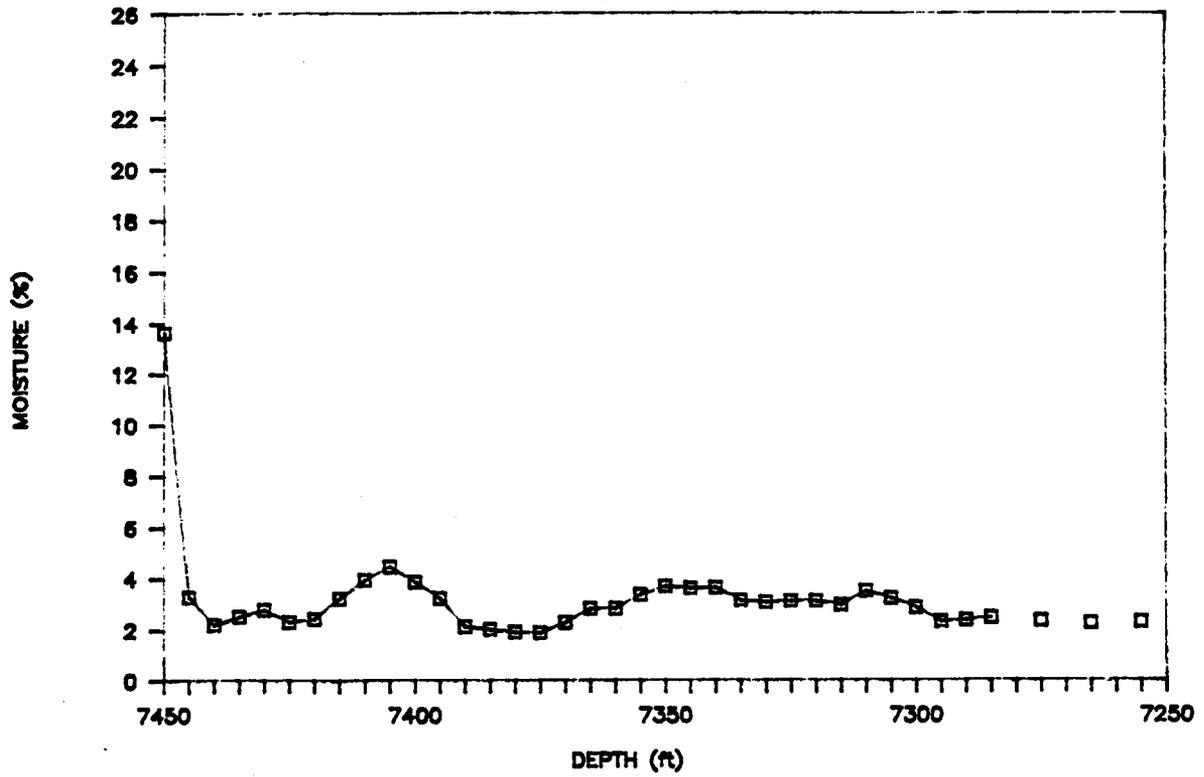
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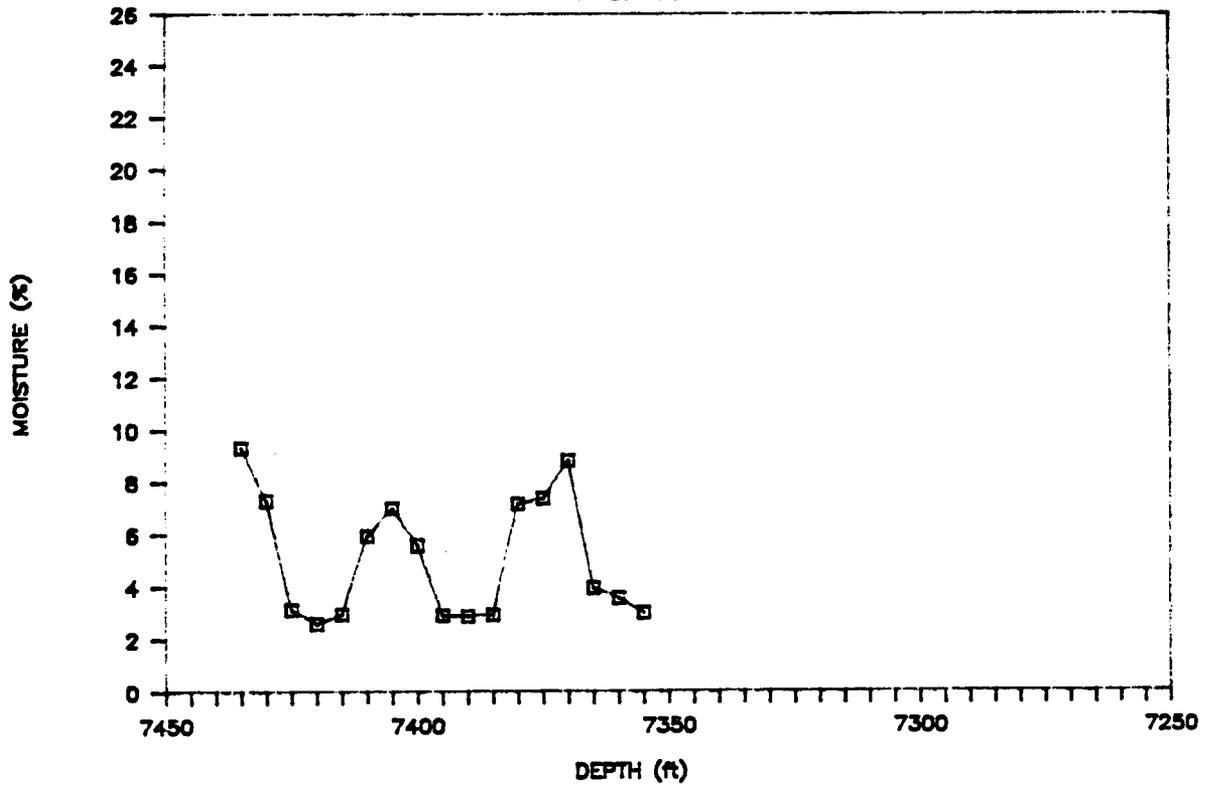
GRAVIMETRIC MOISTURE

P-87-12a



GRAVIMETRIC MOISTURE

P-87-14



GRAVIMETRIC MOISTURE

P-87-15

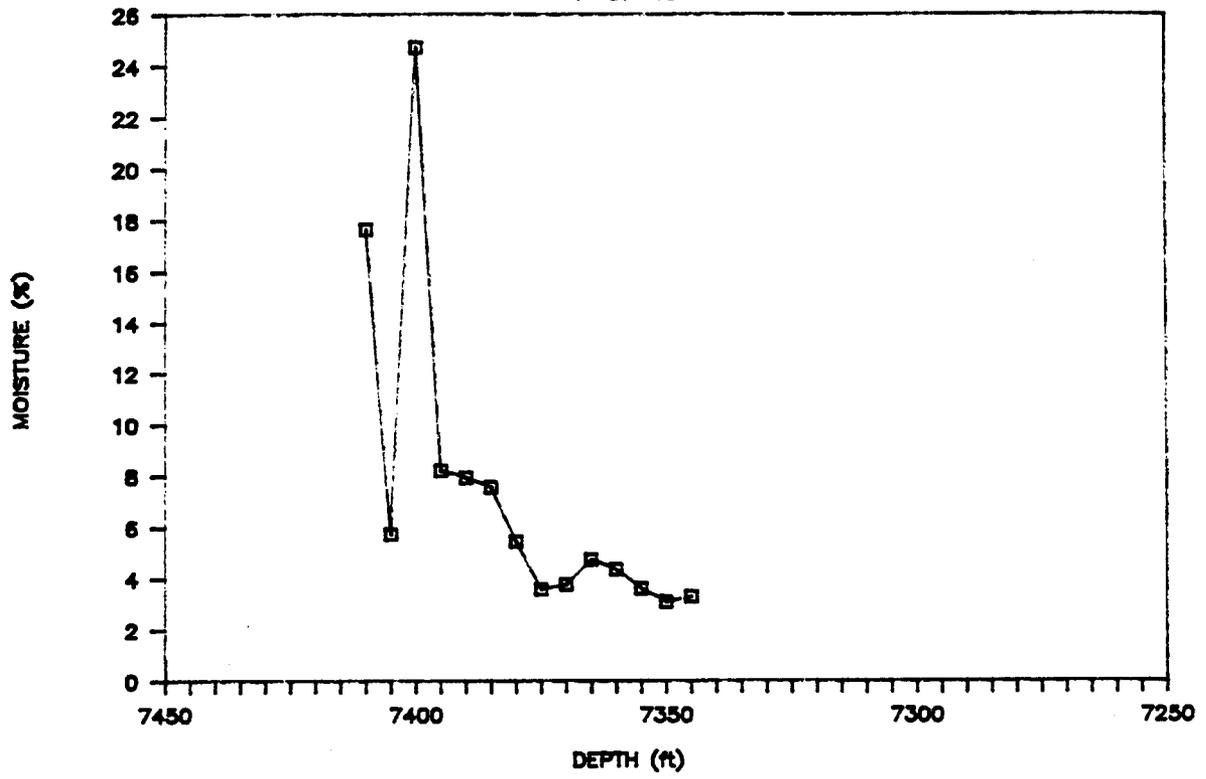


TABLE D-3
 TARGET VOLATILE AND SEMI-VOLATILE ORGANIC COMPOUND
 IDENTIFICATION LIST FOR WELL P-16 CORE SAMPLES

Compound Name	CAS Number
Acetone.....	67641
Benzene.....	71432
Bromodichloromethane.....	75274
Bromoform.....	75252
Bromomethane (methyl bromide).....	74839
2-Butanone (methyl ethyl ketone).....	78933
Carbon Disulfide.....	75150
Carbon Tetrachloride.....	56235
Chlorobenzene.....	108907
Chloroethane.....	75003
Chloroform.....	67663
Chloromethane (methyl chloride).....	74873
1,2-Dichlorobenzene.....	95501
1,3-Dichlorobenzene.....	541731
1,4-Dichlorobenzene.....	106467
1,1-Dichloroethane (ethylidene dichloride).....	75343
1,2-Dichloroethane.....	107062
1,2-Dichloroethene.....	540590
1,1-Dichloroethylene.....	75354
1,2-Dichloropropane (propylene dichloride).....	78875
cis-1,3-Dichloropropene.....	10061015
trans-1,3-Dichloropropene.....	10061026
Ethyl Benzene.....	100414
Naphthalene.....	91023
Methylene Chloride.....	75092
4-Methyl-2-Pentanone.....	108101
Styrene.....	100425
1,1,2,2-Tetrachloroethane.....	79345
Tetrachloroethene.....	127184
Toluene.....	108883
1,1,2-Trichloroethane.....	79005
1,1,1-Trichloroethane (methyl chloroform).....	71556
Trichloroethene.....	79016
Trichlorofluoromethane.....	75694
Vinyl Acetate.....	108054
Vinyl Chloride (chloroethene).....	75014
Xylenes.....	133027

NOTE: All of the above compounds were at concentrations below GC/MS detection limits. Sample date was 9-10-87.

TABLE D-4. RECONNAISSANCE WATER QUALITY AND SEDIMENT SAMPLING
 LOS ALAMOS NATIONAL LABORATORY - TA-16 AREA P LANDFILL
 SEE ATTACHED MAP FOR SAMPLE LOCATIONS

PG. 1 OF 2

STATION ID : TA-16 AREA P - CANON DE VALLE
 SAMPLE TYPE: SURFACE WATER SAMPLES - CANON DE VALLE
 SAMPLE DATE: DECEMBER 7, 1987
 LABORATORY : LANL HSE-9 LABORATORY (ANALYSES ON 12-15-87)

PARAMETER CONCENTRATION ==> (all units in mg/l)

SAMPLE NO.	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
57	< 0.05	3.50	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
59	< 0.05	3.50	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
63	< 0.05	3.50	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
64	< 0.05	3.30	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
70	< 0.05	.50	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
UNCERTAINTY	0.05	0.05	0.01	0.05	0.05	0.001	0.01	0.05

SAMPLE NO. SAMPLE DESCRIPTION ==>

57	DOWNSTREAM SURFACE WATER SAMPLE
59	SURFACE WATER NORTH OF LANDFILL
63	SURFACE WATER NORTH OF LANDFILL
64	UPSTREAM SURFACE WATER SAMPLE
70	SNOWMELT IN INFLOW DRAINAGE CHANNEL

TABLE D-4. RECONNAISSANCE WATER QUALITY AND SEDIMENT SAMPLING
 LOS ALAMOS NATIONAL LABORATORY - TA-16 AREA P LANDFILL
 SEE ATTACHED MAP FOR SAMPLE LOCATIONS

STATION ID : TA-16 AREA P - CANON DE VALLE
 SAMPLE TYPE: STREAM SEDIMENTS & SOIL SAMPLES - EPA WATER EXTRACT
 SAMPLE DATE: DECEMBER 7, 1987
 LABORATORY : LANL HSE-9 LABORATORY (ANALYSES ON 12-15-87)

PARAMETER CONCENTRATION ==> (all units in mg/l)								
SAMPLE NO.	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
55	< 0.05	.60	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
56	< 0.05	.50	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
58	< 0.05	.50	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
60	< 0.05	2.70	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
61	< 0.05	.50	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
62	< 0.05	2.10	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
65	< 0.05	2.70	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
66	< 0.05	.50	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
67	< 0.05	.90	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
68	< 0.05	2.70	< 0.01	< 0.05	.13	< 0.001	< 0.01	< 0.05
69	< 0.05	1.30	< 0.01	< 0.05	< 0.05	< 0.001	< 0.01	< 0.05
UNCERTAINTY	0.05	0.05	0.01	0.05	0.05	0.001	0.01	0.05

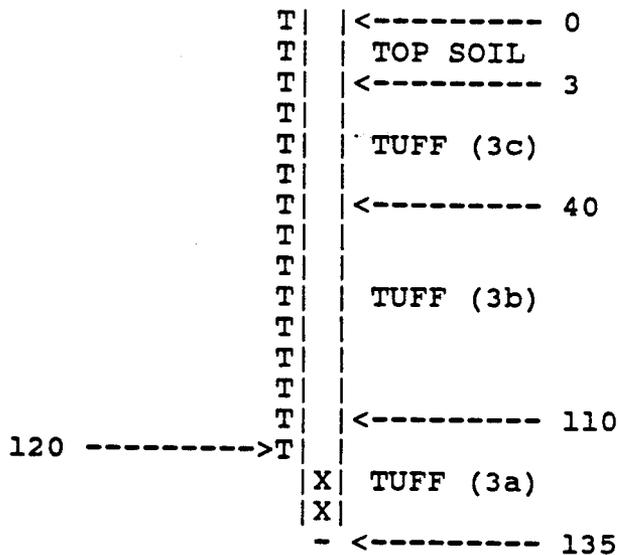
SAMPLE NO.	SAMPLE DESCRIPTION ==>
55	LANDFILL EROSION SOIL SEDIMENTS
56	BACKGROUND EROSION SOIL SEDIMENTS
58	DOWNSTREAM SURFACE CHANNEL SEDIMENTS
60	SURFACE CHANNEL SEDIMENTS NORTH OF LANDFILL
61	SURFACE CHANNEL SEDIMENTS NORTH OF LANDFILL
62	SURFACE CHANNEL SEDIMENTS NORTH OF LANDFILL
65	UPSTREAM SURFACE CHANNEL SEDIMENTS (NORTHWEST)
66	DRAINAGE CHANNEL SEDIMENTS WEST OF LANDFILL
67	DRAINAGE CHANNEL SEDIMENTS AT CANON DE VALLE
68	DRAINAGE CHANNEL SEDIMENTS SOUTH OF LANDFILL
69	INFLOW DRAINAGE CHANNEL SEDIMENTS

BOREHOLE: P-87-00
GEOLOGIST: Fred Brown
DATE DRILLED: 21 JULY 1987
ELEVATION: 7399 ft
LOCATION: 476215,1763523
TOTAL DEPTH: 135 ft
DISPOSITION: Aluminum Casing

DEPTH	DESCRIPTION
0-3	Fill/Top Soil (sandy loam)
3-40	Unit 3c. Light brownish grey tuff Moderately welded Rare rhyolite lithic fragments Common grey pumice lapilli
40	Contact is strongly welded
40-110	Unit 3b. Pale yellowish brown tuff Moderately welded Rare rhyolite fragments Abundant grey pumice lapilli Fracture noted at 45 ft
110	Contact is strongly welded
110-135	Unit 3a. Dark yellowish brown tuff Welded Abundant rhyolite/latite lithic fragments Rare pumice lapilli
135	Unit 2. Densely welded tuff halts drilling

WELL COMPLETION DIAGRAM

P-87-00
(ALUMINUM)



