Department of Energy
Carlsbad Area Office
P. O. Box 3090
Carlsbad, New Mexico 88221

FEB 14 1996

State to please put memo in funds

ENTERED

RECEIVED
FEB 15 1996

in WIPP Library

Mr. Benito Garcia
New Mexico Environmental Department
Hazardous & Radioactive Materials Bureau
P.O. Box 26110
Santa Fe, NM 87502

Dear Mr. Garcia:

Enclosed please find two copies of Data Summary Report No. 1 for Solid Waste Management Units (SWMUs) at the Waste Isolation Pilot Plant (WIPP). This report describes the results of voluntary release assessment sampling at SWMUS 001j, 001m, and 001t described in the Voluntary Release Assessment/Corrective Action Work Plan (DOE/WIPP draft 2115) submitted to the NMED and the EPA on August 1, 1995. The voluntary release assessment program was developed to provide the additional data needed to evaluate potential releases from SWMUs at the WIPP, and describe possible corrective actions at these sites. Data generated as part of this sampling program are intended to update the RCRA Facility Assessment (RFA) for the WIPP (Assessment of Solid Waste Management Units at the Waste Isolation Pilot Plant), NMED/DOE/AIP 94/1.

This summary report is the first of three reports to be submitted to the NMED Hazardous and Radioactive Materials Bureau and the EPA Region VI. The second summary report is scheduled for submittal during the last week of February, 1996. The third report will be issued on, or before March 15, 1996. This schedule is designed to provide all voluntary assessment data to the agencies prior to the issuance of the Part B permit for public review and comment.

We look forward to meeting with you, your staff, and personnel from the EPA Hazardous Waste Management Division to discuss the results of the voluntary release assessment program and the DOE's proposed corrective actions. If you have any questions regarding this Data Summary Report, or if you require any additional information, please contact Mr. Craig Snider at (505) 234-7452, or Mr. D. C. Robertson at (505) 234-8240.

Sincerely,

E K Hunter

E. Kent Hunter, Assistant Manager
Office of National TRU Waste Operations

Enclosures

Printed on recycled paper

960216

cc w/o enclosures:
C. Snider, CAO
D. Hurtt, CAO
S. Zappe, NMED

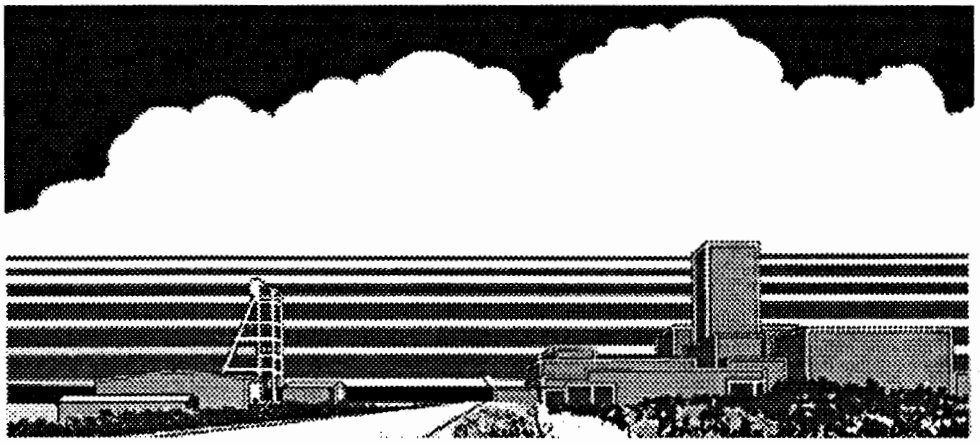
cc w/enclosure:
C & C File

WIPP Library

Data Summary Report No. 1 for Solid Waste Management Units

001j, 001m, and 001t

At the Waste Isolation Pilot Plant



Supplement to DOE/WIPP Draft - 2115

2/96

RECEIVED
FEB 15 1996

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Scope of the Release Assessment Data Summary Report 1
1.2 Rationale for the Selection of Target Analytes at SWMU Mudpits 001j, 001m, and 001t 5
1.3 Geology and Hydrogeology in the Vicinity of the WIPP 8
1.3.1 Surface Formations 8
1.3.2 The Dewey Lake Red Beds 9
1.4 Sample Quality Assurance 9
1.4.1 Data Quality Assurance and Data Validation 10
1.5 Calculation of Action Levels Required to Evaluate Analytical Results . . . 10
1.6 EPA Region III Risk Based Concentration Tables 11
1.6.1 Brief Summary of Guidance on the Content, Use, and Limitations of the Region III Risk Based Concentration Table 11
1.7 Applicability of Assumptions Contained in Appendix D and the EPA Region III RBC Tables 13

2.0 RESULTS OF RELEASE ASSESSMENT SAMPLING AT SWMU 001J . . . 14

2.1 Location of SWMU 001j 14
2.2 Geology and Hydrogeology in the Area of SWMU 001j 14
2.3 Sampling Protocols 15
2.4 Data Quality Assurance 18
2.5 Independent Data Validation 18
2.6 Comparison of Analytical Results and EPA Action Levels at SWMU 001j 18
2.7 Evaluation of Selected Analytical Results Using Risk Based Concentrations 22
2.8 Proposed Corrective Actions at SWMU 001j 23

3.0 RESULTS OF RELEASE ASSESSMENT SAMPLING AT SWMU 001M . . 24

3.1 Location of SWMU 001m 24
3.2 Geology and Hydrogeology in the Area of SWMU 001m 24
3.3 Sampling Protocols 25
3.4 Data Quality Assurance 27
3.5 Independent Data Validation 27
3.6 Comparison of Analytical Results and EPA Action Levels at SWMU 001m 29
3.7 Evaluation of Selected Analytical Results Using Risk Based Concentrations 32
3.8 Proposed Corrective Actions at SWMU 001m 33

4.0 RESULTS OF RELEASE ASSESSMENT SAMPLING AT SWMU 001T . . . 34

4.1 Location of SWMU 001t 34
4.2 Geology and Hydrogeology in the Area of SWMU 001t 34
4.3 Sampling Protocols 36
4.4 Data Quality Assurance 39
4.5 Independent Data Validation 39
4.6 Comparison of Analytical Results and EPA Action Levels at SWMU 001t 39
4.7 Evaluation of Selected Analytical Results Using Risk Based Concentrations 42
4.8 Proposed Corrective Actions at SWMU 001t 43

LIST OF TABLES

Table 1 List of Target Analytes Used in Release Assessment Sampling at SWMUs 001j, 001m, and 001t 7

Table 2 Summary of the Number, Type, and Sampling Interval for Samples Collected at SWMU 001j (P-3 Mud Pit) 16

Table 3 Soil TCLP Analytical Results for Voluntary Release Assessment Sampling at SWMU 001J (Mudpit P-3) 20

Table 3 (cont.) Soil TCLP Analytical Results for Voluntary Release Assessment Sampling at SWMU 001j (Mudpit P-3) 21

Table 4 Summary of the Number, Type, and Sampling Interval for Samples Collected at SWMU 001m (Drill Pad P-6) 26

Table 5 Soil TCLP Analytical Results for Voluntary Release Assessment Sampling at SWMU 001m (Mudpit P-6) 30

Table 5 (cont.) Soil TCLP Analytical Results for Voluntary Release Assessment Sampling at SWMU 001m (Mudpit P-6) 31

Table 6 Summary of the Number, Type, and Sampling Interval for Samples Collected at SWMU 001t (Drill Pad (IMC -374) 37

Table 7 Soil TCLP Analytical Results for Voluntary Release Assessment Sampling at SWMU 001t (Mudpit IMC-374) 40

Table 7 (cont.) Soil TCLP Analytical Results for Voluntary Release Assessment Sampling at SWMU 001t (Mudpit IMC-374) 41

LIST OF FIGURES

Figure 1 Location of SWMUs Identified in the WIPP Release Assessment/ Corrective Action Plan 3

Figure 2 Sample Location Map for SWMU 001j (P-3) 17

Figure 3 Sample Location Map for SWMU 001m (P-6) 28

Figure 4 Sample Location Map for SWMU 001t (IMC-374) 38

LIST OF APPENDICES

Appendix 1 EPA Region III Risk-Based Concentration Table for the Period July 1995 - December 1995

Appendix 2 Results of Voluntary Release Assessment Samples Collected at SWMU 001j

Appendix 3 Results of Voluntary Release Assessment Samples Collected at SWMU 001m

Appendix 4 Results of Voluntary Release Assessment Samples Collected at SWMU 001t

EXECUTIVE SUMMARY

The U.S. Department of Energy, Carlsbad Area Office (DOE-CAO) has completed a voluntary release assessment sampling program at selected Solid Waste Management Units (SWMUs) at the Waste Isolation Pilot Plant (WIPP). This release assessment data summary report is the first of three reports to be submitted to the EPA Region VI, Hazardous Waste Management Division and the NMED Hazardous and Radioactive Materials Bureau to describe the results of voluntary release assessment sampling and identify proposed corrective actions.

The voluntary release assessment/corrective action program is intended to be the first phase in implementing the RCRA Facility Investigation (RFI) corrective action process at the WIPP. Data generated as part of this sampling program are intended to update the RCRA Facility Assessment (RFA) for the WIPP (*Assessment of Solid Waste Management Units at the Waste Isolation Pilot Plant), NMED/DOE/AIP 94/1*. This Release Assessment Data Summary Report documents the results of release assessment sampling at SWMU 001j, 001m, and 001t. These results are provided to document voluntary release assessment/ corrective action commitments contained in the *Voluntary Release Assessment/Corrective Action Work Plan (DOE/WIPP Draft 2115)* submitted to the EPA and NMED in July, 1995.

A total of 76 release assessment samples were collected to determine if a release had occurred from any of the three previously referenced SWMUs. Based on the criteria provided in proposed *40 CFR § 264.514 FR Vol. 55, No. 145, VI(D), p. 30813*, and the October 1995, *EPA Region III Risk-Based Concentration Table, July - December 1995*. EPA Region III Office of RCRA Technical & Program Support Branch (3HW70), the analytical data collected at SWMUs 001j, 001m, and 001t demonstrates that no release of hazardous constituents has occurred. Thus, there is no potential for impacts to human health or the environment.

Based on the results of voluntary release assessment sampling the DOE-CAO formally requests that a determination of No Further Action be granted for SWMUs 001j, 001m, and 001t. Because it is the EPA's intent to encourage voluntary corrective actions as described in the preamble of the Proposed Subpart S Rule, the DOE requests that after appropriate public review and agency approval, a No Further Action determination be granted for the three SWMUs described in this Data Summary Report prior to the issuance of the RCRA Part B Permit for the WIPP. Any delay in the issuance of No Further Action determination may require the DOE to submit a Class III permit modification to remove this SWMU from the list of sites requiring evaluation under the RFI process. This type of permit modification represents an unreasonable expense to remove sites with no potential to impact human health or the environment. If this determination is supported by both the EPA and NMED, these sites will be replanted with native vegetation, in accordance with the *WIPP Land Management Plan (DOE WIPP 93-004)* guidelines.

DATA SUMMARY REPORT FOR SOLID WASTE MANAGEMENT UNITS 001J, 001 M, AND 001T

1.0 INTRODUCTION

The U.S. Department of Energy, Carlsbad Area Office (DOE-CAO) has completed a voluntary Release Assessment sampling program at selected Solid Waste Management Units (SWMUs) at the Waste Isolation Pilot Plant (WIPP). The DOE-CAO, is the Owner and Operator of the WIPP. Westinghouse Electric Corporation, Waste Isolation Division (WID) is the Co-Operator at the site. For the purpose of clarity, any reference to the DOE throughout this release assessment data summary report implies both the DOE-CAO and Westinghouse-WID.

The voluntary release assessment/corrective action program is intended to be the first phase in implementing the RCRA Facility Investigation (RFI) corrective action process at the WIPP. Data generated as part of this sampling program are intended to update the RCRA Facility Assessment (RFA) for the WIPP (*Assessment of Solid Waste Management Units at the Waste Isolation Pilot Plant), NMED/DOE/AIP 94/1*. This Release Assessment Data Summary Report is the first of three reports that will be submitted to the Environmental Protection Agency (EPA) Region VI, Hazardous Waste Management Division and the New Mexico Environment Department (NMED) Hazardous and Radioactive Materials Bureau to describe the results of release assessment sampling and identify proposed corrective actions. Throughout the balance of this release assessment data summary report, the acronym EPA will be used for any further reference to the EPA Region VI Hazardous Waste Management Division, and the acronym NMED will be to reference the NMED Hazardous and Radioactive Materials Bureau.