 SCREEN =
 CAVED-IN X
 BACKFILLED TUFF T
 CEMENT C
 BENTONITE B
 SILICA SAND S

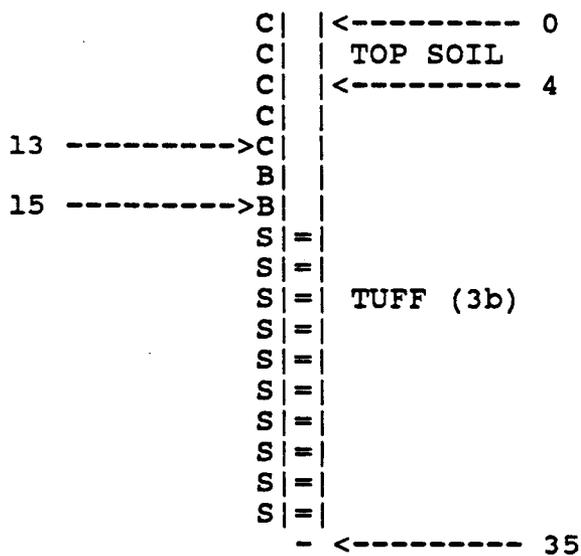
(NOT TO SCALE)

BOREHOLE: P-87-01
GEOLOGIST: Fred Brown
DATE DRILLED: 29 JULY 1987
ELEVATION: 7344 ft
LOCATION: 475756,1764645
TOTAL DEPTH: 35 ft
DISPOSITION: PVC Casing

DEPTH	DESCRIPTION
0-4	Top Soil (sandy loam)
5-10	Unit 3b. Dark yellowish brown tuff Welded Rare rhyolite lithic fragments Rare pumice lapilli
10-35	Unit 3b. Pale yellowish brown tuff Moderately welded Rare rhyolite lithic fragments Rare pumice lapilli

WELL COMPLETION DIAGRAM

P-87-01
(PVC)



SCREEN	=
CAVED-IN	X
BACKFILLED TUFF	T
CEMENT	C
BENTONITE	B
SILICA SAND	S

(NOT TO SCALE)

BOREHOLE: P-87-02
GEOLOGIST: Fred Brown
DATE DRILLED: 23 JULY 1987
ELEVATION: 7341 ft
LOCATION: 475708, 1764617
TOTAL DEPTH: 10 ft
DISPOSITION: Filled In

DEPTH	DESCRIPTION
0-3	Top Soil (sandy loam)
3-10	Unit 3b. Dark yellowish brown tuff Moderately welded Rare rhyolite lithic fragments Rare pumice lapilli

BOREHOLE: P-87-03
GEOLOGIST: Fred Brown
DATE DRILLED: 23 JULY 1987
ELEVATION: 7342 ft
LOCATION: 475676, 1764596
TOTAL DEPTH: 9 ft
DISPOSITION: Teflon Casing

DEPTH	DESCRIPTION
0-3	Top Soil, boulders and cobbles
3-9	Unit 3b. Dark yellowish brown tuff Moderately welded Rare rhyolite lithic fragments Rare pumice lapilli

HSE 9 QUALITY CONTROL RESULTS
AG 9-26-87

SAMPLE NUMBER	RED NUM	RESULT	UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
00.96481	09999	300.	30.	UG/L	9/03/86	
00.96481	09999	270.	30.	UG/L	11/18/86	
00.96481	09999	270.	30.	UG/L	11/18/86	
00.96481	09999	270.	30.	UG/L	11/26/86	
00.96481	09999	240.	20.	UG/L	11/26/86	
00.96481	09999	270.	30.	UG/L	9/22/86	
00.96481	09999	280.	30.	UG/L	9/22/86	
00.96481	09999	280.	30.	UG/L	9/22/86	
00.96481	09999	276.	28.	UG/L	12/09/87	
00.96481	09999	260.	30.	UG/L	9/22/86	
00.96481	09999	290.	30.	UG/L	9/22/86	
00.96481	09999	240.	30.	UG/L	9/03/86	
00.96481	09999	270.	30.	UG/L	11/26/86	
00.96481	09999	270.	30.	UG/L	2/26/87	
00.96481	09999	280.	30.	UG/L	2/02/87	
00.96481	09999	260.	30.	UG/L	9/03/86	
00.96481	09999	250.	30.	UG/L	9/03/86	
00.96481	09999	261.	26.	UG/L	10/29/87	
00.96481	09999	260.	50.	UG/L	5/01/87	

 THESE DATA MEET ESTABLISHED HSE9 GROUP QUALITY ASSURANCE STANDARDS

 ANALYST: *WMB* DATE: *12-9-87* SECTION LEADER: _____ DATE: _____ QUALITY ASSURANCE: *maq 12/9/87*

SAMPLE NUMBER	CERTIFIED VALUE	CERTIFIED VALUE	CERTIFIED VALUE	UNITS	CODE #
00.96481 AG	250.	30.	30.	UG/L	86GAU 02

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 工部局 多一區分局

SAMPLE NUMBER	REQ NUM	RESULT	UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
00.01100	09999	5.50	0.50	MG/L	2/26/87	
00.01100	09999	5.70	0.50	MG/L	12/09/87	
00.01100	09999	5.20	0.50	MG/L	5/06/87	
00.01100	09999	6.00	0.50	MG/L	5/06/87	
00.01100	09999	5.40	0.50	MG/L	6/17/87	
00.01100	09999	5.50	0.60	MG/L	5/07/87	
00.01100	09999	5.30	0.50	MG/L	5/01/87	
00.01100	09999	4.80	0.50	MG/L	10/07/87	
00.01100	09999	5.90	0.60	MG/L	5/01/87	
00.01100	09999	5.00	0.50	MG/L	10/07/87	
00.01100	09999	5.79	0.58	MG/L	3/03/87	
00.01100	09999	4.70	0.50	MG/L	9/02/87	
00.01100	09999	5.77	0.58	MG/L	3/03/87	
00.01100	09999	5.70	0.60	MG/L	3/17/87	
00.01100	09999	4.80	0.50	MG/L	9/02/87	
00.01100	09999	4.80	0.50	MG/L	9/02/87	
00.01100	09999	5.50	0.50	MG/L	2/26/87	
00.01100	09999	5.80	0.50	MG/L	12/09/87	
00.01100	09999	5.60	0.60	MG/L	6/17/87	
00.01100	09999	5.60	0.60	MG/L	6/17/87	
00.01100	09999	5.40	0.50	MG/L	6/17/87	
00.01100	09999	4.74	0.47	MG/L	3/03/87	
00.01100	09999	4.42	0.42	MG/L	3/03/87	
00.01100	09999	4.80	0.50	MG/L	8/25/87	
00.01100	09999	6.00	0.60	MG/L	7/20/87	

 THESE DATA MEET ESTABLISHED HSE9 GROUP QUALITY ASSURANCE STANDARDS

ANALYST: *MSB* DATE: *12-9-87* SECTION LEADER: _____ DATE: _____ QUALITY ASSURANCE: *mag 12/9/87*

SAMPLE NUMBER	CERTIFIED VALUE NAME	CERTIFIED VALUE	CERTIFIED VALUE UNCERTAINTY	CERTIFIED VALUE UNITS	CODE N
00.01100 PB	5.00	0.44	MG/L	86EPA 02	

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SAMPLE NUMBER	REQ NUM	RESULT	UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
00.01100	09999	108.2	10.8	MG/L	2/26/87	
00.01100	09999	94.1	9.4	MG/L	9/10/87	
00.01100	09999	105.8	10.5	MG/L	5/06/87	
00.01100	09999	113.0	11.3	MG/L	5/06/87	
00.01100	09999	104.0	10.0	MG/L	6/17/87	
00.01100	09999	112.2	11.2	MG/L	5/07/87	
00.01100	09999	110.9	11.1	MG/L	5/01/87	
00.01100	09999	92.0	9.0	MG/L	9/02/87	
00.01100	09999	109.1	10.9	MG/L	5/01/87	
00.01100	09999	96.0	10.0	MG/L	9/02/87	
00.01100	09999	112.8	11.3	MG/L	3/03/87	
00.01100	09999	101.0	10.1	MG/L	8/25/87	
00.01100	09999	88.0	9.0	MG/L	12/09/87	
00.01100	09999	111.1	11.1	MG/L	3/03/87	
00.01100	09999	112.0	11.2	MG/L	3/17/87	
00.01100	09999	91.0	9.0	MG/L	9/02/87	
00.01100	09999	108.2	10.8	MG/L	8/25/87	
00.01100	09999	84.9	8.5	MG/L	10/07/87	
00.01100	09999	114.0	11.4	MG/L	2/26/87	
00.01100	09999	93.0	9.3	MG/L	10/07/87	
00.01100	09999	110.0	10.0	MG/L	6/17/87	
00.01100	09999	110.0	10.0	MG/L	6/17/87	
00.01100	09999	104.0	10.0	MG/L	6/17/87	
00.01100	09999	104.8	10.5	MG/L	3/03/87	
00.01100	09999	105.5	10.5	MG/L	3/03/87	
00.01100	09999	104.0	10.0	MG/L	12/08/87	
00.01100	09999	100.9	10.1	MG/L	8/25/87	
00.01100	09999	104.0	10.0	MG/L	12/08/87	
00.01100	09999	107.3	10.7	MG/L	7/20/87	

 THESE DATA MEET ESTABLISHED HSE9 GROUP QUALITY ASSURANCE STANDARDS

ANALYST: *CMB* DATE: *12-9-87* SECTION LEADER: *mag* DATE: *12/9/87* QUALITY ASSURANCE:

SAMPLE NUMBER	CERTIFIED VALUE NAME	CERTIFIED VALUE	CERTIFIED VALUE UNCERTAINTY	CERTIFIED VALUE UNITS	CERTIFIED CODE N

Raw Laboratory Chemical Data Used in Table C-4.

REQUESTOR DATA SHEET # _____

Sampled by DAVID MCINROY Collection Date 11/2/87 Time 1500 Weather ptly/cloudy Witness TONY GRIEG
 Presampling Conference Completed With SUZANNE On DESK Send Report To DAVE MS K490
 Phone 70819 Source of Sample: TA-16 LAGOON Reason for Sampling RCRA CLOSURE
 Group HSEB Site TA59 Building 043 Room No. 224

Priority Assigned: 1. Emergency; 2. Recognized Danger; 3. Imminent Deadline; 4. Special Survey; 5. Routine;
 (Circle One) Priority Approval: _____ (1. GL or BGL; 2. or 3. AGL; 4. or 5. SL).

Method of Analysis Complies With: _____

Background Information Useful to Analyst (Contamination Levels, Hazards, Etc.) _____

Chain of Custody: Yes _____ (See Attached Form) No _____ Other Information _____

All Samples Submitted to MSE-9 Must Be Screened For Radioactivity. Samples Containing Greater Than 20 dpm Total Alpha or 100 dpm Combined Gamma/Beta Contamination Cannot Be Handled At TA-59.

Sample Number	Other I.D.	Sampling Location	Analysis Requested	Sampling Method	Sample Type	Preservative Utilized	Radioactivity Scan (dpm)		Remarks
							Alpha	Beta/Gamma	
8700262		TA-16	Semi-Vol + Vol org.		Soil				
8700263									
264									
265									
266									
267									
87.00268									

Sampling Method: 24FC=24 Hour Flow-Weighted Composite; 24TC=24 Hour Time-Weighted Composite; G=Grab; B=Ball; D=Drill; C=Core; P=Pump; O=Other (Please Specify)

Sample Type: E=Effluent; SL=Sludge; SO=Soil; SC=Soil Core; MW=Well Water; SW=Surface Water; O=Other

Preservative: F=Filtered; NF=Non-Filtered; NA=Non Acidified; A-H₂SO₄ (2 ml/l); A-HNO₃ (5 ml/l); A-HNO₃ (5 ml/l); A H₃PO₄ & CuSO₄; A-Other; I=Iced; P=NaOH.

ANALYSIS DATA SHEET # 6455

Post Sampling Conference Completed With _____ and Samples Submitted On _____ Time _____
 Due _____ Project # _____ Estimate of Time Involved _____ Actual Time _____
 Analytical Results and Remarks _____

If Chain of Custody, Seal(s) Intact: Yes ___ No ___ Seal(s) Broken By: _____ Date _____
 Printed Data Output Attached: Yes ___ No ___ Other Sheets Attached: Yes ___ No ___ (DE-Data Extracted, DA-Data Analyzed)
87, 6452

Sample Number	DE/DA	Compound	CAS #	Analytical Result (Units)	Analytical Uncertainty	MDL	Comments
87.00262	/						
00263	/						
00264	/						
00265	/						
00266	/						
00267	/						
00268	/						
00.97642	/						
00.97643	/						

Approved By: Analyst Carl R. Shyke Notebook Y1772 Page 71 Date 3/29/88 QC Coordinator mag 3/29/88
 Section Leader James Hill Date 3/29/88 Computer Entry _____ Date: !!!

01125 (0025)

182a

E4

HSE-9 ORGANIC ANALYSIS
VOLATILE ORGANICS RESULTS

REQUEST SHEET: 87.6452
SAMPLE NUMBERS: 87.00262-00268
SUBMITTER: DAVE McINROY, HSE-8
DATE: NOVEMBER 25, 1987

The above mentioned soil samples were delivered to me on November 2, 1987. They were immediately refrigerated until the time of extraction and analysis. Extraction and analysis of the samples occurred November 4 through November 6, 1987. Final data analysis was completed on November 24, 1987. The results of the analyses are attached and a description of the procedure used follows.

The methodology used closely follows that specified by the EPA in its Contract Laboratory Program (CLP) for the analysis of medium level contaminated soil. Approximately 4.0 grams of the soil samples were weighed and extracted in 10 mls of a methanolic solution containing 3 surrogate standards (1,2-dichloroethane d4, toluene d8, and 4-bromofluorobenzene). The percent recovery of each of these surrogates appears on the result sheet for each sample. This percent recovery is useful in gauging the efficacy of the soil extraction procedure. One sample (87.00262) was used for matrix spike and matrix spike duplicate analysis in which a mixture of 1,1-dichloroethene, benzene, trichloroethene, toluene, and chlorobenzene was added to the extraction solution. The percent recovery of these compounds can be used to gauge any matrix effects on the sample extraction. The results of these analyses is also attached.

The actual analysis was performed using purge and trap/gas chromatography/mass spectrometry (PT/GC/MS). 100 ul of the methanolic extract was injected into 5 mls of organic free water along with an internal standard solution. This mixture was purged for 11 minutes using helium. Any volatile organics present were concentrated on a trap which is then thermally desorbed into the GC, where they are separated and detected by the MS. Identification of the compounds was performed using library searches, analyst interpretation, and retention time confirmation. Quantification was performed using the internal standard method.

Several compounds were found in the blank and sample runs. Identifications were made where possible. The laboratory blank was found to contain toluene, chloroform, and traces of methylene chloride and carbon disulfide. The source of these compounds was found to be the methanol used in the extraction. No priority pollutants above the minimum detection limits were detected.

The approximate percent moisture in each sample was determined and appears in the table below.

SAMPLE NUMBER	% MOISTURE
87.00262	5.3
87.00263	11.1
87.00264	5.7
87.00265	5.0
87.00266	5.8
87.00267	11.5
87.00268	14.5

Please call if you have any questions.


Suzanne Bell
HSE-9 Organic Analysis Section


Carol Sutcliffe
HSE-9 Section Leader

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HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: CO-97642 QC sample
MATRIX: SOIL
NUMBER OF REPLICATE RUNS: 2

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4	<u>144.1</u>	} mean of 2
TOLUENE d8	<u>108.7</u>	
p-BROMOFLUOROBENZENE	<u>100.6</u>	

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	<MDL	2.50
73839	BROMOMETHANE	<MDL	2.50
75014	VINYL CHLORIDE	<MDL	2.50
75003	CHLOROETHANE	<MDL	2.50
75092	METHYLENE CHLORIDE	<MDL	2.50
67641	ACETONE	<MDL	2.50
75150	CARBON DISULFIDE	<MDL	2.50
75354	1,1-DICHLOROETHENE	<MDL	2.50
75343	1,1-DICHLOROETHANE	<MDL	2.50
540590	1,2-DICHLOROETHENE	<MDL	2.50
67663	CHLOROFORM	<MDL	2.50
107062	1,2-DICHLOROETHANE	10.82 ± 1.1	2.50
78933	2-BUTANONE	<MDL	2.50
71556	1,1,1-TRICHLOROETHANE	<MDL	2.50
56235	CARBON TETRACHLORIDE	<MDL	2.50
108054	VINYL ACETATE	<MDL	2.50
75274	BROMODICHLOROMETHANE	14.88 ± 1.5	2.50
78875	1,2-DICHLOROPROPANE	<MDL	2.50
10061015	cis-1,3-DICHLOROPROPENE	<MDL	2.50
79016	TRICHLOROETHENE	<MDL	2.50
124481	DIBROMOCHLOROMETHANE	0.58 ± 0.06	2.50
79005	1,1,2-TRICHLOROETHANE	<MDL	2.50
71432	BENZENE	8.66 ± 0.9	2.50
10061026	trans-1,3-DICHLOROPROPENE	<MDL	2.50
75252	BROMOFORM	27.80 ± 2.8	2.50
108101	4-METHYL-2-PENTANONE	<MDL	2.50
591786	2-HEXANONE	<MDL	2.50
127184	TETRACHLOROETHENE	<MDL	2.50
79345	1,1,2,2-TETRACHLOROETHANE	<MDL	2.50
108883	TOLUENE	<MDL	2.50
108907	CHLOROBENZENE	> 0.04	2.50
100414	ETHYLBENZENE	<MDL	2.50
100425	STYRENE	<MDL	2.50
133027	XYLENES	<MDL	2.50
75694	TRICHLOROFLUOROMETHANE	<MDL	2.50
95501	1,2-DICHLOROETHANE	<MDL	2.50

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47

27

55

18

45

41

63

MS to MS

		MDL
541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

Recovery off of soils is assumed to be approximately 50%. Reported values are not corrected for % recovery.