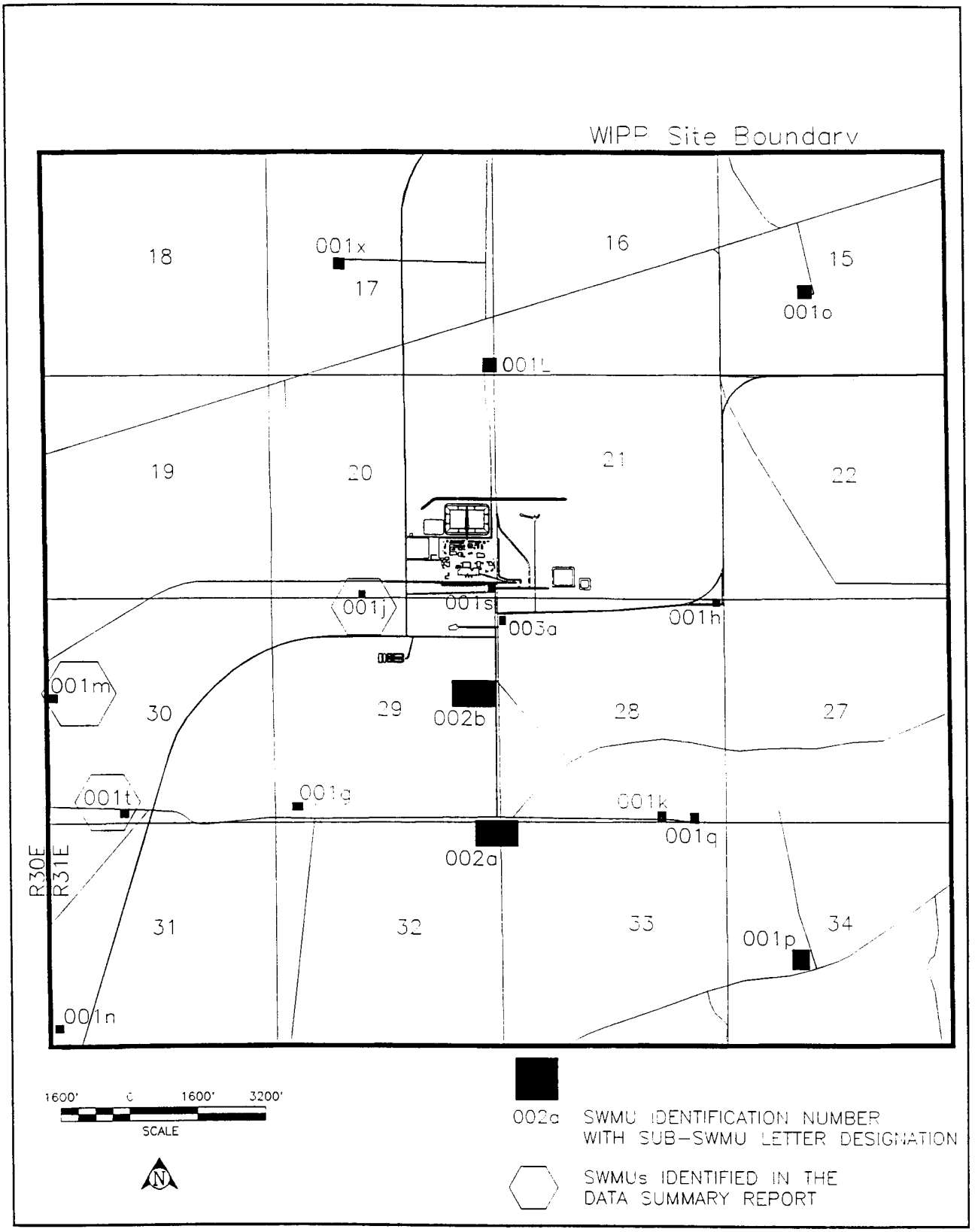
1.1 Scope of the Release Assessment Data Summary Report

This release assessment data summary report documents the results of release assessment sampling at SWMU 001j (mudpit P-3), SWMU 001m (mudpit P-6), and SWMU 001t (mudpit IMC-374). To reduce repetition, information regarding sampling requirements, regional geology, and data quality assurance which are is shared by all three SWMUs are provided in the introduction section of this report. Release Assessment data as well as historical data are being used to evaluate and develop appropriate voluntary corrective actions required for each SWMU. The results of facility investigations and other analyses will be used to focus on plausible concerns and expedite cleanup decisions as defined in the preamble of the Proposed Subpart S Rule, *Federal Register, Vol. 55, No. 145; July 27, 1990; 308033.*

The *Voluntary Release Assessment/Corrective Action Work Plan (DOE/WIPP Draft 2115)*, is the document developed by the DOE to describe the voluntary release assessment sampling protocols and proposed corrective actions at the 16 SWMUs identified in Chapter J of the draft RCRA Part B Permit Application. The relative location of the 16 SWMUs at the WIPP

is provided in Figure 1. In the July 1995, *Release Assessment/Corrective Action Work Plan*, the DOE committed to completing release assessment sampling at 11 SWMUs, initiating corrective actions at 3 SWMUs, and requesting a formal determination of no further action at the 2 remaining SWMUs.

Figure 1
Location of SWMUs Identified in WIPP Release Assessment/Corrective Action Plan



Voluntary Release Assessment Sampling has been completed at the following SWMUs:

SWMU 001g (H-14/P-1 Drill Pad)
SWMU 001h (H-15/P-2 Drill Pad)
SWMU 001j (P-3 mud pit)
SWMU 001k (P-4 Drill Pad)
SWMU 001L (WIPP-12/P-5 Drill Pad)
SWMU 001m (P-6 Drill Pad)
SWMU 001n (P-15 Drill Pad)
SWMU 001s (ERDA 9 Drill Pad)
SWMU 001t (IMC 374 Drill Pad)
SWMU 001x (WIPP-13 Drill Pad)
SWMU 003a (Portacamp Storage Area) (formerly 004a)

Voluntary Corrective Actions have been proposed at the following SWMUs:

SWMU 001o (Badger Unit Drill Pad)
SWMU 001p (Cotton Baby Drill Pad)
SWMU 001q (DOE -1 Drill Pad)

A request for a formal determination for "No Further Action" has been submitted for the followings SWMUs:

SWMU 002a (Brinderson Landfill) (formerly 003a)
SWMU 002b (Construction Landfill) (formerly 003b)

Meetings were held with EPA and NMED personnel in February, August, and September 1995, to review the proposed Release Assessment/Corrective Action Work Plan, and obtain approval of sampling protocols. Data quality objectives for the release assessment sampling program were reviewed and verbally approved by both EPA and NMED personnel prior to completing SWMU sampling. The EPA subsequently provided written approval of all sampling protocols in a December 19, 1995 letter that contained formal review and comment of the July 1995, *Release Assessment/Corrective Action Work Plan.*

A detail description of sampling methods and quality assurance protocols used to complete assessment sampling are described in the work plan. Sampling team personnel utilized the sampling and analytical protocols that are described in the *WIPP Site Effluent and Hazardous Materials Sampling Plan*, WP02-EM2, Rev.0. WP02-EM2 was developed to meet the sampling and analytical protocols defined in *Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, SW-846.*

Release assessment sample and data quality assurance requirements are defined in the *Quality Assurance Project Plan for WIPP Site Effluent and Hazardous Materials Sampling*, WP02-EM1, Rev.0. Agency and DOE personnel discussed the implementation of Data Quality Objectives, including data quality evaluation, and release assessment plan modifications. Potential corrective actions were discussed, in accordance with the *Guidance for the Data Quality Objectives Process, EPA QA/G-4*, September, 1994.

Guidance for establishing sample locations at each SWMU is contained in the *RCRA Facility Investigation (RFI) Guidance, Development of an RFI Work Plan and General Considerations for RCRA Facility Investigations (Vol. 1)*, EPA 530/SW-89-031, May 1989. The DOE utilized a Judgmental Sampling method to characterize each SWMU. The methodology was selected because site layout or unit characteristics, such as mudpit locations, indicated where potential contamination exists. As part of the assessment sampling program review meetings, EPA, NMED, and DOE staff evaluated proposed sampling locations and approved the DOE's proposal to limit the first round of RFI release assessment samples to soils media. This determination was based on discussions in the RFA which state that soil is the only media that has the potential to be impacted by releases at individual SWMUs.

1.2 Rationale for the Selection of Target Analytes at SWMU Mudpits 001j, 001m, and 001t

Material Safety Data Sheets (MSDS) have been reviewed to determine potential drilling additives and other products that may have been used to drill the boreholes at each of these three SWMUs. It was assumed that these constituents were subsequently discharged into the mudpits at SWMU 001j, SWMU 001m, and SWMU 001t. Information contained in the RFA, as well as drill logs and geologic reports, were also used to establish the following list of potential wastes streams:

1. attapulgite drill gel (salt bentonite gel)
2. bentonite gel
3. diesel fuel
4. gear grease/gear lubricants
5. hydraulic fluids
6. hydrochloric acid (20% solution)
7. lignite
8. meta-trifluorobenzoic acid
9. metal cuttings
10. motor oil
11. portland cement
12. sodium and potassium chloride saturated brine
13. starch
14. soda ash
15. sodium hydroxide (NaOH)

Based on the review of MSDS for each of these potential waste streams, the DOE developed and the agencies approved, a list of target analytes for all mudpits evaluated in the original release assessment work plan. Because drilling additives, such as drill mud, gear lubricants, and diesel fuel, have a limited potential to generate hazardous constituents, the list of target analytes has been limited. A list of target analytes used in release assessment sampling at SWMUs 001j, 001m, and 001t is provided in Table 1.

TABLE 1
LIST OF TARGET ANALYTES USED IN RELEASE ASSESSMENT SAMPLING AT SWMUS 001J, 001M, AND 001T

PARAMETER	EPA ANALYTICAL METHOD (or equivalent)
Inorganic Analytes	
Arsenic	6010
Barium	6010
Cadmium	6010
Chromium	6010
Lead	6010
Mercury	7470/7471
Thallium	6010
Organic Analytes	
Benzene	8240/8260
Chloroform	8240/8260
1,2 Dichloroethane	8240/8260
Ethylbenzene	8240/8260
Toluene	8240/8260
1,1,1-Trichloroethane	8240/8260
Vinyl Chloride	8240/8260
Xylenes	8240/8260

1.3 Geology and Hydrogeology in the Vicinity of the WIPP

The geology at the WIPP is characterized by four primary stratigraphic units or regions. The first region includes a near-surface region of Holocene surface deposits, the Mescalero Caliche Formation, and the Gatuna and Dockum Formations. The second region is the Dewey Lake Red Beds. The third region is the Rustler Formation, which is made up of five individual stratigraphic formations. The fourth region is the uppermost part of the Salado Formation.

Because the uppermost strata are the only zones likely to be influenced by any potential release from SWMUs at the WIPP, a brief description of the regional geology and individual surface strata are the only formations discussed in this data summary report. The determination to examine only the near-surface geology at each SWMU site is based on information contained in Section 4.0 of the WIPP RFA. In Section 4.0 of the RFA the NMED described the potential for a release to groundwater sources in the vicinity of SWMUs 001j, 001m, and 001t as low-to-moderately-low, based on the depth to groundwater and the relative low permeability of the Dewey Lake Formation, the shallowest potential water bearing zone at each of these SWMU sites. A detailed description of the geology and hydrogeology at the WIPP is contained in Chapter D of the *WIPP RCRA Part B Permit Application*, Chapter 2 of the WIPP *Project Technical Baseline* Document, and Section 3.3 of the *WIPP RFA*.

1.3.1 Surface Formations

The uppermost stratigraphic formations are made up of Quaternary and Triassic-age surface and near-surface strata. These formations consists of Holocene surface deposits, the Mescalero Caliche Formation, and the Gatuna and Dockum group of formations. The uppermost formation consists of fine-to-medium-grained Eolian sands of the Holocene Age that are typically 10-14 feet thick. Soil development is poor, and the overall permeability in this unit is high.

The Mescalero Caliche underlies surface dune sands. Sands and gravels in the Mescalero Caliche are characteristically well cemented with a chalky-to-finely crystalline matrix of calcium carbonate. The caliche is invoked as a continuous, impermeable barrier over much of the site, however, the Mescalero Caliche may be locally thin or absent. The Gatuna formation occurs as a discontinuous deposit of friable, poorly sorted, pale, reddish brown silty sandstone, with localized mudstone and gravelly beds. The rock generally occurs as the most shallow formation on the western side of the WIPP site, where the thickness and distribution of the formation is variable and erratic. Representative thicknesses at the site range from 10-32 feet. Measurements of hydraulic conductivity in the Gatuna Formation encountered in foundation boreholes at the WIPP facility generally range from 7.8×10^{-6} m/s. to 1.0×10^{-8} m/s.

Triassic aged Santa Rosa Formation overlays the Dewey Lake Beds over the eastern half of the WIPP site. *Mercer (1983)* describes the formation as "a sequence of well-indurated, cemented, fine-to-coarse grain sandstone with interbeds of siltstone and mudstone." The formation ranges in thickness over 200 feet to the northeast to less than 50 feet near the area of the WIPP repository. West of the repository itself, the Dockum Formation is essentially absent, and the Gatuna Formation lies directly over the Dewey Lake Formation.

1.3.2 The Dewey Lake Red Beds

Section 2.1.3.6 of the *WIPP Project Technical Baseline* identifies three main sources of geologic information on the Dewey Lake Red Bed Formation in the vicinity of the WIPP. *Miller (1955, 1966)* studied the petrology of the unit. *Schiel (1988, 1994)* evaluated outcrops in the vicinity of the site and interpreted geophysical logs of the unit in southeastern New Mexico and west Texas. *Holt and Powers (1990)* described in detail the Dewey Lake Red Bed Formation at the WIPP Air Intake Shaft.

The Dewey Lake Red Beds are characterized as a deltaic sequence of alternating, thinly bedded siltstone and mudstone with lenticular interbeds of fine-to-coarse-grained sandstone. The formation dips gently to the east and thins to the west, where it is also found at relatively shallow depths. The Dewey Lake Red Beds occur at a depth of 20 to 40 feet at the south end of the site. This general trend continues south of the WIPP site boundary. Data indicate that the Dewey Lake is found at moderate depths (70 to 100 feet) along the central axis of the site and occurs between 130 to 220 feet along the eastern site boundary.

Mercer, (1983) and D'Appolonia (1982b) contend that groundwater occurs perched or semi-perched in lenticular sands in the upper Dewey Lake, and suggests that surface recharge may occur where local geologic conditions permit.

The Dewey Lake Red Bed Formation yields water in sufficient volume and quality for domestic and stock wells along the southern WIPP boundary. These wells may produce from perched aquifers *(Mercer, 1983, Lappin et al., 1989)*, or they may produce from transmissive zones in a continuously saturated zone that is elsewhere unproductive due to low transmissivities. On the southeastern boundary of the site, Barn Well is used for domestic purposes and Ranch Well is used for livestock watering. Wells in this area are adjacent to an extensive, thick, active area of dunes, which could be the recharge area for these water bearing sand dunes units. These wells are completed at 94 feet and 212 feet, respectively. Packer-permeability tests indicate that hydraulic conductivities range from 2.5×10^{-6} m/s to 1.0×10^{-8} m/s. Presumably, water bearing zones would have higher values.

1.4 Sample Quality Assurance

Field quality control samples such as duplicate samples, field blanks, and equipment rinsate samples were collected by the sampling team and documented in the sampling logbook. All samples were collected and managed in accordance with Section 3.3.1 of the *Quality*

Assurance Project Plan for WIPP Site Effluent and Hazardous Materials Sampling (WP02-EM1), and Section 3.3 of the *WIPP Site Effluent and Hazardous Materials Sampling Plan (WP02-EM2).*

Deionized water was used for the field and equipment rinsate blanks samples because deionized water provides excellent sensitivity to contamination. Equipment rinsate samples were collected for each type of sample (organic soil, and inorganic soil). Equipment rinsate blanks were collected to verify the effectiveness of field equipment decontamination. The equipment blanks are collected, using deionized water transported to the sampling site. At the sampling location, deionized water is poured over or through the sample collection device, collected, and returned for analysis.