Chlorobenzene and dibromochloromethane were slightly above background

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HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: Blank
 MATRIX: SOIL
 NUMBER OF REPLICATE RUNS: 2

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4 98.1
 TOLUENE d8 98.9
 p-BROMOFLUOROBENZENE 91.3

Mean of 2

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	- MDL	2.50
73839	BROMOMETHANE		2.50
75014	VINYL CHLORIDE		2.50
75003	CHLOROETHANE		2.50
75092	METHYLENE CHLORIDE	See note	2.50
67641	ACETONE	MDL	2.50
75150	CARBON DISULFIDE	See note	2.50
75354	1,1-DICHLOROETHENE	MDL	2.50
75343	1,1-DICHLOROETHANE		2.50
540590	1,2-DICHLOROETHENE		2.50
67663	CHLOROFORM	7.0 ppb in water	2.50
107062	1,2-DICHLOROETHANE	- MDL	2.50
78933	2-BUTANONE		2.50
71556	1,1,1-TRICHLOROETHANE		2.50
56235	CARBON TETRACHLORIDE		2.50
108054	VINYL ACETATE		2.50
75274	BROMODICHLOROMETHANE		2.50
78875	1,2-DICHLOROPROPANE		2.50
10061015	cis-1,3-DICHLOROPROPENE		2.50
79016	TRICHLOROETHENE		2.50
124481	DIBROMOCHLOROMETHANE		2.50
79005	1,1,2-TRICHLOROETHANE		2.50
71432	BENZENE		2.50
10061026	trans-1,3-DICHLOROPROPENE		2.50
75252	BROMOFORM		2.50
108101	4-METHYL-2-PENTANONE		2.50
591786	2-HEXANONE		2.50
127184	TETRACHLOROETHENE		2.50
79345	1,1,2,2-TETRACHLOROETHANE		2.50
108883	TOLUENE	20.0 ppb in water	2.50
108907	CHLOROBENZENE	MDL	2.50
100414	ETHYLBENZENE		2.50
100425	STYRENE		2.50
133027	XYLENES		2.50
75694	TRICHLOROFLUOROMETHANE		2.50
95501	1,2-DICHLOROBENZENE		2.50

	MDL	
541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds, are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

Soil blank also contained hydrocarbons, a trace of xylene, carbon disulfide, and methylene chloride. The source of these contaminants was found to be the methanol used in extraction. Purge and Trap is a concentration technique that will enhance any contamination in the solvent, as occurred here. Carbon disulfide and methylene chloride are common laboratory contaminants.

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HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: 8700262 - Matrix Spike
 MATRIX: SOIL
 NUMBER OF REPLICATE RUNS: 3

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4 96.1
 TOLUENE d8 97.9
 p-BROMOFLUOROBENZENE 91.3

Results are
in % recovery

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
		% recovery (acceptable range)	
74873	CHLOROMETHANE		2.50
73839	BROMOMETHANE		2.50
75014	VINYL CHLORIDE		2.50
75003	CHLOROETHANE		2.50
75092	METHYLENE CHLORIDE		2.50
67641	ACETONE		2.50
75150	CARBON DISULFIDE		2.50
75354	1,1-DICHLOROETHENE	87.3% (59-172)	2.50
75343	1,1-DICHLOROETHANE		2.50
540590	1,2-DICHLOROETHENE		2.50
67663	CHLOROFORM	(TOTAL)	2.50
107062	1,2-DICHLOROETHANE		2.50
73933	2-BUTANONE		2.50
71556	1,1,1-TRICHLOROETHANE		2.50
56235	CARBON TETRACHLORIDE		2.50
108054	VINYL ACETATE		2.50
75274	BROMODICHLOROMETHANE		2.50
78875	1,2-DICHLOROPROPANE		2.50
10061015	cis-1,3-DICHLOROPROPENE		2.50
79016	TRICHLOROETHENE	100.8% (62-137)	2.50
124481	DIBROMOCHLOROMETHANE		2.50
79005	1,1,2-TRICHLOROETHANE		2.50
71432	BENZENE	125.2% (66-142)	2.50
10061026	trans-1,3-DICHLOROPROPENE		2.50
75252	BROMOFORM		2.50
108101	4-METHYL-2-PENTANONE		2.50
591786	2-HEXANONE		2.50
127184	TETRACHLOROETHENE		2.50
79345	1,1,2,2-TETRACHLOROETHANE		2.50
108883	TOLUENE	97.8% (59-139)	2.50
108907	CHLOROBENZENE	101.5% (60-133)	2.50
100414	ETHYLBENZENE		2.50
100425	STYRENE		2.50
133027	XYLENES		2.50
75694	TRICHLOROFUOROMETHANE	(TOTAL)	2.50
95501	1,2-DICHLOROBENZENE		2.50

541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

Spiked compounds are those used by EPA contract laboratories. Acceptable recoveries as defined by EPA follow the calculated recoveries in parentheses.

HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: 8700262

MATRIX: SOIL

NUMBER OF REPLICATE RUNS: 3

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4 96.1
TOLUENE d8 97.9
p-BROMOFLUOROBENZENE 91.3

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	<MDL	2.50
73839	BROMOMETHANE		2.50
75014	VINYL CHLORIDE		2.50
75003	CHLOROETHANE		2.50
75092	METHYLENE CHLORIDE		2.50
67641	ACETONE	<MDL	2.50
75150	CARBON DISULFIDE	<MDL	2.50
75354	1,1-DICHLOROETHENE	<MDL	2.50
75343	1,1-DICHLOROETHANE		2.50
540590	1,2-DICHLOROETHENE		2.50
67663	CHLOROFORM		2.50
107062	1,2-DICHLOROETHANE		2.50
78933	2-BUTANONE		2.50
71556	1,1,1-TRICHLOROETHANE		2.50
56235	CARBON TETRACHLORIDE		2.50
108054	VINYL ACETATE		2.50
75274	BROMODICHLOROMETHANE		2.50
78875	1,2-DICHLOROPROPANE		2.50
10061015	cis-1,3-DICHLOROPROPENE		2.50
79016	TRICHLOROETHENE		2.50
124481	DIBROMOCHLOROMETHANE		2.50
79005	1,1,2-TRICHLOROETHANE		2.50
71432	BENZENE		5.00
10061026	trans-1,3-DICHLOROPROPENE		2.50
75252	BROMOFORM		2.50
108101	4-METHYL-2-PENTANONE		2.50
591786	2-HEXANONE		2.50
127184	TETRACHLOROETHENE		2.50
79345	1,1,2,2-TETRACHLOROETHANE		2.50
108883	TOLUENE		2.50
108907	CHLOROENZENE		2.50
100414	ETHYLBENZENE		2.50
100425	STYRENE		2.50
133027	XYLENES		2.50
75694	TRICHLOROFLUOROMETHANE		2.50
95501	1,2-DICHLOROENZENE		2.50

Sample ID	Compound	MDL
541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds, are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

This sample was used for matrix spike and duplicates.

HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: 87 00263
MATRIX: SOIL
NUMBER OF REPLICATE RUNS: 1

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4 97.1
TOLUENE d8 96.1
p-BROMOFLUOROBENZENE 90.0

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	<mdl	2.50
73839	BROMOMETHANE		2.50
75014	VINYL CHLORIDE		2.50
75003	CHLOROETHANE		2.50
75092	METHYLENE CHLORIDE	See note	2.50
67641	ACETONE	<mdl	2.50
75150	CARBON DISULFIDE	See note	2.50
75354	1,1-DICHLOROETHENE	<mdl	2.50
75343	1,1-DICHLOROETHANE		2.50
540590	1,2-DICHLOROETHENE		2.50
67663	CHLOROFORM		2.50
107062	1,2-DICHLOROETHANE		2.50
78933	2-BUTANONE		2.50
71556	1,1,1-TRICHLOROETHANE		2.50
56235	CARBON TETRACHLORIDE		2.50
108054	VINYL ACETATE		2.50
75274	BROMODICHLOROMETHANE		2.50
78875	1,2-DICHLOROPROPANE		2.50
10061015	cis-1,3-DICHLOROPROPENE		2.50
79016	TRICHLOROETHENE		2.50
124481	DIBROMOCHLOROMETHANE		2.50
79005	1,1,2-TRICHLOROETHANE		2.50
71432	BENZENE		2.50
10061026	trans-1,3-DICHLOROPROPENE		2.50
75252	BROMOFORM		2.50
108101	4-METHYL-2-PENTANONE		2.50
591786	2-HEXANONE		2.50
127184	TETRACHLOROETHENE		2.50
79345	1,1,2,2-TETRACHLOROETHANE		2.50
108883	TOLUENE		2.50
108907	CHLOROBENZENE		2.50
100414	ETHYLBENZENE		2.50
100425	STYRENE		2.50
133027	XYLENES		2.50
75694	TRICHLOROFLUOROMETHANE		2.50
95501	1,2-DICHLOROETHANE		2.50

Sample ID	Compound Name	MDL (ppb)
541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

Traces of methylene chloride and carbon disulfide most likely due to laboratory contamination.

HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: 8700264
MATRIX: SOIL
NUMBER OF REPLICATE RUNS: 2

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4	<u>971</u>	} mean of 2
TOLUENE d8	<u>999</u>	
p-BROMOFLUOROBENZENE	<u>90.7</u>	

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	LMOL	2.50
73839	BROMOMETHANE		2.50
75014	VINYL CHLORIDE		2.50
75003	CHLOROETHANE		2.50
75092	METHYLENE CHLORIDE	See note	2.50
67641	ACETONE	LMOL	2.50
75150	CARBON DISULFIDE	See note	2.50
75354	1,1-DICHLOROETHENE	LMOL	2.50
75343	1,1-DICHLOROETHANE		2.50
540590	1,2-DICHLOROETHENE		2.50
67663	CHLOROFORM		2.50
107062	1,2-DICHLOROETHANE		2.50
78933	2-BUTANONE		2.50
71556	1,1,1-TRICHLOROETHANE		2.50
56235	CARBON TETRACHLORIDE		2.50
108054	VINYL ACETATE		2.50
75274	BROMODICHLOROMETHANE		2.50
78875	1,2-DICHLOROPROPANE		2.50
10061015	cis-1,3-DICHLOROPROPENE		2.50
79016	TRICHLOROETHENE		2.50
124481	DIBROMOCHLOROMETHANE		2.50
79005	1,1,2-TRICHLOROETHANE		2.50
71432	BENZENE		2.50
10061026	trans-1,3-DICHLOROPROPENE		2.50
75252	BROMOFORM		2.50
108101	4-METHYL-2-PENTANONE		2.50
591786	2-HEXANONE		2.50
127184	TETRACHLOROETHENE		2.50
79345	1,1,2,2-TETRACHLOROETHANE		2.50
108883	TOLUENE		2.50
108907	CHLOROBENZENE		2.50
100414	ETHYLBENZENE		2.50
100425	STYRENE		2.50
133027	XYLENES		2.50
75694	TRICHLOROFLUOROMETHANE		2.50
95501	1,2-DICHLOROBENZENE		2.50

Sample ID	Compound	MDL (pmol)
541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

Traces of methylene chloride and carbon disulfide seen. Most likely a laboratory contamination

HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: 87 00265
MATRIX: SOIL
NUMBER OF REPLICATE RUNS: 1

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4 101.8
TOLUENE d8 104.2
p-BROMOFLUOROBENZENE 93.0

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	<mdl	2.50
73839	BROMOMETHANE		2.50
75014	VINYL CHLORIDE		2.50
75003	CHLOROETHANE		2.50
75092	METHYLENE CHLORIDE	See note	2.50
67641	ACETONE	<mdl	2.50
75150	CARBON DISULFIDE	See note	2.50
75354	1,1-DICHLOROETHENE	<mdl	2.50
75343	1,1-DICHLOROETHANE		2.50
540590	1,2-DICHLOROETHENE		2.50
67663	CHLOROFORM		2.50
107062	1,2-DICHLOROETHANE		2.50
78933	2-BUTANONE		2.50
71556	1,1,1-TRICHLOROETHANE		2.50
56235	CARBON TETRACHLORIDE		2.50
108054	VINYL ACETATE		2.50
75274	BROMODICHLOROMETHANE		2.50
78875	1,2-DICHLOROPROPANE		2.50
10061015	cis-1,3-DICHLOROPROPENE		2.50
79016	TRICHLOROETHENE		2.50
124481	DIBROMOCHLOROMETHANE		2.50
79005	1,1,2-TRICHLOROETHANE		2.50
71432	BENZENE		2.50
10061026	trans-1,3-DICHLOROPROPENE		2.50
75252	BROMOFORM		2.50
108101	4-METHYL-2-PENTANONE		2.50
591786	2-HEXANONE		2.50
127184	TETRACHLOROETHENE		2.50
79345	1,1,2,2-TETRACHLOROETHANE		2.50
108883	TOLUENE		2.50
108907	CHLOROBENZENE		2.50
100414	ETHYLBENZENE		2.50
100425	STYRENE		2.50
133027	XYLENES		2.50
75694	TRICHLOROFLUOROMETHANE		2.50
95501	1,2-DICHLOROBENZENE		2.50

Sample ID	Compound	MDL (µmol)
541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

Traces of methylene chloride and carbon disulfide most likely due to laboratory contamination.

HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: 87 00266
MATRIX: SOIL
NUMBER OF REPLICATE RUNS: 2

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4	<u>119.3</u>	} mean of 2.
TOLUENE d8	<u>99.7</u>	
p-BROMOFLUOROBENZENE	<u>94.3</u>	

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	<u><mdl</u>	2.50
73839	BROMOMETHANE	<u><mdl</u>	2.50
75014	VINYL CHLORIDE	<u><mdl</u>	2.50
75003	CHLOROETHANE	<u><mdl</u>	2.50
75092	METHYLENE CHLORIDE	<u>see note</u>	2.50
67641	ACETONE	<u><mdl</u>	2.50
75150	CARBON DISULFIDE	<u>see note</u>	2.50
75354	1,1-DICHLOROETHENE	<u><mdl</u>	2.50
75343	1,1-DICHLOROETHANE	<u><mdl</u>	2.50
540590	1,2-DICHLOROETHENE	<u><mdl</u>	2.50
67663	CHLOROFORM	<u><mdl</u>	2.50
107062	1,2-DICHLOROETHANE	<u><mdl</u>	2.50
78933	2-BUTANONE	<u><mdl</u>	2.50
71556	1,1,1-TRICHLOROETHANE	<u><mdl</u>	2.50
56235	CARBON TETRACHLORIDE	<u><mdl</u>	2.50
108054	VINYL ACETATE	<u><mdl</u>	2.50
75274	BROMODICHLOROMETHANE	<u><mdl</u>	2.50
78875	1,2-DICHLOROPROPANE	<u><mdl</u>	2.50
10061015	cis-1,3-DICHLOROPROPENE	<u><mdl</u>	2.50
79016	TRICHLOROETHENE	<u><mdl</u>	2.50
124481	DIBROMOCHLOROMETHANE	<u><mdl</u>	2.50
79005	1,1,2-TRICHLOROETHANE	<u><mdl</u>	2.50
71432	BENZENE	<u><mdl</u>	2.50
10061026	trans-1,3-DICHLOROPROPENE	<u><mdl</u>	2.50
75252	BROMOFORM	<u><mdl</u>	2.50
108101	4-METHYL-2-PENTANONE	<u><mdl</u>	2.50
591786	2-HEXANONE	<u><mdl</u>	2.50
127184	TETRACHLOROETHENE	<u><mdl</u>	2.50
79345	1,1,2,2-TETRACHLOROETHANE	<u><mdl</u>	2.50
108883	TOLUENE	<u><mdl</u>	2.50
108907	CHLOROBENZENE	<u><mdl</u>	2.50
100414	ETHYLBENZENE	<u><mdl</u>	2.50
100425	STYRENE	<u><mdl</u>	2.50
133027	XYLENES	<u><mdl</u>	2.50
75694	TRICHLOROFLUOROMETHANE	<u><mdl</u>	2.50
95501	1,2-DICHLOROETHANE	<u><mdl</u>	2.50

	MDL	
541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

Traces of methylene chloride and carbon disulfide are most likely laboratory contaminants.

HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: 87.00267

MATRIX: SOIL

NUMBER OF REPLICATE RUNS: 2

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4 101.1
TOLUENE d8 101.7
p-BROMOFLUOROBENZENE 94.7 } mean of 2.

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	<MDL	2.50
73839	BROMOMETHANE		2.50
75014	VINYL CHLORIDE		2.50
75003	CHLOROETHANE		2.50
75092	METHYLENE CHLORIDE		2.50
67641	ACETONE		2.50
75150	CARBON DISULFIDE		2.50
75354	1,1-DICHLOROETHENE		2.50
75343	1,1-DICHLOROETHANE		2.50
540590	1,2-DICHLOROETHENE		2.50
67663	CHLOROFORM	(TOTAL)	2.50
107062	1,2-DICHLOROETHANE		2.50
78933	2-BUTANONE		2.50
71556	1,1,1-TRICHLOROETHANE		2.50
56235	CARBON TETRACHLORIDE		2.50
108054	VINYL ACETATE		2.50
75274	BROMODICHLOROMETHANE		2.50
78875	1,2-DICHLOROPROPANE		2.50
10061015	cis-1,3-DICHLOROPROPENE		2.50
79016	TRICHLOROETHENE		2.50
124481	DIBROMOCHLOROMETHANE		2.50
79005	1,1,2-TRICHLOROETHANE		2.50
71432	BENZENE		2.50
10061026	trans-1,3-DICHLOROPROPENE		2.50
75252	BROMOFORM		2.50
108101	4-METHYL-2-PENTANONE		2.50
591786	2-HEXANONE		2.50
127184	TETRACHLOROETHENE		2.50
79345	1,1,2,2-TETRACHLOROETHANE		2.50
108883	TOLUENE		2.50
108907	CHLOROBENZENE		2.50
100414	ETHYLBENZENE		2.50
100425	STYRENE		2.50
133027	XYLENES	(TOTAL)	2.50
75694	TRICHLOROFLUOROMETHANE		2.50
95501	1,2-DICHLOROBENZENE		2.50

	μmol	
541731	1,3-DICHLOROBENZENE	2.50
106467	1,4-DICHLOROBENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOBENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROBENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

HSE-9 ORGANIC ANALYSIS SECTION
VOLATILE ORGANICS RESULT SHEET

SAMPLE NUMBER: 87 00268
MATRIX: SOIL
NUMBER OF REPLICATE RUNS: 1

SURROGATE SPIKE RECOVERIES: (% RECOVERY)

1,2-DICHLOROETHANE d4 99.3
TOLUENE d8 100.3
p-BROMOFLUOROBENZENE 92.1

CAS #	COMPOUND	RESULT +/- (ppm)	MDL (ppm)
74873	CHLOROMETHANE	<MDL	2.50
73839	BROMOMETHANE		2.50
75014	VINYL CHLORIDE		2.50
75003	CHLOROETHANE		2.50
75092	METHYLENE CHLORIDE	See note	2.50
67641	ACETONE	<MDL	2.50
75150	CARBON DISULFIDE	See note	2.50
75354	1,1-DICHLOROETHENE	<MDL	2.50
75343	1,1-DICHLOROETHANE		2.50
540590	1,2-DICHLOROETHENE		2.50
67663	CHLOROFORM		2.50
107062	1,2-DICHLOROETHANE		2.50
78933	2-BUTANONE		2.50
71556	1,1,1-TRICHLOROETHANE		2.50
56235	CARBON TETRACHLORIDE		2.50
108054	VINYL ACETATE		2.50
75274	BROMODICHLOROMETHANE		2.50
78875	1,2-DICHLOROPROPANE		2.50
10061015	cis-1,3-DICHLOROPROPENE		2.50
79016	TRICHLOROETHENE		2.50
124481	DIBROMOCHLOROMETHANE		2.50
79005	1,1,2-TRICHLOROETHANE		2.50
71432	BENZENE		2.50
10061026	trans-1,3-DICHLOROPROPENE		2.50
75252	BROMOFORM		2.50
108101	4-METHYL-2-PENTANONE		2.50
591786	2-HEXANONE		2.50
127184	TETRACHLOROETHENE		2.50
79345	1,1,2,2-TETRACHLOROETHANE		2.50
108883	TOLUENE		2.50
108907	CHLOROBENZENE		2.50
100414	ETHYLBENZENE		2.50
100425	STYRENE		2.50
133027	XYLENES		2.50
75694	TRICHLOROFUOROMETHANE		2.50
95501	1,2-DICHLOROBENZENE		2.50

		MDL
541731	1,3-DICHLOROENZENE	2.50
106467	1,4-DICHLOROENZENE	2.50
91023	NAPHTHALENE	2.50
104518	n-BUTYLBENZENE	2.50
108861	BROMOENZENE	2.50
95498	2-CHLOROTOLUENE	2.50
106434	4-CHLOROTOLUENE	2.50
74953	DIBROMOMETHANE	2.50
142289	1,3-DICHLOROPROPANE	2.50
590207	2,2-DICHLOROPROPANE	2.50
87683	HEXACHLOROBUTADIENE	2.50
103651	n-PROPYLBENZENE	2.50
630206	1,1,1,2-TETRACHLOROETHANE	2.50
120821	1,2,4-TRICHLOROENZENE	2.50
96184	1,2,3-TRICHLOROPROPANE	2.50
95636	1,2,4-TRIMETHYLBENZENE	2.50

MDL : Minimum detection limit (estimated)

The system has been shown to be capable of detecting all of the above listed compounds. In some cases, not all of these compounds are included in the standard calibration runs.

The linear range of the detector is 1-200 ppb in 5 ml of water. In those samples with analyte concentrations greater than 200 ppb, dilutions are made. As a calculated value approaches the limit of detection, the uncertainty associated with that value increases. In general, uncertainties are assigned as follows:

CALCULATED CONCENTRATION (ppb)	UNCERTAINTY (%)
1-5	50.0
5-200	10.0

If a sample is run in triplicate and its concentration falls within the range of the curves, uncertainty is reported as the standard deviation of the replicates. Normally, samples are run in duplicate.

The results of matrix spike and matrix spike duplicate runs if applicable are attached.

Traces of methylene chloride and carbon disulfide are most likely from laboratory contamination

E-5

Raw Laboratory Chemical Data Used in Table C-5.

REQUESTOR DATA SHEET # _____

Log Book _____ Page _____

Sampled by DAVID MCENROY Collection Date 11/2/87 Time 1500 Weather ptly/cloudy Witness TONY GRIEGOS
 Presampling Conference Completed With SUZANNE On DESK Send Report To DAVE MS K490
 Phone 70819 Source of Sample: TA-16 LAGOON Reason for Sampling RCRA CLOSURE
 Group HSEB Site TA59 Building 043 Room No. 224

Priority Assigned: 1. Emergency; 2. Recognized Danger; 3. Imminent Deadline; 4. Special Survey; 5. Routine;
 (Circle One) Priority Approval: _____ (1. GL or DGL; 2. or 3. AGL; 4. or 5. SL).

Method of Analysis Complies With: _____
 Background Information Useful to Analyst (Contamination Levels, Hazards, Etc.) _____

Chain of Custody: Yes _____ (See Attached Form) No _____ Other Information _____

All Samples Submitted to HSE-9 Must Be Screened For Radioactivity. Samples Containing Greater Than 20 dpm Total Alpha or 100 dpm Combined Gamma/Beta Contamination Cannot Be Handled At TA-59.

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Sample Number	Other I.D.	Sampling Location	Analysis Requested	Sampling Method	Sample Type	Preservative Utilized	Radioactivity Scan (dpm)		Remarks
							Alpha	Beta/Gamma	
87.00262		TA-16	Semi.Vol + Vol org.		Soil				
87.00263			↓		↓				
264									
265									
266									
267									
87.00268									

Sampling Method: 24FC=24 Hour Flow-Weighted Composite; 24TC=24 Hour Time-Weighted Composite; G=Grab; B=Ball; D=Drill; C=Core; P=Pump; O=Other (Please Specify)

Sample Type: E=Effluent; SL=Sludge; SO=Soil; SC=Soil Core; WW=Well Water; SW=Surface Water; O=Other

Preservative: F=Filtered; NF=Non-Filtered; NA=Non Acidified; A H₂SO₄ (2 ml/l); A HNO₃ (5 ml/l); A HNO₃ (5 ml/l);

A H₃PO₄ & CuSO₄; A-Other; I=Iced; P=NaOH.

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: Blank
SAMPLE MATRIX: WATER Soil

REQUEST SHEET NUMBER: 6452
NOTEBOOK: Y-1772 Pg 71

Sample weight: 29.99g

RESULTS**	COMPOUND	CAS #	MDL*
<u>ug/g</u>			
<u>LMOL</u>	PHENOL	108952	20.0
	bis(2-CHLOROETHYL)ETHER	111444	20.0
	2-CHLOROPHENOL	95578	20.0
	1,3-DICHLOROBENZENE	541731	50.0
	1,4-DICHLOROBENZENE	106467	100.0
	BENZYL ALCOHOL	100516	20.0
	1,2-DICHLOROBENZENE	95501	100.0
	2-METHYLPHENOL	95487	20.0
	bis-(2-CHLOROISOPROPYL)ETHER	39638329	100.0
	4-METHYLPHENOL	106445	20.0
	N-NITROSO-DIPROPYLAMINE	621647	50.0
	HEXACHLOROETHANE	67721	20.0
	NITROBENZENE	98953	20.0
	ISOPHORONE	78591	20.0
	2-NITROPHENOL	88755	20.0
	2,4-DIMETHYLPHENOL	105679	20.0
	BENZOIC ACID	65850	20.0
	bis-(2-CHLOROETHOXY)METHANE	111911	100.0
	2,4-DICHLOROPHENOL	120832	20.0
	1,2,4-TRICHLOROBENZENE	120821	20.0
	NAPHTHALENE	91203	20.0
	4-CHLOROANILINE	106478	20.0
	HEXACHLOROBUTADIENE	87683	100.0
	4-CHLORO-3-METHYLPHENOL	59507	20.0
	2-METHYLNAPHTHALENE	91576	20.0
	HEXACHLOROCYCLOPENTADIENE	77474	20.0
	2,4,6-TRICHLOROPHENOL	88062	20.0
	2,4,5-TRICHLOROPHENOL	95954	20.0
	2-CHLORONAPHTHALENE	91587	100.0
	2-NITROANILINE	88744	20.0
	DIMETHYLPHTHALATE	131113	50.0
	ACENAPHTHYLENE	208968	20.0
	2,6-DINITROTOLUENE	606202	50.0
	3-NITROANILINE	99092	20.0
	ACENAPHTHENE	83329	20.0
	2,4-DINITROPHENOL	51285	200.0
	4-NITROPHENOL	100027	50.0
	DIBENZOFURAN	132649	20.0
	2,4-DINITROTOLUENE	121142	50.0
	DIETHYLPHTHALATE	84662	50.0

2 MDL	4-CHLOROPHENYL PHENYL ETHER	7005723	20.0
-----	FLUORENE	86737	20.0
-----	4-NITROANILINE	100016	50.0
-----	4,6-DINITRO-2-METHYLPHENOL	534521	100.0
-----	N-NITROSODIPHENYLAMINE	86306	20.0
-----	4-BROMOPHENYL PHENYL ETHER	101553	50.0
-----	HEXACHLOROBENZENE	118741	20.0
-----	PENTACHLOROPHENOL	87865	100.0
-----	PHENANTHRENE	85018	20.0
-----	ANTHRACENE	120127	20.0
6.5 ± 1.3	DI-N-BUTYLPHTHALATE	84742	20.0
2 MDL	FLUORANTHENE	206440	20.0
-----	PYRENE	129000	20.0
-----	BUTYL BENZYL PHTHALATE	85687	20.0
NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941	
-----	BENZO(a)ANTHRACENE	56553	20.0
-----	CHRYSENE	218019	20.0
2.5 ± 0.5	bis-(2-ETHYLHEXYL)PHTHALATE	117817	50.0
2 MDL	DI-N-OCTYL PHTHALATE	117840	20.0
-----	BENZO(b)FLUORANTHENE	205992	20.0
-----	BENZO(k)FLUORANTHENE	207089	20.0
-----	BENZO(a)PYRENE	50328	20.0
-----	INDENO(1,2,3-cd)PYRENE	193395	20.0
NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/L
 ** RESULTS: UNITS ARE UG/L +/- AN UNCERTAINTY
 *** NG: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS		ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	34.0	21.0-100.0
PHENOL d6	71.7	10.0- 94.0
2,4,6-TRIBROMOPHENOL	57.8	10.0-123.0
BASE/NEUTRALS		
NITROBENZENE d5	90.0	35.0-114.0
2-FLUOROBIPHENYL	99.9	43.0-116.0
4-TERPHENYL d14	213.3	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

F

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: 87-00267
 SAMPLE MATRIX: SOIL
 SAMPLE WEIGHT: 29.94 g

REQUEST SHEET NUMBER: 6452
 NOTEBOOK: Y-1772 Pg 71

RESULTS**	COMPOUND	CAS #	MDL*
<u>2 MDL</u>	PHENOL	108952	0.5
-----	bis-(2-CHLOROETHYL)ETHER	111444	0.5
-----	2-CHLOROPHENOL	95578	0.5
-----	1,3-DICHLOROBENZENE	541731	1.5
-----	1,4-DICHLOROBENZENE	106467	3.3
-----	BENZYL ALCOHOL	100516	0.5
-----	1,2-DICHLOROBENZENE	95501	3.3
-----	2-METHYLPHENOL	95487	0.5
-----	bis-(2-CHLOROISOPROPYL)ETHER	39638329	3.3
-----	4-METHYLPHENOL	106445	0.5
<u>8.3E-2</u>	N-NITROSO-DIPROPYLAMINE ✓	621647	1.5
<u>2 MDL</u>	HEXACHLOROETHANE	67721	0.5
-----	NITROBENZENE	98953	0.5
-----	ISOPHORONE	78591	0.5
-----	2-NITROPHENOL	88755	0.5
-----	2,4-DIMETHYLPHENOL	105679	0.5
-----	BENZOIC ACID	65850	0.5
-----	bis-(2-CHLOROETHOXY)METHANE	111911	3.3
-----	2,4-DICHLOROPHENOL	120832	0.5
-----	1,2,4-TRICHLOROBENZENE	120821	0.5
-----	NAPHTHALENE	91203	0.5
-----	4-CHLOROANILINE	106478	0.5
-----	HEXACHLOROBUTADIENE	87683	3.3
-----	4-CHLORO-3-METHYLPHENOL	59507	0.5
-----	2-METHYLNAPHTHALENE	91576	0.5
-----	HEXACHLOROCYCLOPENTADIENE	77474	0.5
-----	2,4,6-TRICHLOROPHENOL	88062	0.5
-----	2,4,5-TRICHLOROPHENOL	95954	0.5
-----	2-CHLORONAPHTHALENE	91587	3.3
-----	2-NITROANILINE	88744	0.5
-----	DIMETHYLPHTHALATE	131113	1.5
-----	ACENAPHTHYLENE	208968	0.5
-----	2,6-DINITROTOLUENE	606202	1.5
-----	3-NITROANILINE	99092	0.5
-----	ACENAPHTHENE	83329	0.5
-----	2,4-DINITROPHENOL	51285	6.7
-----	4-NITROPHENOL	100027	1.5
-----	DIBENZOFURAN	132649	0.5
-----	2,4-DINITROTOLUENE	121142	1.5
-----	DIETHYLPHTHALATE	84662	1.5

<u>2 mol</u>	4-CHLOROPHENYL PHENYL ETHER	7005723	0.5
-----	FLUORENE	86737	0.5
-----	4-NITROANILINE	100016	1.5
-----	4,6-DINITRO-2-METHYLPHENOL	534521	3.3
-----	N-NITROSODIPHENYLAMINE	86306	0.5
-----	4-BROMOPHENYL PHENYL ETHER	101553	1.5
-----	HEXACHLOROBENZENE	118741	0.5
-----	PENTACHLOROPHENOL	87865	3.3
-----	PHENANTHRENE	85018	0.5
-----	ANTHRACENE	120127	0.5
<u>42 ± 0.8</u>	DI-N-BUTYLPHTHALATE	84742	0.5
<u>2 mol</u>	FLUORANTHENE	206440	0.5
-----	PYRENE	129000	0.5
-----	BUTYL BENZYL PHTHALATE	85687	0.5
NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941	
-----	BENZO(a)ANTHRACENE	56553	0.5
-----	CHRYSENE	218019	0.5
<u>245.4</u>	bis-(2-ETHYLHEXYL)PHTHALATE	117817	1.5
<u>2 mol</u>	DI-N-OCTYL PHTHALATE	117840	0.5
-----	BENZO(b)FLUORANTHENE	205992	0.5
-----	BENZO(k)FLUORANTHENE	207089	0.5
-----	BENZO(a)PYRENE	50328	0.5
-----	INDENO(1,2,3-cd)PYRENE	193395	0.5
NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/G
 ** RESULTS: UNITS ARE UG/G +/- AN UNCERTAINTY
 *** NG: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS		ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	<u>96.8</u>	21.0-100.0
PHENOL d6	<u>138.3</u>	10.0- 94.0
2,4,6-TRIBROMOPHENOL	<u>62.9</u>	10.0-123.0