1.4.1 Data Quality Assurance and Data Validation

All sample analyses were completed in accordance SW-846 or equivalent analytical protocols. Halliburton NUS Laboratories is the contract laboratory used to analyze all Release Assessment Samples. Sample analytical methods and Quality Assurance/Quality Control requirements have been completed in accordance with the *Halliburton NUS Laboratories General Quality Assurance Plan*, March 10, 1995. The Halliburton QA plan defines all equipment calibration, sample handling, sample analyses, matrix blank, and method blank analyses required to meet SW-846 QA/QC requirements.

An independent data quality review was completed by Harding Lawson & Associates (HLA) Engineering and Environmental Services. HLA developed a procedure to complete QA/QC data package reviews in accordance with the data quality requirements described in SW-846 and the *Halliburton NUS General Quality Assurance Plan.*

1.5 Calculation of Action Levels Required to Evaluate Analytical Results

Appendix D of proposed 40 CFR § 264.521(d), FR Vol. 55, No. 145, VI(D), p. 30870, establishes criteria for selecting and calculating action levels for soils. Action level concentrations in Appendix D assume a chronic exposure through consumption of soil media contaminated with hazardous constituents. Criteria for establishing soil action levels can also be found in proposed *40 CFR § 264.521(d), Appendix A*. The tables contained in Appendix A provide "Examples of Concentrations Meeting Criteria for Action Levels for Air, Water, and Soil Media." To complete Appendix D soil action level calculations, the DOE multiplied all TCLP concentrations by 20 (total concentration level in mg/kg.) to obtain the intake assumption used in the Appendix D formula to compute the actual action level.

No action levels are established in Appendices A, D, or F for Barium, Benzene, Thallium or Vinyl Chloride tested at SWMUs 001j, 001m, and 001t. For these four analytes, only barium was detected above the method detection limit. It is important to note that constituent concentrations for these analytes collected inside the SWMU mudpit areas are identical to concentrations for both up-and-down gradient background samples.

1.6 EPA Region III Risk Based Concentration Tables

As part of the assessment of the constituent action levels, the DOE evaluated action level criteria developed by the EPA Region III office of Technical and Program Support. The DOE requests that the *EPA Region III Risk Based Concentration (RBC) Table* be used in the evaluation of release assessment data when an action level has not been established in Appendices A, D, or F. As part of the evaluation of analytical data collected at SWMUs 001j, 001m, and 001t, the DOE used the RBC action levels for the constituents that do not have calculated action levels in Appendix D of the Subpart S rule. When using the RBC tables the DOE used the risk-based concentrations for soil ingestion from an industrial land use. This criteria appeared to most closely match the parameters established in Appendix D. The Soil Screening Levels for transfers to groundwater are not appropriate because geologic data demonstrates that any potential release of hazardous constituents to groundwater from any of the SWMUs described in this data summary report is extremely remote.

1.6.1 Brief Summary of Guidance on the Content, Use, and Limitations of the Region III Risk Based Concentration Table

Toxicologists working with the EPA Region III Technical and Program Support Branch developed the RBC table to screen sites not yet on the National Priority List (NPL), respond rapidly to citizen inquires, and spot-check formal baseline risk assessments. Region III distributes this table and associated guidance to all interested parties on a semiannual basis. The Risk-Based table used in this assessment is the table published for the period July - December. A complete copy of the July - December 1995, Risk-Based Table and associated guidance information is contained in Appendix 1.

The EPA Region III Technical and Program Support Branch developed guidance and limitations on the use of the RBC table. Important sections of this guidance have been transcribed here to define the scope and limitations of the RBC table. Background materials provide the complete basis for all the calculations, with the intent of showing users exactly how the RBCs were developed.

The table contains reference doses and carcinogenic potency slopes obtained from the Integrated Risk Information System (IRIS) through September 1, 1995, the Health Effect Assessment Summary Table (HEAST) through May 1995, the EPA National Center for Environmental Assessment (NCEA) Superfund Health Risk constants have been combined with "standard" exposure scenarios to calculate RBCs. The RBCs are chemical concentrations corresponding to fixed levels of risk (i.e., a hazard quotient of 1, or lifetime cancer risk of 10^{-6}, whichever occurs to a lower concentration) in water, air, fish tissue, and soil.

The RBC table also includes soil screening levels (SSLs) for protection of groundwater and air. Most SSLs were obtained directly from the EPA Office of Solid Waste and Emergency Response (OSWER) proposed SSL guidance document, to which we have added some

additional SSLs based on the same methodology. Sources of SSLs are noted in the table. SSLs incorporate the same exposure assumptions as RBCs, plus additional assumptions needed of intermedia extrapolation. SSLs are therefore distinct from RBCs and should be used only in the framework proposed in the OSWER document.

Guidance provided by Region III also states that the RBCs have several important limitations. Specifically excluded from consideration are (1) transfers from soil to air and groundwater, and (2) cumulative risk from multiple contaminants or media. Additionally, the guidance documentation also states that the toxicity information contained in the table have been assembled by hand, and despite extensive checking and years of use, may contain errors. Thus, agency personnel advise that users cross-check all information before relying on any referenced doses (RfDs) or carcinogenic potency slopes (CPSs) in the table.

Region III guidance documentation states that many users want to know if the risk-based concentrations can be used as valid no-action levels or cleanup levels, especially for soils. The answer is a bit complex. First, it is important to realize that the RBC table does not constitute regulation, and should not be viewed as a substitute for a site-specific risk assessment. For sites where:

1. A single medium is contaminated

2. A single contaminant contributes nearly all of the health risk

3. Volatilization or leaching of that contaminant from soil is expected not to be significant

4. The exposure scenarios used in the RBC table are appropriate for the site

5. The fixed risk levels used in the RBC table are appropriate for the site

6. Risk to ecological receptors is expected not to be significant

The risk-based concentrations would probably be protective as no-action levels or cleanup goals. However, to the extent that a site deviates from this description, as most do, the RBCs would not necessarily be appropriate. Although the three SWMU sites described in this work plan may not specifically meet the six criteria described above, the results of release assessment sampling indicate no potential impact to human health and the environment exists. Thus, the values contained in the RBC table may be appropriate to use as guidance for making a No Further Action determination.

1.7 Applicability of Assumptions Contained in Appendix D and the EPA Region III RBC Tables

Several assumptions contained in Appendix D for evaluating action levels are not applicable to the soils contained in the three SWMUs describe in this summary report. First, Appendix D assumes that shallow soils in the vicinity of a SWMU site will ultimately be used for residential use. Second, this model also assumes that soils will be ingested over a long period of time creating a long term or chronic health risk. All of the SWMUs at the WIPP are located within the WIPP Land Withdrawal Area. Congress withdrew these areas from all types of land use except TRU waste management and historical land uses such as hunting and livestock grazing. The WIPP land withdrawal effectively precludes residential land for posterity and eliminates a direct ingestion pathway. Ingestion due to the human consumption of livestock or game animals will be precluded by the implementation of reclamation activities that will cover all SWMU sites with top soil and replant the site with native vegetation. And third, analytical data demonstrates that soil contamination at these SWMU sites are below 40 CFR § 264.521(d), Appendix D or Region III RBC concentrations and do not represent a potential threat to groundwater sources.

2.0 RESULTS OF RELEASE ASSESSMENT SAMPLING AT SWMU 001J

2.1 Location of SWMU 001j

This section of the release assessment data summary report documents the results of release assessment sampling at SWMU 001j, and describes the proposed corrective actions at this location. SWMU 001j is located in the SE 1/4 of the SE 1/4 of the SW 1/4 of Section 20, Township 22 South, Range 31 East. Pennsylvania Drilling Company drilled the P-3 borehole in August 1976 as part of a 21-well U.S. Geologic Survey (USGS) resource evaluation program to investigate the potash resources in the Salado Formation. The mudpit constructed for the drilling of the P-3 potash exploration well is SWMU 001j. Drilling fluids used at the P-3 site include saturated sodium and potassium chloride brine, starch, and salt gel (attapulgite).

2.2 Geology and Hydrogeology in the Area of SWMU 001j

The USGS lithology logs identify the near-surface deposits at the SWMU 001j as shallow fine-to-medium-grained Eolian sands that overlay Mescalero Caliche, and Gatuna Formations. Underlying the Gatuna Formation is the Dewey Lake Redbed Formation.

The sampling team logbook describes the surface sands as reddish medium-to-fine grained sands intermixed with white calcite or caliche pebbles and vegetative debris. No continuous caliche layer was identified during the sampling visit. The RFA describes soil development at this location as poor, and the release potential for soils in the immediate vicinity of SWMU 001j as high. Although the release potential at this location is high, analytical data from samples collected at SWMU 001j indicate that constituent concentrations at this site are equal to the background concentrations in the area, and all sample analyses except Barium are below method detection limits. Barium concentrations are significantly below RBC table action level concentrations.

Although no continuous caliche layer was observed during the sampling visit, the *U.S. Geological Survey (USGS)* P-3 lithology logs indicate that caliche was encountered from depth of 5 to 10 feet. The Mescalero Caliche is characteristically well cemented with a chalky-to-finely crystalline matrix of calcium carbonate. Based on surface excavations in the vicinity of the P-3 mudpit area, it is assumed that the Mescalero Caliche is invoked as a continuous, impermeable barrier at this site.

The RFA goes on to describe the groundwater migration potential at this site as relatively low. The shallowest potential water bearing formation beneath the P-3 mudpit area is the Dewey Lake Redbed formation. The upper extent of Dewey Lake formation at the P-3 boreholes is 41 feet below surface. The Dewey Lake formation is 417 feet thick in the P-3 borehole. The Dewey Lake Red Beds in this region are characterized as a deltaic sequence

of alternating, thinly bedded siltstone and mudstone with lenticular interbeds of fine-to coarse-grained sandstone *(Mercer, 1983; D'Appolonia 1982b)*. *Mercer (1983)* contends that groundwater occurs perched or semi-perched in lenticular sands in the upper Dewey Lake.

Drilling logs indicate that no groundwater or formation moisture was noted in the Dewey Lake Red Beds, however, there is no confirmation that air foam circulation was used on this borehole. Drilling logs from H-1 and H-2 boreholes, which were air drilled, identified minor zones of moisture at approximately 185 feet; however, short-term tests to determine fluid yield indicated negligible flow (*TME 3059, 1980*). Lithology logs from the boring of the WIPP Air Intake Shaft document that cuttings from the AIS were moist. Localized surface recharge is also supported by observations during detailed geologic logging of the AIS shaft (*Holt and Powers, 1990; DOE/WIPP 90-051*). Recent meteoric rainwater is offered as one explanation for the occurrence of moisture and wet units described down to 165 feet below the surface in the AIS. The H-1, H-2, and AIS shaft are all located within 1500 feet of the P-3 borehole. The WIPP RFA also documents that subsurface logs indicate that the top of the Dewey Lake Red Beds at the SWMU 001j location is relatively impermeable.

Once drilling of the P-3 borehole was completed, the hole was plugged to surface. During the trip out of the hole, the casing stuck and 336 feet of 4 1/2 inch casing was left in the hole. Casing was left in the hole from a depth of 490 feet to 826 feet. The hole was plugged back to the surface using 500 gallons of mud flush in advance of 210 sacks of 50 percent Pozmix "A" and 50 percent Class "C" cement, 2 percent gel and 19.4 pounds per sack salt. One joint of 3 1/2 inch O.D. casing was set into the soft cement and cut off 1 foot above the ground level to mark the hole. This method of plugging effectively sealed the borehole and eliminated any potential migration of surface constituents to the Culebra Dolomite water bearing zones 640 feet below the surface.

2.3 Sampling Protocols

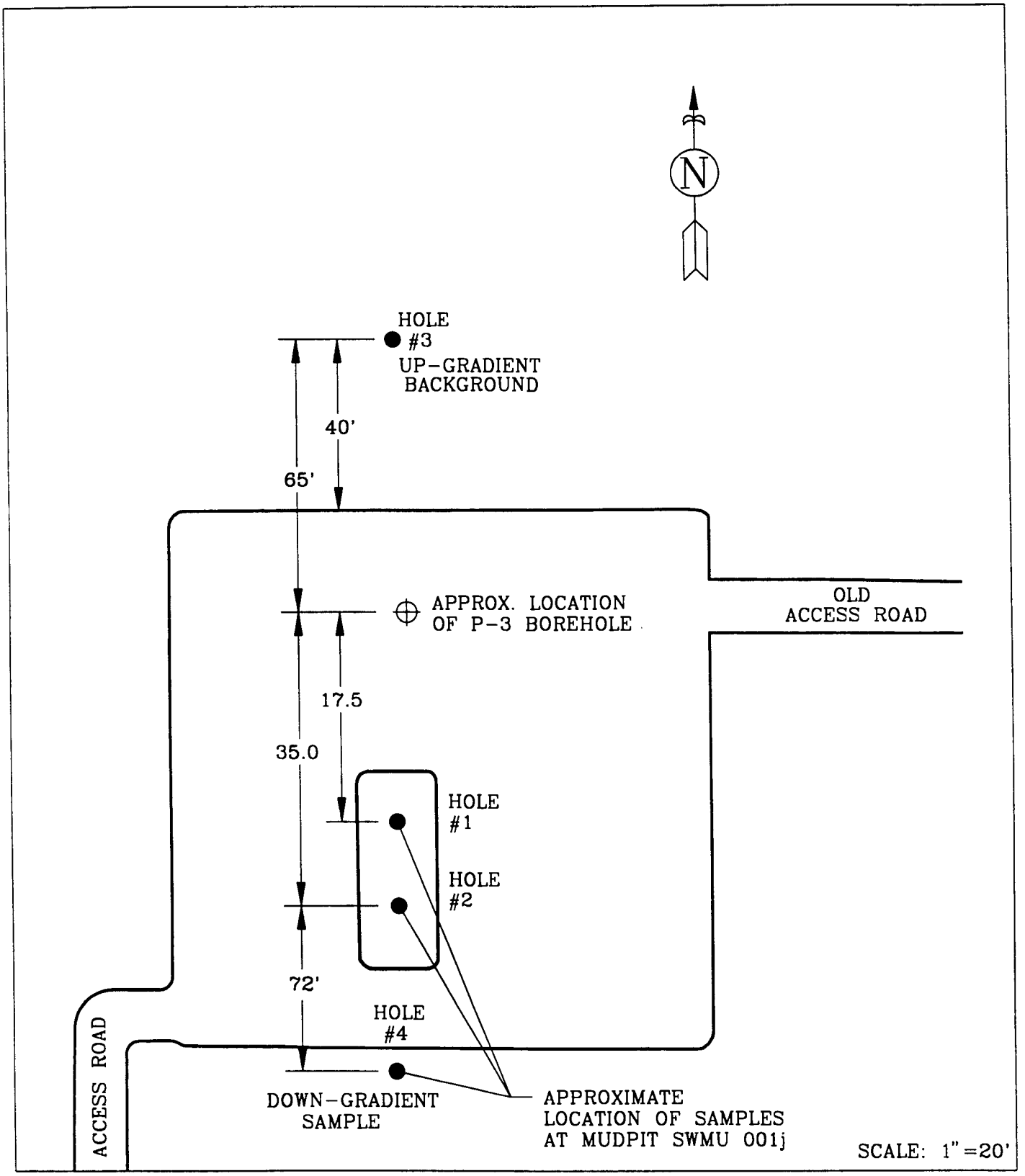
During the sampling visits to the P-3 mudpit, the sampling team located a single rectangular mudpit on the south central part of the drill pad. The P-3 well pad is heavily vegetated, and no discolored soil or liner material were identified during sampling activities. A total of 28 soil samples were collected to characterize the vertical and horizontal extent of any potential release from the SWMU 001j mudpit. The rationale for selecting sample depths at mudpits during the initial round of voluntary release assessment sampling was based on an evaluation of the 001j SWMU site, and historical information contained in the RFA.