BASE/NEUTRALS

NITROBENZENE d5	<u>134.4</u>	35.0-114.0
2-FLUOROBIPHENYL	<u>155.4</u>	43.0-116.0
4-TERPHENYL d14	<u>234.5</u>	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: 8700268
 SAMPLE MATRIX: SOIL
 SAMPLE WEIGHT: 30.00 g

REQUEST SHEET NUMBER: 6452
 NOTEBOOK: Y-1772 Pg 71

RESULTS**	COMPOUND	CAS #	MDL*
<u>6 MOL</u>	PHENOL	108952	0.5
-----	bis(2-CHLOROETHYL)ETHER	111444	0.5
-----	2-CHLOROPHENOL	95578	0.5
-----	1,3-DICHLOROBENZENE	541731	1.5
-----	1,4-DICHLOROBENZENE	106467	3.3
-----	BENZYL ALCOHOL	100516	0.5
-----	1,2-DICHLOROBENZENE	95501	3.3
-----	2-METHYLPHENOL	95487	0.5
-----	bis-(2-CHLOROISOPROPYL)ETHER	39638329	3.3
-----	4-METHYLPHENOL	106445	0.5
-----	N-NITROSO-DIPROPYLAMINE	621647	1.5
-----	HEXACHLOROETHANE	67721	0.5
-----	NITROBENZENE	98953	0.5
-----	ISOPHORONE	78591	0.5
-----	2-NITROPHENOL	88755	0.5
-----	2,4-DIMETHYLPHENOL	105679	0.5
-----	BENZOIC ACID	65850	0.5
-----	bis-(2-CHLOROETHOXY)METHANE	111911	3.3
-----	2,4-DICHLOROPHENOL	120832	0.5
-----	1,2,4-TRICHLOROBENZENE	120821	0.5
-----	NAPHTHALENE	91203	0.5
-----	4-CHLOROANILINE	106478	0.5
-----	HEXACHLOROBUTADIENE	87683	3.3
-----	4-CHLORO-3-METHYLPHENOL	59507	0.5
-----	2-METHYLNAPHTHALENE	91576	0.5
-----	HEXACHLOROCYCLOPENTADIENE	77474	0.5
-----	2,4,6-TRICHLOROPHENOL	88062	0.5
-----	2,4,5-TRICHLOROPHENOL	95954	0.5
-----	2-CHLORONAPHTHALENE	91587	3.3
-----	2-NITROANILINE	88744	0.5
-----	DIMETHYLPHTHALATE	131113	1.5
-----	ACENAPHTHYLENE	208968	0.5
-----	2,6-DINITROTOLUENE	606202	1.5
-----	3-NITROANILINE	99092	0.5
-----	ACENAPHTHENE	83329	0.5
-----	2,4-DINITROPHENOL	51285	6.7
-----	4-NITROPHENOL	100027	1.5
-----	DIBENZOFURAN	132649	0.5
-----	2,4-DINITROTOLUENE	121142	1.5
-----	DIETHYLPHTHALATE	84662	1.5

<u>2 MDL</u>	4-CHLOROPHENYL PHENYL ETHER	7005723	0.5
	FLUORENE	86737	0.5
	4-NITROANILINE	100016	1.5
	4,6-DINITRO-2-METHYLPHENOL	534521	3.3
	N-NITROSODIPHENYLAMINE	86306	0.5
	4-BROMOPHENYL PHENYL ETHER	101553	1.5
	HEXACHLOROBENZENE	118741	0.5
	PENTACHLOROPHENOL	87865	3.3
	PHENANTHRENE	85018	0.5
	ANTHRACENE	120127	0.5
<u>2.556</u>	DI-N-BUTYLPHTHALATE	84742	0.5
<u>2 MDL</u>	FLUORANTHENE	206440	0.5
	PYRENE	129000	0.5
<u>3.036</u>	BUTYL BENZYL PHTHALATE	85687	0.5
NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941	
<u>2 MDL</u>	BENZO(a)ANTHRACENE	56553	0.5
	CHRYSENE	218019	0.5
	bis-(2-ETHYLHEXYL)PHTHALATE	117817	1.5
	DI-N-OCTYL PHTHALATE	117840	0.5
	BENZO(b)FLUORANTHENE	205992	0.5
	BENZO(k)FLUORANTHENE	207089	0.5
	BENZO(a)PYRENE	50328	0.5
	INDENO(1,2,3-cd)PYRENE	193395	0.5
NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/G
 ** RESULTS: UNITS ARE UG/G +/- AN UNCERTAINTY
 *** NQ: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS		ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	<u>14.1</u>	21.0-100.0
PHENOL d6	<u>55.4</u>	10.0- 94.0
2,4,6-TRIBROMOPHENOL	<u>27.9</u>	10.0-123.0
BASE/NEUTRALS		
NITROBENZENE d5	<u>57.5</u>	35.0-114.0
2-FLUOROBIPHENYL	<u>108.6</u>	43.0-116.0
4-TERPHENYL d14	<u>194.0</u>	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: 87.06268 with Matrix Spike REQUEST SHEET NUMBER: 6452
 SAMPLE MATRIX: WATER Soil NOTEBOOK: Y-1772 Pg 71

weight sample: 30.31g

RESULTS**	COMPOUND	CAS #	MDL*
46.5	91.6 ± 15.4 PHENOL	108952	20.0
	<MDL bis(2-CHLOROETHYL) ETHER	111444	20.0
43.0	61.9 ± 12.4 2-CHLOROPHENOL	95578	20.0
	<MDL 1,3-DICHLOROBENZENE	541731	50.0
246.0	260.8 ± 130 1,4-DICHLOROBENZENE	106467	100.0
	<MDL BENZYL ALCOHOL	100516	20.0
	1,2-DICHLOROBENZENE	95501	100.0
	2-METHYLPHENOL	95487	20.0
	bis-(2-CHLOROISOPROPYL) ETHER	39638329	100.0
	4-METHYLPHENOL	106445	20.0
	N-NITROSO-DIPROPYLAMINE	621647	50.0
	HEXACHLOROETHANE	67721	20.0
	NITROBENZENE	98953	20.0
	ISOPHORONE	78591	20.0
	2-NITROPHENOL	88755	20.0
	2,4-DIMETHYLPHENOL	105679	20.0
	BENZOIC ACID	65850	20.0
	bis-(2-CHLOROETHOXY) METHANE	111911	100.0
	2,4-DICHLOROPHENOL	120832	20.0
61.9	195.5 ^a 1,2,4-TRICHLOROBENZENE	120821	20.0
	109.4 ^a NAPHTHALENE	91203	20.0
	<MDL 4-CHLOROANILINE	106478	20.0
	HEXACHLOROBUTADIENE	87683	100.0
	4-CHLORO-3-METHYLPHENOL	59507	20.0
	2-METHYLNAPHTHALENE	91576	20.0
	HEXACHLOROCYCLOPENTADIENE	77474	20.0
	2,4,6-TRICHLOROPHENOL	88062	20.0
	2,4,5-TRICHLOROPHENOL	95954	20.0
	2-CHLORONAPHTHALENE	91587	100.0
	2-NITROANILINE	88744	20.0
	DIMETHYLPHTHALATE	131113	50.0
	ACENAPHTHYLENE	208968	20.0
	2,6-DINITROTOLUENE	606202	50.0
	3-NITROANILINE	99092	20.0
59.6	63.8 ± 12.8 ACENAPHTHENE	83329	20.0
	<MDL 2,4-DINITROPHENOL	51285	200.0
735	146.2 ± 29.2 4-NITROPHENOL	100027	50.0
	<MDL DIBENZOFURAN	132649	20.0
10.9	148.6 ± 29.6 2,4-DINITROTOLUENE	121142	50.0
	<MDL DIETHYLPHTHALATE	84662	50.0

^a This compound appears to be present in matrix spike though not intentionally added.

	<u>4mDL</u>	4-CHLOROPHENYL PHENYL ETHER	7005723	20.0
	-----	FLUORENE	86737	20.0
	-----	4-NITROANILINE	100016	50.0
	-----	4,6-DINITRO-2-METHYLPHENOL	534521	100.0
	-----	N-NITROSODIPHENYLAMINE	86306	20.0
	-----	4-BROMOPHENYL PHENYL ETHER	101553	50.0
	-----	HEXACHLOROBENZENE	118741	20.0
50.3	<u>103.6 ± 20.6</u>	PENTACHLOROPHENOL	87865	100.0
	<u>4mDL</u>	PHENANTHRENE	85018	20.0
	-----	ANTHRACENE	120127	20.0
17.4 ± 3.4	<u>52.0 ± 10.0</u>	DI-N-BUTYLPHTHALATE	84742	20.0
	<u>4mDL</u>	FLUORANTHENE	206440	20.0
103.3	<u>104.3 ± 20.8</u>	PYRENE	129000	20.0
	<u>4mDL</u>	BUTYL BENZYL PHTHALATE	85687	20.0
	NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941	
	-----	BENZO(a)ANTHRACENE	56553	20.0
	-----	CHRYSENE	218019	20.0
2.6 ± 0.5	<u>54.0 ± 10.0</u>	bis-(2-ETHYLHEXYL)PHTHALATE	117817	50.0
	<u>4mDL</u>	DI-N-OCTYL PHTHALATE	117840	20.0
	-----	BENZO(b)FLUORANTHENE	205992	20.0
	-----	BENZO(k)FLUORANTHENE	207089	20.0
	-----	BENZO(a)PYRENE	50328	20.0
	-----	INDENO(1,2,3-cd)PYRENE	193395	20.0
	NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
	NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/L
 ** RESULTS: UNITS ARE UG/L +/- AN UNCERTAINTY
 *** NG: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS		ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	<u>20.7</u>	21.0-100.0
PHENOL d6	<u>42.7</u>	10.0- 94.0
2,4,6-TRIBROMOPHENOL	<u>40.8</u>	10.0-123.0
BASE/NEUTRALS		
NITROBENZENE d5	<u>78.6</u>	35.0-114.0
2-FLUOROBIPHENYL	<u>100.0</u>	43.0-116.0
4-TERPHENYL d14	<u>199.6</u>	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: 88.00268 *Matrix Spike Duplicate* REQUEST SHEET NUMBER: 6452
 SAMPLE MATRIX: SOIL NOTEBOOK: Y-1772 Pg 71
 SAMPLE WEIGHT: 30.00 g

RESULTS**	COMPOUND	CAS #	MDL*
<u>7/2 R_c</u>	<u>236.2 ± 118^{ug}</u> PHENOL	108952	0.5
<u>119.9</u>	<u>2 mDL</u> bis(2-CHLOROETHYL)ETHER	111444	0.5
<u>55.0</u>	<u>165.4 ± 33.0^{ug}</u> 2-CHLOROPHENOL	95578	0.5
	<u>2 mDL</u> 1,3-DICHLOROBENZENE	541731	1.5
<u>40.0</u>	<u>423.8 ± 40.0^{ug}</u> 1,4-DICHLOROBENZENE	106467	3.3
	<u>2 mDL</u> BENZYL ALCOHOL	100516	0.5
	1,2-DICHLOROBENZENE	95501	3.3
	2-METHYLPHENOL	95487	0.5
	bis-(2-CHLOROISOPROPYL)ETHER	39638329	3.3
	4-METHYLPHENOL	106445	0.5
<u>55.7</u>	<u>81.4 ± 16.2^{ug}</u> N-NITROSO-DIPROPYLAMINE	621647	1.5
	<u>2 mDL</u> HEXACHLOROETHANE	67721	0.5
	NITROBENZENE	98953	0.5
	ISOPHORONE	78591	0.5
	2-NITROPHENOL	88755	0.5
	2,4-DIMETHYLPHENOL	105679	0.5
	BENZOIC ACID	65850	0.5
	bis-(2-CHLOROETHOXY)METHANE	111911	3.3
<u>107.8</u>	<u>340.5 ± 30.1^{ug}</u> 2,4-DICHLOROPHENOL	120832	0.5
	<u>2 mDL</u> 1,2,4-TRICHLOROBENZENE	120821	0.5
	<u>106.4 ± 21.2^{ug}</u> NAPHTHALENE	91203	0.5
	<u>2 mDL</u> 4-CHLOROANILINE	106478	0.5
	HEXACHLOROBUTADIENE	87683	3.3
	4-CHLORO-3-METHYLPHENOL	59507	0.5
	2-METHYLNAPHTHALENE	91576	0.5
	HEXACHLOROCYCLOPENTADIENE	77474	0.5
	2,4,6-TRICHLOROPHENOL	88062	0.5
	2,4,5-TRICHLOROPHENOL	95954	0.5
	2-CHLORONAPHTHALENE	91587	3.3
	2-NITROANILINE	88744	0.5
	DIMETHYLPHTHALATE	131113	1.5
	ACENAPHTHYLENE	208968	0.5
	2,6-DINITROTOLUENE	606202	1.5
	3-NITROANILINE	99092	0.5
<u>77.6</u>	<u>53.0 ± 16.6^{ug}</u> ACENAPHTHENE	83329	0.5
	<u>2 mDL</u> 2,4-DINITROPHENOL	51285	6.7
<u>70.9</u>	<u>141.1 ± 28.2^{ug}</u> 3-NITROPHENOL	100027	1.5
	<u>2 mDL</u> DIBENZOFURAN	132649	0.5
<u>105.9</u>	<u>145.9 ± 29.1^{ug}</u> 2,4-DINITROTOLUENE	121142	1.5
	<u>2 mDL</u> DIETHYLPHTHALATE	84662	1.5

2mDL	4-CHLOROPHENYL PHENYL ETHER	7005723	0.5	
	FLUORENE	86737	0.5	
	4-NITROANILINE	100016	1.5	
	4,6-DINITRO-2-METHYLPHENOL	534521	3.3	
	N-NITROSODIPHENYLAMINE	86306	0.5	
	4-BROMOMPHENYL PHENYL ETHER	101553	1.5	
	HEXACHLOROBENZENE	118741	0.5	
541	111.5 ± 22.2 μg	PENTACHLOROPHENOL	87865	3.3
	2mDL	PHENANTHRENE	85018	0.5
		ANTHRACENE	120127	0.5
	6.5	DI-N-BUTYLPHTHALATE	84742	0.5
	2mDL	FLUORANTHENE	206440	0.5
1526	154.1 ± 30.9 μg	PYRENE	129000	0.5
	2mDL	BUTYL BENZYL PHTHALATE	85687	0.5
	NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941	
	2mDL	BENZO(a)ANTHRACENE	56553	0.5
		CHRYSENE	218019	0.5
		bis-(2-ETHYLHEXYL)PHTHALATE	117817	1.5
		DI-N-OCTYL PHTHALATE	117840	0.5
		BENZO(b)FLUORANTHENE	205992	0.5
		BENZO(k)FLUORANTHENE	207089	0.5
		BENZO(a)PYRENE	50328	0.5
		INDENO(1,2,3-cd)PYRENE	193395	0.5
	NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
	NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/G
 ** RESULTS: UNITS ARE UG/G +/- AN UNCERTAINTY
 *** NQ: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS		ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	<u>60.9</u>	21.0-100.0
PHENOL d6	<u>88.7</u>	10.0- 94.0
2,4,6-TRIBROMOPHENOL	<u>29.9</u>	10.0-123.0
BASE/NEUTRALS		
NITROBENZENE d5	<u>131.2</u>	35.0-114.0
2-FLUOROBIPHENYL	<u>140.9</u>	43.0-116.0
4-TERPHENYL d14	<u>229.0</u>	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: QL 00.97643
SAMPLE MATRIX: WATER Soil

REQUEST SHEET NUMBER: 6452
NOTEBOOK: Y-1772 Pg 71

RESULTS**	COMPOUND	CAS #	MDL*
<i>ug/sample</i>			
<i>100</i>	PHENOL	108952	20.0
	bis(2-CHLOROETHYL)ETHER	111444	20.0
	2-CHLOROPHENOL	95578	20.0
	1,3-DICHLOROBENZENE	541731	50.0
	1,4-DICHLOROBENZENE	106467	100.0
	BENZYL ALCOHOL	100516	20.0
	1,2-DICHLOROBENZENE	95501	100.0
	2-METHYLPHENOL	95487	20.0
	bis-(2-CHLOROISOPROPYL)ETHER	39638329	100.0
	4-METHYLPHENOL	106445	20.0
	N-NITROSO-DIPROPYLAMINE	621647	50.0
	HEXACHLOROETHANE	67721	20.0
	NITROBENZENE	98953	20.0
	ISOPHORONE	78591	20.0
	2-NITROPHENOL	88755	20.0
	2,4-DIMETHYLPHENOL	105679	20.0
	BENZOIC ACID	65850	20.0
	bis-(2-CHLOROETHOXY)METHANE	111911	100.0
	2,4-DICHLOROPHENOL	120832	20.0
<i>61</i>	1,2,4-TRICHLOROBENZENE	120821	20.0
	NAPHTHALENE	91203	20.0
	4-CHLOROANILINE	106478	20.0
	HEXACHLOROBUTADIENE	87683	100.0
	4-CHLORO-3-METHYLPHENOL	59507	20.0
	2-METHYLNAPHTHALENE	91576	20.0
	HEXACHLOROCYCLOPENTADIENE	77474	20.0
	2,4,6-TRICHLOROPHENOL	88062	20.0
	2,4,5-TRICHLOROPHENOL	95954	20.0
	2-CHLORONAPHTHALENE	91587	100.0
	2-NITROANILINE	88744	20.0
	DIMETHYLPHTHALATE	131113	50.0
	ACENAPHTHYLENE	208968	20.0
	2,6-DINITROTOLUENE	606202	50.0
	3-NITROANILINE	99092	20.0
	ACENAPHTHENE	83329	20.0
	2,4-DINITROPHENOL	51285	200.0
<i>5.0</i>	4-NITROPHENOL	100027	50.0
	DIBENZOFURAN	132649	20.0
	2,4-DINITROTOLUENE	121142	50.0
	DIETHYLPHTHALATE	84662	50.0

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: Blank w/ Matrix Spike REQUEST SHEET NUMBER: 6452
 SAMPLE MATRIX: WATER Soil NOTEBOOK: Y-1772 Pg 71

Sample weight: 30.24g

RESULTS**	COMPOUND	CAS #	MDL*
107	131.2 ± 36.2 ug NO 2.2 PHENOL	108952	20.0
5	185 143.8 ± 20.8 2-CHLOROPHENOL	111444	20.0
33	106 279.1 ± 139.1 2-MOL 1,3-DICHLOROBENZENE	95578	20.0
	1,4-DICHLOROBENZENE	541731	50.0
	BENZYL ALCOHOL	106467	100.0
	1,2-DICHLOROBENZENE	100516	20.0
	2-METHYLPHENOL	95501	100.0
	bis-(2-CHLOROISOPROPYL)ETHER	95487	20.0
	4-METHYLPHENOL	39638329	100.0
	N-NITROSO-DIPROPYLAMINE	106445	20.0
	HEXACHLOROETHANE	621647	50.0
	NITROBENZENE	67721	20.0
	ISOPHORONE	98953	20.0
	2-NITROPHENOL	78591	20.0
	2,4-DIMETHYLPHENOL	88755	20.0
	BENZOIC ACID	105679	20.0
	bis-(2-CHLOROETHOXY)METHANE	65850	20.0
	2,4-DICHLOROPHENOL	111911	100.0
31	316* 202.7 ± 40.4 91.4 ± 15.2 2-MOL 1,2,4-TRICHLOROBENZENE	120832	20.0
	1,2-NAPHTHALENE	120821	20.0
	4-CHLOROANILINE	91203	20.0
	HEXACHLOROBUTADIENE	106478	20.0
	4-CHLORO-3-METHYLPHENOL	87683	100.0
	2-METHYLNAPHTHALENE	59507	20.0
	HEXACHLOROCYCLOPENTADIENE	91576	20.0
	2,4,6-TRICHLOROPHENOL	77474	20.0
	2,4,5-TRICHLOROPHENOL	88062	20.0
	2-CHLORONAPHTHALENE	95954	20.0
	2-NITROANILINE	91587	100.0
	DIMETHYLPHTHALATE	88744	20.0
	ACENAPHTHYLENE	131113	50.0
	2,6-DINITROTOLUENE	208968	20.0
	3-NITROANILINE	606202	50.0
3	107 76.3 ± 15.2 2-MOL ACENAPHTHENE	99092	20.0
	2,4-DINITROPHENOL	83329	20.0
8	199 146.8 ± 29.2 2-MOL 4-NITROPHENOL	51285	200.0
	DIBENZOFURAN	100027	50.0
10	134 132.6 ± 26.4 2-MOL 2,4-DINITROTOLUENE	132649	20.0
	DIETHYLPHTHALATE	121142	50.0
		84662	50.0

*Saturation point, accurate quantitation not possible
 Naphthalene appears to be in matrix spike

LMOL	4-CHLOROPHENYL PHENYL ETHER	7005723	20.0	
---	FLUORENE	86737	20.0	
---	4-NITROANILINE	100016	50.0	
---	4,6-DINITRO-2-METHYLPHENOL	534521	100.0	
---	N-NITROSODIPHENYLAMINE	86306	20.0	
---	4-BROMOPHENYL PHENYL ETHER	101553	50.0	
---	HEXACHLOROENZENE	118741	20.0	
5 206	128.8 ± 25.6	PENTACHLOROPHENOL	87865	100.0
---	LMOL	PHENANTHRENE	85018	20.0
---	ANTHRACENE	120127	20.0	
4.3 ± 0.84	28.9 ± 25.8	DI-N-BUTYLPHTHALATE	84742	20.0
---	LMOL	FLUORANTHENE	206440	20.0
50 101	116.1 ± 23.7	PYRENE	129000	20.0
---	LMOL	BUTYL BENZYL PHTHALATE	85687	20.0
NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941		
---	LMOL	BENZO(a)ANTHRACENE	56553	20.0
---	CHRYSENE	218019	20.0	
---	bis-(2-ETHYLHEXYL)PHTHALATE	117817	50.0	
---	DI-N-OCTYL PHTHALATE	117840	20.0	
---	BENZO(b)FLUORANTHENE	205992	20.0	
---	BENZO(k)FLUORANTHENE	207089	20.0	
---	BENZO(a)PYRENE	50328	20.0	
---	INDENO(1,2,3-cd)PYRENE	193395	20.0	
NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703		
NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242		

* MDL: MINIMUM DETECTION LIMIT IN UG/L
 ** RESULTS: UNITS ARE UG/L +/- AN UNCERTAINTY
 *** NG: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS		ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	51.0	21.0-100.0
PHENOL d6	72.1	10.0- 94.0
2,4,6-TRIBROMOPHENOL	63.9	10.0-123.0
BASE/NEUTRALS		
NITROBENZENE d5	85.5	35.0-114.0
2-FLUOROBIPHENYL	125.1	43.0-116.0
4-TERPHENYL d14	221.2	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: 8700262
 SAMPLe MATRIX: SOIL
 SAMPLe WEIGHT: 29.93 g

REQUEST SHEET NUMBER: 6452
 NOTEBOOK: Y-1772 Pg 71

RESULTS**	COMPOUND	CAS #	MDL*
<u>2</u>	PHENOL	108952	0.5
-----	bis(2-CHLOROETHYL)ETHER	111444	0.5
-----	2-CHLOROPHENOL	95578	0.5
-----	1,3-DICHLOROBENZENE	541731	1.5
-----	1,4-DICHLOROBENZENE	106467	3.3
-----	BENZYL ALCOHOL	100516	0.5
-----	1,2-DICHLOROBENZENE	95501	3.3
-----	2-METHYLPHENOL	95487	0.5
-----	bis-(2-CHLOROISOPROPYL)ETHER	39638329	3.3
-----	4-METHYLPHENOL	106445	0.5
-----	N-NITROSO-DIPROPYLAMINE	621647	1.5
-----	HEXACHLOROETHANE	67721	0.5
-----	NITROBENZENE	98953	0.5
-----	ISOPHORONE	78591	0.5
-----	2-NITROPHENOL	88755	0.5
-----	2,4-DIMETHYLPHENOL	105679	0.5
-----	BENZOIC ACID	65850	0.5
-----	bis-(2-CHLOROETHOXY)METHANE	111911	3.3
-----	2,4-DICHLOROPHENOL	120832	0.5
-----	1,2,4-TRICHLOROBENZENE	120821	0.5
-----	NAPHTHALENE	91203	0.5
-----	4-CHLOROANILINE	106478	0.5
-----	HEXACHLOROBUTADIENE	87683	3.3
-----	4-CHLORO-3-METHYLPHENOL	59507	0.5
-----	2-METHYLNAPHTHALENE	91576	0.5
-----	HEXACHLOROCYCLOPENTADIENE	77474	0.5
-----	2,4,6-TRICHLOROPHENOL	88062	0.5
-----	2,4,5-TRICHLOROPHENOL	95954	0.5
-----	2-CHLORONAPHTHALENE	91587	3.3
-----	2-NITROANILINE	88744	0.5
-----	DIMETHYLPHTHALATE	131113	1.5
-----	ACENAPHTHYLENE	208968	0.5
-----	2,6-DINITROTOLUENE	606202	1.5
-----	3-NITROANILINE	99092	0.5
-----	ACENAPHTHENE	83329	0.5
-----	2,4-DINITROPHENOL	51285	6.7
-----	4-NITROPHENOL	100027	1.5
-----	DIBENZOFURAN	132649	0.5
-----	2,4-DINITROTOLUENE	121142	1.5
-----	DIETHYLPHTHALATE	84662	1.5

Concentration	Compound Name	Value	MDL
2 MOL	4-CHLOROPHENYL PHENYL ETHER	7005723	0.5
	FLUORENE	86737	0.5
	4-NITROANILINE	100016	1.5
	4,6-DINITRO-2-METHYLPHENOL	534521	3.3
	N-NITROSODIPHENYLAMINE	86306	0.5
	4-BROMOPHENYL PHENYL ETHER	101553	1.5
	HEXACHLOROBENZENE	118741	0.5
	PENTACHLOROPHENOL	87865	3.3
	PHENANTHRENE	85018	0.5
	ANTHRACENE	120127	0.5
7.1 E 14	DI-N-BUTYLPHTHALATE	84742	0.5
2 MOL	FLUORANTHENE	206440	0.5
	PYRENE	129000	0.5
	BUTYL BENZYL PHTHALATE	85687	0.5
NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941	
	BENZO(a)ANTHRACENE	56553	0.5
	CHRYSENE	218019	0.5
	bis-(2-ETHYLHEXYL)PHTHALATE	117817	1.5
	DI-N-OCTYL PHTHALATE	117840	0.5
	BENZO(b)FLUORANTHENE	205992	0.5
	BENZO(k)FLUORANTHENE	207089	0.5
	BENZO(a)PYRENE	50328	0.5
	INDENO(1,2,3-cd)PYRENE	193395	0.5
NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/G
 ** RESULTS: UNITS ARE UG/G +/- AN UNCERTAINTY
 *** NQ: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS	Value	ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	47.2	21.0-100.0
PHENOL d6	90.2	10.0- 94.0
2,4,6-TRIBROMOPHENOL	52.1	10.0-123.0
BASE/NEUTRALS		
NITROBENZENE d5	NF	35.0-114.0
2-FLUOROBIPHENYL	139.1	43.0-116.0
4-TERPHENYL d14	255.2	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: ~~8520~~ 87.00263 REQUEST SHEET NUMBER: 6452
 SAMPLe MATRIX: SOIL NOTEBOOK: Y-1772 Pg 71
 SAMPLe WEIGHT: 30.7 9

RESULTS**	COMPOUND	CAS #	MDL*
<u>2</u>	PHENOL	108952	0.5
-----	bis(2-CHLOROETHYL)ETHER	111444	0.5
-----	2-CHLOROPHENOL	95578	0.5
-----	1,3-DICHLOROBENZENE	541731	1.5
-----	1,4-DICHLOROBENZENE	106467	3.3
-----	BENZYL ALCOHOL	100516	0.5
-----	1,2-DICHLOROBENZENE	95501	3.3
-----	2-METHYLPHENOL	95487	0.5
-----	bis-(2-CHLOROISOPROPYL)ETHER	39638329	3.3
-----	4-METHYLPHENOL	106445	0.5
-----	N-NITROSO-DIPROPYLAMINE	621647	1.5
-----	HEXACHLOROETHANE	67721	0.5
-----	NITROBENZENE	98953	0.5
-----	ISOPHORONE	78591	0.5
-----	2-NITROPHENOL	88755	0.5
-----	2,4-DIMETHYLPHENOL	105679	0.5
-----	BENZOIC ACID	65850	0.5
-----	bis-(2-CHLOROETHOXY)METHANE	111911	3.3
-----	2,4-DICHLOROPHENOL	120832	0.5
-----	1,2,4-TRICHLOROBENZENE	120821	0.5
-----	NAPHTHALENE	91203	0.5
-----	4-CHLOROANILINE	106478	0.5
-----	HEXACHLOROBUTADIENE	87683	3.3
-----	4-CHLORO-3-METHYLPHENOL	59507	0.5
-----	2-METHYLNAPHTHALENE	91576	0.5
-----	HEXACHLOROCYCLOPENTADIENE	77474	0.5
-----	2,4,6-TRICHLOROPHENOL	88062	0.5
-----	2,4,5-TRICHLOROPHENOL	95954	0.5
-----	2-CHLORONAPHTHALENE	91587	3.3
-----	2-NITROANILINE	88744	0.5
-----	DIMETHYLPHTHALATE	131113	1.5
-----	ACENAPHTHYLENE	208968	0.5
-----	2,6-DINITROTOLUENE	606202	1.5
-----	3-NITROANILINE	99092	0.5
-----	ACENAPHTHENE	83329	0.5
-----	2,4-DINITROPHENOL	51285	6.7
-----	4-NITROPHENOL	100027	1.5
-----	DIBENZOFURAN	132649	0.5
-----	2,4-DINITROTOLUENE	121142	1.5
-----	DIETHYLPHTHALATE	84662	1.5

<u>4mOL</u>	4-CHLOROPHENYL PHENYL ETHER	7005723	0.5
-----	FLUORENE	86737	0.5
-----	4-NITROANILINE	100016	1.5
-----	4,6-DINITRO-2-METHYLPHENOL	534521	3.3
-----	N-NITROSODIPHENYLAMINE	86306	0.5
-----	4-BROMOPHENYL PHENYL ETHER	101553	1.5
-----	HEXACHLOROBENZENE	118741	0.5
-----	PENTACHLOROPHENOL	87865	3.3
-----	PHENANTHRENE	85018	0.5
-----	ANTHRACENE	120127	0.5
<u>4.8 ± 0.9</u>	DI-N-BUTYLPHTHALATE	84742	0.5
<u>4mOL</u>	FLUORANTHENE	206440	0.5
-----	PYRENE	129000	0.5
-----	BUTYL BENZYL PHTHALATE	85687	0.5
NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941	
-----	BENZO(a)ANTHRACENE	56553	0.5
-----	CHRYSENE	218019	0.5
-----	bis-(2-ETHYLHEXYL)PHTHALATE	117817	1.5
-----	DI-N-OCTYL PHTHALATE	117840	0.5
-----	BENZO(b)FLUORANTHENE	205992	0.5
-----	BENZO(k)FLUORANTHENE	207089	0.5
-----	BENZO(a)PYRENE	50328	0.5
-----	INDENO(1,2,3-cd)PYRENE	193395	0.5
NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/G
 ** RESULTS: UNITS ARE UG/G +/- AN UNCERTAINTY
 *** NQ: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS		ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	<u>61.3</u>	21.0-100.0
PHENOL d6	<u>108.7</u>	10.0- 94.0
2,4,6-TRIBROMOPHENOL	<u>38.0</u>	10.0-123.0

BASE/NEUTRALS

NITROBENZENE d5	<u>114.0</u>	35.0-114.0
2-FLUOROBIPHENYL	<u>113.3</u>	43.0-116.0
4-TERPHENYL d14	<u>253.1</u>	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: 87.00264
 SAMPLE MATRIX: SOIL
 SAMPLE WEIGHT: 30.14 g