A list of the number and type of samples collected at SWMU 001j and their associated sample intervals is provided in Table 2. Organic and metals samples collected in the mudpit area at the 12-24 inch depth were used to provide a data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60-72 inch depth were used to quantify the maximum vertical extent of potential constituent migration. Figure 2 is a revised sample location map showing sample locations and measurements between sample borehole locations at SWMU 001j.

TABLE 2

NUMBER, TYPE, AND SAMPLING INTERVAL FOR SAMPLES COLLECTED AT SWMU 001J (P-3 MUD PIT)		
	12 - 24"	**60 - 72"**
NUMBER OF SAMPLES:		
Inorganic Analysis	4	4
Organic Analysis	4	4
NUMBER OF DUPLICATE SAMPLES:		
Inorganic Analysis	2	2
Organic Analysis	2	2
NUMBER OF EQUIPMENT BLANKS:		
Inorganic Analysis	0	1
Organic Analysis	0	1
NUMBER OF FIELD BLANKS:		
Inorganic Analysis	1	0
Organic Analysis	1	0

FIGURE 2
SAMPLE LOCATION MAP SWMU 001j (P-3)
SAMPLED 07/26/95 & 07/27/95



Up gradient and down gradient samples were collected to evaluate the lateral extent of potential constituent migration and to establish background concentrations for constituents in the vicinity of the P-3 mudpit site. These samples were collected from an undisturbed location, immediately up and down gradient, of the SWMU area. Up-gradient and down-gradient metals and volatile samples were collected at both the 12-24 inch and 60-72 inch depth. Background sample locations were selected by the sampling team members during the sampling visit. Sample locations were noted in the sample logbook and sampling location maps revised to reflect the location of up gradient and down gradient samples.

A tractor mounted power auger was used to drill an 8 inch diameter borehole to the appropriate sampling depth. A stainless tube sampler was used to collect a core sample for organic analytes from both the 12-24 inch and 60-72 inch depths. A disposable teflon scoop was generally used to collect metals constituent samples from the 12-24 inch depth. Metal constituent samples were collected in one liter (1000 ml) clear glass bottles with teflon lined lids. Volatile organic constituent samples were collected in 4-ounce (125 ml) clear glass bottles with welded septum lids.

2.4 Data Quality Assurance

Analytical data generated for samples collected at SWMU 001j were completed in accordance with SW-846 or equivalent analytical protocols. Halliburton NUS Laboratories is the contract laboratory used to analyze all Release Assessment Samples. Sample analytical methods and Quality Assurance/Quality Control requirements have been completed in accordance with the *Halliburton NUS Laboratories General Quality Assurance Plan*, March 10, 1995. The Halliburton QA plan defines all equipment calibration, sample handling, sample analyses, matrix blank, and method blank analyses required to meet *SW-846* QA/QC requirements.

2.5 Independent Data Validation

An independent data quality review of SWMU 001j samples was completed by Harding Lawson & Associates (HLA) Engineering and Environmental Services Incorporated. HLA developed the procedure to complete QA/QC data package reviews in accordance with the data quality requirements described in *SW-846* and the *Halliburton NUS General Quality Assurance Plan*. A copy of the independently reviewed analytical data package for SWMU 001j is provided as Appendix 2.

2.6 Comparison of Analytical Results and EPA Action Levels at SWMU 001j

Appendix D of proposed 40 CFR § 264.521(d), FR Vol. 55, No. 145, VI(D), p.30870, establishes criteria for selecting and calculating action levels for soils. Action level concentrations in Appendix D assume a chronic exposure through consumption of soil media contaminated with hazardous constituents. Criteria for establishing soil action levels can also be found in *40 CFR § 264.521(d), Appendix A*. The tables in Appendix A contain

"Examples of Concentrations Meeting Criteria for Action Levels for Air, Water, and Soil Media." In order to complete Appendix D soil action level calculations, the DOE multiplied all TCLP concentrations by 20 (estimated total concentrations in mg/kg.) to obtain the intake assumption used in the Appendix D formula to compute the actual action level.

For all but one constituent listed in either Appendix A and Appendix D, analytical results demonstrate that sample constituent concentrations are below soil action levels. The only exception was the constituent concentrations for lead. Consistently, the TCLP analytical concentration for lead was at the established TCLP method detection limit of <0.5 mg./l. Upon receipt of the initial analytical results, the contract laboratory was contacted and a randomly selected group of samples were re-analyzed for lead to achieve a lower detection limit. Analytical results for all of these re-analyzed samples showed TCLP concentrations of <0.05 mg/l for lead. This concentration is below the Maximum Contaminant Level (MCL) for lead of 0.05 mg/l established in Appendix A. The results of voluntary release assessment samples collected at SWMU 001j are provided in Table 3.

No action levels are established in Appendices A, D, or F for Barium, Benzene, Thallium or Vinyl Chloride tested at SWMU 001j. For these analytes, only barium was detected above the method detection limit. It is important to note that constituent concentrations for these analytes collected from inside the SWMU mudpit area are identical to concentrations for both up-and-down gradient background samples. Selected samples from SWMU 001j were also re-analyzed for thallium. Re-analysis established a lower detection limit for thallium of <0.2 mg/l.