REQUEST SHEET NUMBER: 6452
 NOTEBOOK: Y-1772 Pg 71

RESULTS**	COMPOUND	CAS #	MDL*
<u>MDL</u>	PHENOL	108952	0.5
-----	bis(2-CHLOROETHYL)ETHER	111444	0.5
-----	2-CHLOROPHENOL	95578	0.5
-----	1,3-DICHLOROBENZENE	541731	1.5
-----	1,4-DICHLOROBENZENE	106467	3.3
-----	BENZYL ALCOHOL	100516	0.5
-----	1,2-DICHLOROBENZENE	95501	3.3
-----	2-METHYLPHENOL	95487	0.5
-----	bis-(2-CHLOROISOPROPYL)ETHER	39638329	3.3
-----	4-METHYLPHENOL	106445	0.5
-----	N-NITROSO-DIPROPYLAMINE	621647	1.5
-----	HEXACHLOROETHANE	67721	0.5
-----	NITROBENZENE	98953	0.5
-----	ISOPHORONE	78591	0.5
-----	2-NITROPHENOL	88755	0.5
-----	2,4-DIMETHYLPHENOL	105679	0.5
-----	BENZOIC ACID	65850	0.5
-----	bis-(2-CHLOROETHOXY)METHANE	111911	3.3
-----	2,4-DICHLOROPHENOL	120832	0.5
-----	1,2,4-TRICHLOROBENZENE	120821	0.5
-----	NAPHTHALENE	91203	0.5
-----	4-CHLOROANILINE	106478	0.5
-----	HEXACHLOROBTADIENE	87683	3.3
-----	4-CHLORO-3-METHYLPHENOL	59507	0.5
-----	2-METHYLNAPHTHALENE	91576	0.5
-----	HEXACHLOROCYCLOPENTADIENE	77474	0.5
-----	2,4,6-TRICHLOROPHENOL	88062	0.5
-----	2,4,5-TRICHLOROPHENOL	95954	0.5
-----	2-CHLORONAPHTHALENE	91587	3.3
-----	2-NITROANILINE	88744	0.5
-----	DIMETHYLPHTHALATE	131113	1.5
-----	ACENAPHTHYLENE	208968	0.5
-----	2,6-DINITROTOLUENE	606202	1.5
-----	3-NITROANILINE	99092	0.5
-----	ACENAPHTHENE	83329	0.5
-----	2,4-DINITROPHENOL	51285	6.7
-----	4-NITROPHENOL	100027	1.5
-----	DIBENZOFURAN	132649	0.5
-----	2,4-DINITROTOLUENE	121142	1.5
-----	DIETHYLPHTHALATE	84662	1.5

Concentration	Compound Name	Reference Number	Concentration (ug/g)
4mOL	4-CHLOROPHENYL PHENYL ETHER	7005723	0.5
	FLUORENE	86737	0.5
	4-NITROANILINE	100016	1.5
	4,6-DINITRO-2-METHYLPHENOL	534521	3.3
	N-NITROSODIPHENYLAMINE	86306	0.5
	4-BROMOPHENYL PHENYL ETHER	101553	1.5
	HEXACHLOROBENZENE	118741	0.5
	PENTACHLOROPHENOL	87865	3.3
	PHENANTHRENE	85018	0.5
	ANTHRACENE	120127	0.5
12.2 ± 2.4	DI-N-BUTYLPHTHALATE	84742	0.5
1mOL	FLUORANTHENE	206440	0.5
	PYRENE	129000	0.5
	BUTYL BENZYL PHTHALATE	85687	0.5
NOT ANALYZED	3,3'-DICHLOROBENZIDINE	91941	
	BENZO(a)ANTHRACENE	56553	0.5
	CHRYSENE	218019	0.5
	bis-(2-ETHYLHEXYL)PHTHALATE	117817	1.5
	DI-N-OCTYL PHTHALATE	117840	0.5
	BENZO(b)FLUORANTHENE	205992	0.5
	BENZO(k)FLUORANTHENE	207089	0.5
	BENZO(a)PYRENE	50328	0.5
	INDENO(1,2,3-cd)PYRENE	193395	0.5
NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/G
 ** RESULTS: UNITS ARE UG/G +/- AN UNCERTAINTY
 *** NQ: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS	Recovery (%)	ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	68.7	21.0-100.0
PHENOL d6	114.6	10.0- 94.0
2,4,6-TRIBROMOPHENOL	46.5	10.0-123.0

BASE/NEUTRALS

NITROBENZENE d5	159.9 77.5	35.0-114.0
2-FLUOROBIPHENYL	159.9	43.0-116.0
4-TERPHENYL d14	232.7	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: 8700265
 SAMPLE MATRIX: SOIL
 SAMPLE WEIGHT: 30.54g

REQUEST SHEET NUMBER: 6452
 NOTEBOOK: Y-1772 Pg 71

RESULTS**	COMPOUND	CAS #	MDL*
<u>4</u>	PHENOL	108952	0.5
	bis(2-CHLOROETHYL)ETHER	111444	0.5
	2-CHLOROPHENOL	95578	0.5
	1,3-DICHLOROBENZENE	541731	1.5
	1,4-DICHLOROBENZENE	106467	3.3
	BENZYL ALCOHOL	100516	0.5
	1,2-DICHLOROBENZENE	95501	3.3
	2-METHYLPHENOL	95487	0.5
	bis-(2-CHLOROISOPROPYL)ETHER	39638329	3.3
	4-METHYLPHENOL	106445	0.5
	N-NITROSO-DIPROPYLAMINE	621647	1.5
	HEXACHLOROETHANE	67721	0.5
	NITROBENZENE	98953	0.5
	ISOPHORONE	78591	0.5
	2-NITROPHENOL	88755	0.5
	2,4-DIMETHYLPHENOL	105679	0.5
	BENZOIC ACID	65850	0.5
	bis-(2-CHLOROETHYOXY)METHANE	111911	3.3
	2,4-DICHLOROPHENOL	120832	0.5
	1,2,4-TRICHLOROBENZENE	120821	0.5
	NAPHTHALENE	91203	0.5
	4-CHLOROANILINE	106478	0.5
	HEXACHLOROBUTADIENE	87683	3.3
	4-CHLORO-3-METHYLPHENOL	59507	0.5
	2-METHYLNAPHTHALENE	91576	0.5
	HEXACHLOROCYCLOPENTADIENE	77474	0.5
	2,4,6-TRICHLOROPHENOL	88062	0.5
	2,4,5-TRICHLOROPHENOL	95954	0.5
	2-CHLORONAPHTHALENE	91587	3.3
	2-NITROANILINE	88744	0.5
	DIMETHYLPHTHALATE	131113	1.5
	ACENAPHTHYLENE	208968	0.5
	2,6-DINITROTOLUENE	606202	1.5
	3-NITROANILINE	99092	0.5
	ACENAPHTHENE	83329	0.5
	2,4-DINITROPHENOL	51285	6.7
	4-NITROPHENOL	100027	1.5
	DIBENZOFURAN	132649	0.5
	2,4-DINITROTOLUENE	121142	1.5
	DIETHYLPHTHALATE	84662	1.5

Concentration	Compound Name	Reference Number	Value
MDL	4-CHLOROPHENYL PHENYL ETHER	7005723	0.5
	FLUORENE	86737	0.5
	4-NITROANILINE	100016	1.5
	4,6-DINITRO-2-METHYLPHENOL	534521	3.3
	N-NITROSODIPHENYLAMINE	86306	0.5
	4-BROMOPHENYL PHENYL ETHER	101553	1.5
	HEXACHLOROBENZENE	118741	0.5
	PENTACHLOROPHENOL	87865	3.3
	PHENANTHRENE	85018	0.5
	ANTHRACENE	120127	0.5
4.210.8	DI-N-BUTYLPHTHALATE	84742	0.5
MDL	FLUORANTHENE	206440	0.5
	PYRENE	129000	0.5
	BUTYL BENZYL PHTHALATE	85687	0.5
NOT ANALYZED	3,3'-DICHLOROENZIDINE	91941	
	BENZO(a)ANTHRACENE	56553	0.5
	CHRYSENE	218019	0.5
	bis-(2-ETHYLHEXYL)PHTHALATE	117817	1.5
	DI-N-OCTYL PHTHALATE	117840	0.5
	BENZO(b)FLUORANTHENE	205992	0.5
	BENZO(k)FLUORANTHENE	207089	0.5
	BENZO(a)PYRENE	50328	0.5
	INDENO(1,2,3-cd)PYRENE	193395	0.5
NOT ANALYZED	DIBENZ(a,h)ANTHRACENE	53703	
NOT ANALYZED	BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/G
 ** RESULTS: UNITS ARE UG/G +/- AN UNCERTAINTY
 *** NQ: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS	Recovery (%)	ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	43.4	21.0-100.0
PHENOL d6	39.7	10.0- 94.0
2,4,6-TRIBROMOPHENOL	38.7	10.0-123.0

BASE/NEUTRALS

NITROBENZENE d5	70.7	35.0-114.0
2-FLUOROBIPHENYL	117.2	43.0-116.0
4-TERPHENYL d14	232.6	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

HSE-9 ORGANIC RESULTS SHEET
SEMIVOLATILE ORGANICS

SAMPLE NUMBER: 8800266
 SAMPLE MATRIX: SOIL
 SAMPLE WEIGHT: 30.06 9

REQUEST SHEET NUMBER: 6452
 NOTEBOOK: Y-1772 Pg 71

RESULTS**	COMPOUND	CAS #	MDL*
<u>2m0</u>	PHENOL	108952	0.5
-----	bis(2-CHLOROETHYL)ETHER	111444	0.5
-----	2-CHLOROPHENOL	95578	0.5
-----	1,3-DICHLOROBENZENE	541731	1.5
-----	1,4-DICHLOROBENZENE	106467	3.3
-----	BENZYL ALCOHOL	100516	0.5
-----	1,2-DICHLOROBENZENE	95501	3.3
-----	2-METHYLPHENOL	95487	0.5
-----	bis-(2-CHLOROISOPROPYL)ETHER	39638329	3.3
-----	4-METHYLPHENOL	106445	0.5
-----	N-NITROSO-DIPROPYLAMINE	621647	1.5
-----	HEXACHLOROETHANE	67721	0.5
-----	NITROBENZENE	98953	0.5
-----	ISOPHORONE	78591	0.5
-----	2-NITROPHENOL	88755	0.5
-----	2,4-DIMETHYLPHENOL	105679	0.5
-----	BENZOIC ACID	65850	0.5
-----	bis-(2-CHLOROETHOXY)METHANE	111911	3.3
-----	2,4-DICHLOROPHENOL	120832	0.5
-----	1,2,4-TRICHLOROBENZENE	120821	0.5
-----	NAPHTHALENE	91203	0.5
-----	4-CHLOROANILINE	106478	0.5
-----	HEXACHLOROBUTADIENE	87683	3.3
-----	4-CHLORO-3-METHYLPHENOL	59507	0.5
-----	2-METHYLNAPHTHALENE	91576	0.5
-----	HEXACHLOROCYCLOPENTADIENE	77474	0.5
-----	2,4,6-TRICHLOROPHENOL	88062	0.5
-----	2,4,5-TRICHLOROPHENOL	95954	0.5
-----	2-CHLORONAPHTHALENE	91587	3.3
-----	2-NITROANILINE	88744	0.5
-----	DIMETHYLPHTHALATE	131113	1.5
-----	ACENAPHTHYLENE	208968	0.5
-----	2,6-DINITROTOLUENE	606202	1.5
-----	3-NITROANILINE	99092	0.5
-----	ACENAPHTHENE	83329	0.5
-----	2,4-DINITROPHENOL	51285	6.7
-----	4-NITROPHENOL	100027	1.5
-----	DIBENZOFURAN	132649	0.5
-----	2,4-DINITROTOLUENE	121142	1.5
-----	DIETHYLPHTHALATE	84662	1.5

LAB 3-25

Concentration	Compound Name	Value	MDL
LMOL	4-CHLOROPHENYL PHENYL ETHER	7005723	0.5
-----	FLUORENE	86737	0.5
-----	4-NITROANILINE	100016	1.5
-----	4,6-DINITRO-2-METHYLPHENOL	534521	3.3
-----	N-NITROSODIPHENYLAMINE	86306	0.5
-----	4-BROMOPHENYL PHENYL ETHER	101553	1.5
-----	HEXACHLOROENZENE	118741	0.5
-----	PENTACHLOROPHENOL	87865	3.3
-----	PHENANTHRENE	85018	0.5
-----	ANTHRACENE	120127	0.5
-----	DI-N-BUTYLPHTHALATE	84742	0.5
6.6	FLUORANTHENE	206440	0.5
-----	PYRENE	129000	0.5
-----	BUTYL BENZYL PHTHALATE	85687	0.5
-----	NOT ANALYZED 3,3'-DICHLOROBENZIDINE	91941	
-----	BENZO(a)ANTHRACENE	56553	0.5
-----	CHRYSENE	218019	0.5
-----	bis-(2-ETHYLHEXYL)PHTHALATE	117817	1.5
-----	DI-N-OCTYL PHTHALATE	117840	0.5
-----	BENZO(b)FLUORANTHENE	205992	0.5
-----	BENZO(k)FLUORANTHENE	207089	0.5
-----	BENZO(a)PYRENE	50328	0.5
-----	INDENO(1,2,3-cd)PYRENE	193395	0.5
-----	NOT ANALYZED DIBENZ(a,h)ANTHRACENE	53703	
-----	NOT ANALYZED BENZO(g,h,i)PERYLENE	191242	

* MDL: MINIMUM DETECTION LIMIT IN UG/G
 ** RESULTS: UNITS ARE UG/G +/- AN UNCERTAINTY
 *** NQ: NOT QUANTIFIED, BELOW CALIBRATION CURVE
 **** NF: NOT FOUND

SURROGATE SPIKE RECOVERIES (%)

ACIDS	Value	ACCEPTABLE RANGE (CLP)
2-FLUOROPHENOL	69.5	21.0-100.0
PHENOL d6	94.2	10.0- 94.0
2,4,6-TRIBROMOPHENOL	53.1	10.0-123.0
BASE/NEUTRALS		
NITROBENZENE d5	849.5 93.9	35.0-114.0
2-FLUOROBIPHENYL	64.9 129.7	43.0-116.0
4-TERPHENYL d14	231.5	33.0-141.0

COMMENTS:
 PHTHALATES ARE COMMON LABORATORY AND FIELD CONTAMINANTS

APPENDIX F.

Background Concentration Levels for Cadmium on Sigma Mesa

**SIGMA MESA - BACKGROUND ELEMENTAL CONCENTRATIONS IN SOIL AND
VEGETATION: 1979**

by

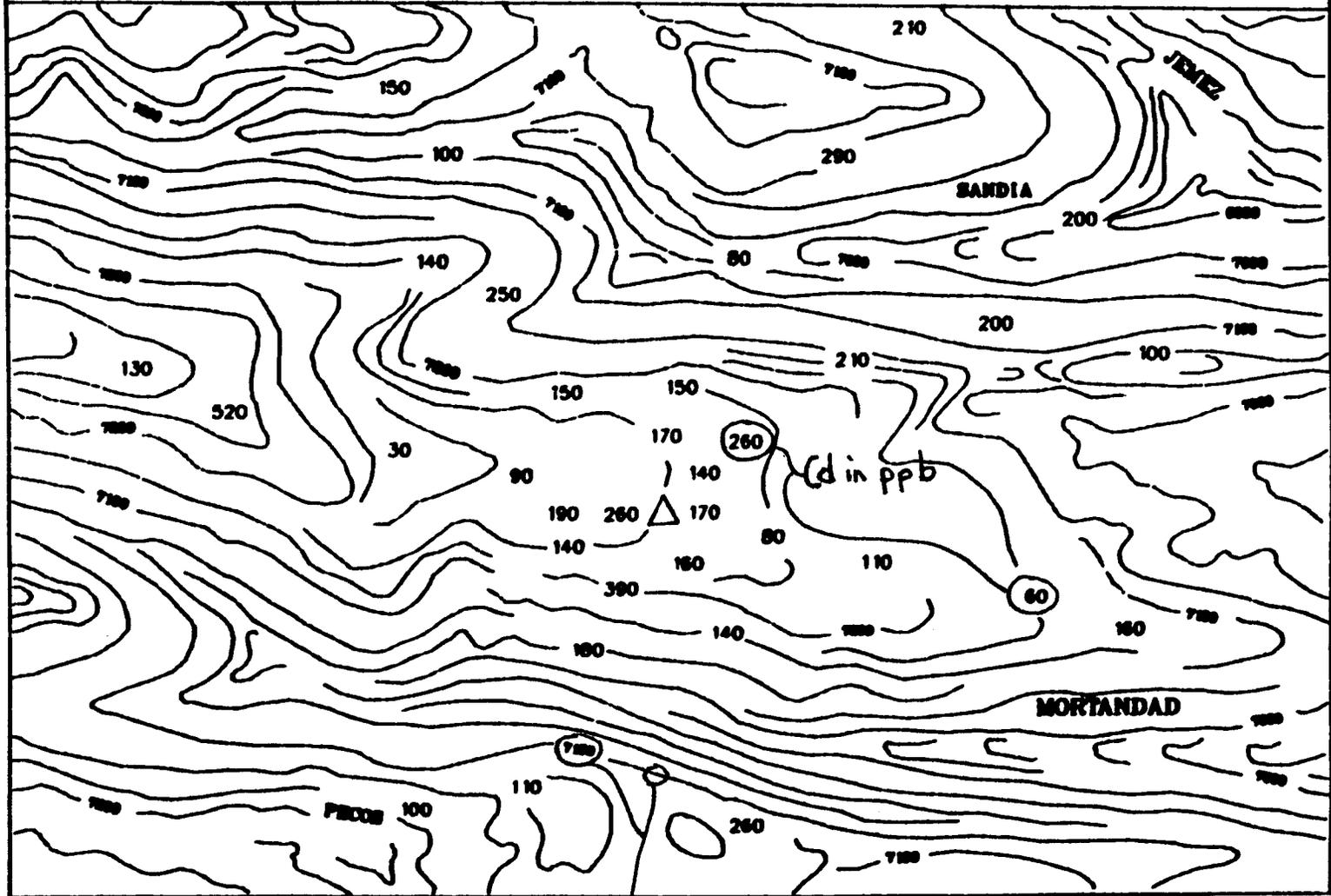
**Roger W. Ferenbaugh, Ernest S. Gladney,
and George H. Brooks, Jr.**

**Los Alamos National Laboratory Report
(in preparation)**

SIGMA MESA

SOIL

CADMIUM ~~(PPB)~~ PPB



topographic contours
(ft. above MSL)

SOIL: CATIONS (Quantities expressed in ppm except as otherwise specified.)

Location center	Al*	As	Ba	Be	B	Cd (ppb) ^a	Cu	Fe*	Pb	Li	Mg
2W	5.33	6.67	610	1.40	27.	260	40.	2.19	25.	22.	3300.
3W	5.91	5.45	610	0.90	24.	190	48.	2.29	24.	25.	3600.
4W	5.45	4.84	570	1.40	25.	90	38.	1.94	25.	20.	3000.
5W	6.03	5.68	690	1.70	20.	30	42.	2.23	25.	26.	3900.
6W	5.73	5.71	700	1.60	19.	520	46.	1.97	23.	24.	3700.
7W	5.46	5.44	650	1.80	25.	130	41.	1.92	25.	21.	3300.
1NW	5.32	5.29	620	1.30	24.	30	40.	1.99	23.	23.	2700.
2NW	5.49	5.61	660	1.10	27.	!	32.	2.03	96.	23.	3400.
3NW	5.35	5.12	700	1.40	26.	150	45.	2.12	24.	22.	3300.
4NW	5.73	3.16	200	1.50	9.	250	7.6	1.06	22.	24.	1100.
5NW	5.81	2.53	160	2.10	10.	100	8.8	1.16	16.	28.	950.
6NW	6.29	3.00	260	2.40	11.	150	11.	1.61	22.	39.2	1200.
1N	6.23	2.44	220	2.10	8.	140	8.5	1.32	23.	23.	1100.
2N	5.52	5.78	680	2.70	24.	170	41.	2.40	18.	24.	3800.
3N	5.75	5.96	620	0.90	27.	150	43.	2.22	33.	23.	3400.
4N	5.82	3.01	210	0.00	10.	80	9.2	1.34	16.	29.	1500.
5N	5.92	1.79	180	2.50	10.	290	9.0	1.19	28.	28.	850.
1NE	5.73	3.14	400	2.10	8.	210	6.7	1.21	65.	25.	2400.
2NE	6.22	4.82	570	1.50	20.	140	27.	2.02	18.	25.	3700.
3NE	6.00	6.22	620	1.40	25.	260	41.	2.08	20.	25.	4000.
4NE	5.79	1.27	150	3.30	0.	210	136.	1.05	12.	24.	670.
5NE	6.20	1.78	120	1.80	7.	200	5.1	1.11	15.	26.	510.
6NE	5.82	2.66	180	1.60	10.	200	8.9	1.22	32.	26.	1200.
1E	5.30	3.74	240	2.20	11.	!	13.	1.26	30.	26.	1600.
2E	5.50	5.68	720	1.60	27.	170	39.	2.05	25.	25.	3800.
3E	6.16	4.98	590	0.00	23.	80	40.	2.41	12.	25.	4000.
4E	6.15	4.08	385	1.70	15.	110	27.	2.09	20.	24.	2700.
5E	5.70	4.24	300	2.10	13.	60	15.	1.52	25.	24.	1800.
6E	6.31	2.81	260	2.30	10.	160	14.	1.70	16.	27.	1400.
7E	5.93	2.64	190	2.00	9.	!	8.9	0.98	8.	26.	930.
1SE	6.17	1.82	180	2.60	10.	100	6.8	1.18	19.	29.	1100.
2SE	6.00	3.48	440	1.80	14.	160	18.	1.50	19.	25.	2700.
3SE	5.38	1.74	130	2.10	9.	140	4.4	1.02	14.	19.	810.
1S	6.30	1.61	140	2.20	7.	260	4.3	1.10	8.	26.	860.
2S	5.32	4.26	390	1.70	16.	390	21.	1.69	26.	25.	2200.
3S	5.39	2.05	150	1.90	9.	180	4.2	0.99	19.	22.	760.
1SW	5.68	1.66	350	2.30	0.	110	54.	2.55	11.	22.	1700.
2SW	5.95	4.52	590	1.80	19.	140	39.	2.24	19.	24.	3400.
3SW	6.38	4.91	380	2.00	18.	!	26.	1.87	20.	27.	3000.
5SW	6.64	3.48	200	2.40	13.	100	16.	1.68	24.	23.	2800.

25-OCT-82

PAGE 1

H-B ANALYTICAL RESULTS

CD

DWL

SAMPLE NUMBER	REQ NUM	RESULT	UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
79.01624	00978	1W	260.0000	20.0000	PPB	10/25/82
79.01625	00978	2W	190.0000	20.0000	PPB	10/25/82
79.01626	00978	3W	90.0000	20.0000	PPB	10/25/82
79.01627	00978	4W	30.0000	20.0000	PPB	10/25/82
79.01628	00978	5W	520.0000	50.0000	PPB	10/25/82
79.01629	00978	6W	130.0000	20.0000	PPB	10/25/82
79.01630	00978	7W	30.0000	20.0000	PPB	10/25/82
79.01631	00978	1E	170.0000	20.0000	PPB	10/25/82
79.01632	00978	2E	80.0000	20.0000	PPB	10/25/82
79.01633	00978	3E	110.0000	20.0000	PPB	10/25/82
79.01634	00978	4E	60.0000	20.0000	PPB	10/25/82
79.01635	00978	5E	160.0000	20.0000	PPB	10/25/82
79.01637	00978	7E	100.0000	20.0000	PPB	10/25/82
79.01638	00978	1N	170.0000	20.0000	PPB	10/25/82
79.01639	00978	2N	150.0000	20.0000	PPB	10/25/82
79.01640	00978	3N	80.0000	20.0000	PPB	10/25/82
79.01641	00978	4N	290.0000	30.0000	PPB	10/25/82
79.01642	00978	5N	210.0000	20.0000	PPB	10/25/82
79.01643	00978	1S	390.0000	30.0000	PPB	10/25/82
79.01644	00978	2S	180.0000	20.0000	PPB	10/25/82
79.01645	00978	3S	110.0000	20.0000	PPB	10/25/82
79.01647	00978	2NW	150.0000	50.0000	PPB	10/25/82
79.01648	00978	3NW	250.0000	20.0000	PPB	10/25/82
79.01649	00978	4NW	100.0000	20.0000	PPB	10/25/82
79.01651	00978	5NW	140.0000	20.0000	PPB	10/25/82
79.01652	00978	1NE	140.0000	20.0000	PPB	10/25/82
79.01653	00978	2NE	260.0000	20.0000	PPB	10/25/82
79.01654	00978	3NE	210.0000	20.0000	PPB	10/25/82
79.01655	00978	4NE	200.0000	20.0000	PPB	10/25/82
79.01656	00978	5NE	200.0000	20.0000	PPB	10/25/82
79.01658	00978	1SE	160.0000	20.0000	PPB	10/25/82
79.01659	00978	2SE	140.0000	20.0000	PPB	10/25/82
79.01660	00978	3SE	260.0000	20.0000	PPB	10/25/82
79.01661	00978	4SW	140.0000	20.0000	PPB	10/25/82
79.01663	00978	5SW	100.0000	20.0000	PPB	10/25/82
79.01650	"	5NW	150.	20.	"	"

INTERIM STATUS CLOSURE PLAN
TECHNICAL AREA (TA) 16 SURFACE IMPOUNDMENT

Los Alamos National Laboratory
Los Alamos, New Mexico 87545
NM 0890010515

February 6, 1989

Response Comments to the Hazardous Waste Bureau, New Mexico
Environmental Improvement Division, Disapproval of Closure Plan
Dated January 5, 1989

1. Responses to this New Mexico Environmental Improvement Division (NMEID) comment are contained in the revised closure plan document dated January 1989 and entitled, Interim Status Closure Plan, Tech Area 16 Surface Impoundment, prepared by International Technology, Inc. (IT, Inc., 1989) for the Los Alamos National Laboratory (LANL), and attached herein. This IT, Inc. (1989) report is hereafter referred to as the revised plan; it has been labeled as Volume I of II. A corrected version of the Supplemental Report for the Interim Status Closure Plan at the TA-16 Surface Impoundment, originally submitted to the NMEID on December 7, 1988, and dated November 18, 1988, forms an integral part of the revised plan. This modified document is hereafter referred to as the Supplemental Report; it has been labeled as Volume II of II. Modifications to the Supplemental Report are inclosed herein. The original closure plan document, prepared by IT, Inc. for LANL and submitted to the NMEID in November 1986, should be discarded.
2. The original closure plan document dated November 1986, and prepared by IT, Inc., was distributed for internal LANL review before final submittal to NMEID. The final draft version of this document was not marked as a draft copy, and has remained at LANL as a work document. This unmarked draft document was inadvertently referenced in the Supplemental Report. Hence, the TA-16 surface impoundment was incorrectly reported to have "approximately 100,000 gallons" on page 5 of the old Supplemental Report. The correct volume for the TA-16 impoundment is 18,610 gallons, as originally stated in the final IT, Inc. document dated November 1986, and submitted to the NMEID. Modifications to the Supplemental Report are enclosed that rectify this oversight.
3. There was never any RCRA defined totally enclosed treatment unit installed in conjunction with the interim status closure plan at the TA-16 impoundment. A wastewater treatment unit, as defined in NMHWMR-5, Part I, Section 260.10, was installed because of NPDES discharge requirements under NPDES Permit Numbers NM0028355 and NM0028576 at NPDES Outfall Number 05A-055. Discharges from this outfall are subject to Section 402 and 307(b) of the Clean Water Act; furthermore, this wastewater treatment unit meets the definition of a wastewater

treatment tank. Thus this unit does not require a RCRA permit under NMHWMR-5, Part V, Section 264.1(g)(6), or under NMHWMR-5, Part VI, Section 265.1(c)(10). However a complete description of this wastewater treatment unit has been included in the revised closure plan document (IT, Inc., 1989) inclosed herein.

4. Responses to this NMEID comment are contained in the revised closure plan document (IT, Inc., 1989) inclosed herein.
5. No additional boreholes will be located and drilled at the TA-16 impoundment. No monitoring of the uppermost aquifer, located approximately 1,230 feet beneath the TA-16 impoundment, is anticipated. Supporting documentation for a ground-water monitoring waiver at the TA-16 surface impoundment, as required under NMHWMR-5, Part VI, Section 265.90(c), is on file at LANL's Environmental Surveillance Group (HSE-8) office. This demonstration is in writing, and has been certified by both a qualified geotechnical engineer and a qualified geologist.
6. Responses to this NMEID comment are contained in the revised closure plan document (IT, Inc., 1989) inclosed herein.
7. Responses to this NMEID comment are contained in the revised closure plan document (IT, Inc., 1989), inclosed herein; and in the modified Supplemental Report. Since the NMEID has already received the original Supplemental Report, only modifications to it have been enclosed herein.
8. Personnel in the WX-12 Group at LANL will sample the liner for potentially explosive residue. Personnel from HSE-8 will simultaneously sample the liner for hazardous wastes. Sampling procedures and contaminant indicator parameters are described in the revised closure plan (IT, Inc., 1989). If WX-12 determines that the liner is still contaminated with explosives, then WX-3 and HSE-8 will provide the NMEID with adequate documentation of all contamination, including analytical test data and a photographic record of field testing activities. The liner will then be removed for thermal treatment at TA-16 in accordance with NMHWMR-5, Part VI, Section 265.382.

If WX-3 certifies in writing that the liner is not contaminated with explosive residue, then the liner will be considered by LANL as equipment contaminated by hazardous wastes. If the HSE-8 analyses demonstrate that the liner was successfully decontaminated of all hazardous wastes before its removal from the impoundment, then it will be reclaimed for

subsequent utilization in other LANL activities, or will be disposed of as solid waste. If the HSE-8 analyses demonstrate that the liner is still contaminated with hazardous wastes, then it will be disposed of as a hazardous waste. In this later event, additional soil sampling will be conducted at those areas where the liner is presently stored, and appropriate actions will be taken (i.e., determination of the extent of potentially contaminated soils, soil removal, etc.). Detailed procedures that will be followed in the final liner disposition are contained in the revised closure plan document (IT, Inc., 1989).

9. No additional boreholes will be drilled in the bottom of the impoundment. However, additional soil sampling in the impoundment excavation is described in the revised closure plan (IT, Inc., 1989). Furthermore, soil sampling below the present liner storage location will also be conducted if it is determined that the liner is still contaminated with hazardous wastes. These sampling procedures and contaminant indicator parameters are fully described in the revised closure plan (IT, Inc., 1989). If contamination is identified below the former impoundment excavation, or in soils below the current liner storage location, then appropriate remedial actions will be taken. These LANL responses to contamination are described in the revised closure plan (IT, Inc., 1989).
10. Soil sample 87.0278 indicated a cadmium concentration of 0.18 mg/l below the impoundment bottom, with an analytical uncertainty of 0.02 mg/l (see pgs. 81 and 172, Supplemental Report). Of the five soil samples recovered from below the impoundment liner and two background samples recovered adjacent to the impoundment (see pgs. 81 and 165-180, Supplemental Report), only soil sample 87.0278 indicated cadmium above detection limits. These same analyses also indicated that all other EP toxicity metals were at or below detection limits for all seven soil samples. Both impoundment sludge sample 86.02598 and impoundment water sample 86.02597 indicated cadmium concentrations of less than 0.05 mg/l, with an analytical uncertainty of 0.05 mg/l (see pgs. 73 and 124, Supplemental Report). Furthermore, impoundment water samples numbered 87.02602 and 87.02603 (see pgs. 76 and 130, Supplemental Report) also indicated cadmium levels at or below detection limits. Except for barium and lead, these same samples also indicated that all other EP toxicity metals were at or below detection limits. Sludge sample 86.02598 had a lead concentration of 0.50 mg/l with a detection limit of 0.20 mg/l; barium was detected above 100 mg/l in multiple impoundment samples. These data clearly indicate that no cadmium contamination has occurred below the impoundment liner

because no cadmium above its detection limit was ever observed in either the impoundment sludge or fluid. This observation is further supported by elevated barium concentrations (i.e., greater than 100 mg/l) in impoundment fluids that were recorded on multiple occasions (see pgs. 73-77, Supplemental Report); however, no barium concentrations above detection limits were recorded in any of the five soil samples recovered below the impoundment liner (see pgs. 73 and 76, and pg. 81 and 176, Supplemental Report).

Two conclusions can be drawn from this information. First, it is unlikely that the contents of the impoundment could have contaminated sub-base soils with cadmium to concentration levels above recorded levels in the impoundment. This statement is supported by the number of cadmium-free samples taken from the wastes in the impoundment compared to the one sub-base soil sample showing 0.18 mg/l cadmium. Second, it is even more unlikely that cadmium would be released from the impoundment wastes and into the sub-base soils below the liner, and that barium was not. Barium and lead were the only metals characteristic of EP toxicity that were detected in the impoundment wastes. If a release had occurred, then barium would have been found with cadmium beneath the impoundment. In conclusion, this information indicates that no contaminated fluids ever leaked from the impoundment at TA-16, and that the 0.18 mg/l cadmium level in sample 87.0278 is naturally occurring.

This conclusion is further supported by historical studies (i.e., 1979-1982) conducted on Sigma Mesa near TA-3 at LANL which are unrelated to activities at the TA-16 impoundment. These studies clearly indicate that trace levels of cadmium are a common natural constituent of various soil types in Los Alamos County. These data are currently being prepared for a LANL publication; however, these data have been included with the modifications to the Supplemental Report (i.e., added as Appendix F). Analyses of these data indicate that the mean background cadmium level in 36 soil samples is about 0.170 mg/l, with a 95% confidence interval of 0.138 to 0.201 mg/l (see pgs. 3-4, Supplemental Report). Clearly the recorded cadmium concentration level of 0.18 mg/l in sample 87.0278 falls between these confidence limits, and is indicative of background levels.

11. All metals characteristic of EP toxicity were tested on multiple occasions and with multiple samples; these results are contained in the Supplemental Report (see Appendices C and E). Samples were collected from impoundment sludges and fluids, soils from below the impoundment liner, and soils

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below the NPDES outfall. As a convenience to the reader, the tables contained in Appendix C have been modified to reference actual sample numbers. The analytical results corresponding to these sample numbers are contained in Appendix E.

12. See comment (11) above.

END OF LANL COMMENTS TO NMEID LETTER DATED JANUARY 5, 1989