TABLE 3

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001j, Mudpit P-3

Bore Number:	BORE #1	BORE #1	BORE #2	BORE #2	BORE #3	BORE #3	BORE #3	BORE #3
Depth (inches):	12-24	60-72	12-24	60-72	12-24	12-24	60-72	60-72
Sample Date:	7/26/95	7/26/95	7/26/95	7/26/95	7/26/95	7/26/95	7/27/95	7/27/95
WID Sample Numbers:	RA-95-001	RA-95-004	RA-95-013	RA-95-016	RA-95-019	RA-95-021	RA-95-024	RA-95-023
	RA-95-003	RA-95-006	RA-95-015	RA-95-018	RA-95-020	RA-95-022	RA-95-025	RA-95-026
						Duplicate		Duplicate
Analytes								
Leachable Metals (mg/L)								
Arsenic (As)	0.2 UB	0.2 UB	0.2 UB	0.2 UB	0.1 UB	1 U	1 U	1 U
Barium (Ba)	0.47 UB	0.75 B	0.71 UB	1.1 B	0.35 UB	0.42 UB	0.48 UB	0.69 UB
Cadmium (Cd)	0.005 U	0.005 U	0.005 U	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U
Chromium (Cr)	0.02 U	0.02 U	0.02 U	0.02 U	0.2 U	0.2 U	0.2 U	0.2 U
Lead (Pb)	0.05 U	0.05 U	0.05 U	0.05 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury (Hg)	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Thallium (Tl)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	2 U	2 U
Leachable Volatiles (mg/L)								
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Toluene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Xylenes, total	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

B Detected in the blank
BR Sample was broken in transit
EQ BLANK Equipment Rinse Blank
FD BLANK Field Blank
J Estimated value
NA Not analyzed
R Rejected value
U Not detected; value is method reporting limit
UB Detected in the blank and qualified as not detected

Samples RA-95-002, RA-95-005, RA-95-008, RA-95-011, RA-95-014, RA-95-017 were not analyzed. Samples RA-95-007 and RA-95-010 were broken in transit.

TABLE 3 (cont.)

Voluntary Release Assessment
SWMU #001j, Mudpit P-3

Bore Number:	BORE #4	BORE #4	BORE #4	BORE #4	EQ BLANK	FD BLANK
Depth (inches):	12-24	12-24	60-72	60-72		
Sample Date:	7/27/95	7/27/95	7/27/95	7/27/95	7/26/95	7/26/95
WID Sample Numbers:	RA-95-027	RA-95-028	RA-95-031	RA-95-032	RA-95-009	RA-95-012
	RA-95-029	RA-95-030	RA-95-033	RA-95-034		
		Duplicate		Duplicate		
Analytes						
Leachable Metals (mg/L)						
Arsenic (As)	1 U	0.1 U	1 U	1 U	0.1 U	0.1 U
Barium (Ba)	0.68 UB	1.2 B	0.67 UB	0.76 B	0.019 UB	0.016 UB
Cadmium (Cd)	0.05 U	0.06	0.06	0.05 U	0.005 U	0.005 U
Chromium (Cr)	0.2 U	0.2 U	0.2 U	0.2 U	0.02 U	0.02 U
Lead (Pb)	0.5 U	0.5 U	0.5 U	0.5 U	0.05 U	0.05 U
Mercury (Hg)	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0008 U	0.0008 U
Thallium (Tl)	2 U	0.2 U	2 U	2 U	0.2 U	0.2 U
Leachable Volatiles (mg/L)						
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U		
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U		
Benzene	0.05 U	0.05 U	0.05 U	0.05 U		
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U		
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U		
Toluene	0.05 U	0.05 U	0.05 U	0.05 U		
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U		
Xylenes, total	0.05 U	0.05 U	0.05 U	0.05 U		

B Detected in the blank
BR Sample was broken in transit
EQ BLANK Equipment Rinse Blank
FD BLANK Field Blank
J Estimated value
NA Not analyzed
R Rejected value
U Not detected, value is method reporting limit
UB Detected in the blank and qualified as not detected

Samples RA-95-002, RA-95-005, RA-95-008, RA-95-011, RA-95-014, RA-95-017 were not analyzed. Samples RA-95-007 and RA-95-010 were broken in transit.

2.7 Evaluation of Selected Analytical Results Using Risk Based Concentrations

As part of the assessment of the constituent action levels at SWMU 001j, the DOE used the Risk Based Concentration (RBC) levels, developed by the EPA Region III office of Technical and Program Support, to evaluate analytical results for Barium, Benzene, Thallium, and Vinyl Chloride. These criteria appeared to most closely match the parameters established in Appendix D.

The RBC soil concentration for Barium is 140,000 mg/kg. The analytical results for Barium at SWMU 001j ranged from 0.016 mg/l to 1.1 mg/l. These TCLP concentrations can be converted to total concentrations (mg/kg equivalent) by multiplying the TCLP concentration by 20. Thus the total concentration equivalent for Barium analytes at SWMU 001j range from 0.32 mg/kg to 22.0 mg/kg.

Using the same methodology, the Region III RBC soil concentration for Benzene is 200 mg/kg. Benzene concentrations at SWMU 001j were all listed at below the TCLP method detection limit of <0.05 mg/l. Converting the TCLP concentration to total concentration, the total Benzene concentration for all samples collected at SWMU 001j are <1.0 mg/kg. This concentration is significantly below the 200 mg/kg soil concentration established for Benzene contained in the RBC table.

Initial thallium analyses at SWMU 001j were all at a method detection limit of <2.0 mg/l. Based on these analytical results, a selected group of samples were re-analyzed for thallium. Re-analysis established a lower detection limit for thallium of <0.2 mg/l. No RBC industrial soil ingestion concentration for Thallium is provided in Table 1. However, a SSL for soil transfers to groundwater is provided. As discussed earlier, geologic data demonstrates that the release of constituents from SWMU 001j to groundwater is extremely remote. Thus, a soil screening concentration has limited application at this site. Additionally, the TCLP concentrations for samples collected inside both the P-3 mudpit area and at the up and down gradient sample locations are below SW-846 method detection limits.

The RBC soil concentration for Vinyl Chloride is 3.0 mg/kg. TCLP analytical concentrations for Vinyl Chloride at all of the boreholes sampled at SWMU 001j were <0.1 mg. Converting the TCLP concentration to total concentrations as described earlier, the total Vinyl Chloride concentration at all of the SWMU 001j boreholes is <2.0 mg/kg. Thus, the Vinyl Chloride concentration at all locations and depths are below both the method detection limit, and the Region III Risk Based Concentrations for industrial soils.

2.8 Proposed Corrective Actions at SWMU 001j

Based on the criteria provided in proposed *40 CFR § 264.514 FR Vol. 55, No. 145, VI(D), p. 30813*, the voluntary release assessment analytical data collected at SWMU 001j demonstrates that no release of hazardous constituents has occurred. This data clearly demonstrates that there is no threat to human health or the environment from drilling activities conducted at SWMU 001j and that additional RFI assessments are not required. In fact, thousands of similar mudpits exist immediately outside the WIPP boundary and the regulations do not require additional corrective actions at these sites.

Because it is the EPA's intent to encourage voluntary corrective actions as described in the preamble of the Proposed Subpart S Rule, the DOE requests that after appropriate public review and agency approval, a No Further Action determination be granted for SWMU 001j prior to the issuance of the RCRA Part B Permit for the WIPP. Any delay in the issuance of No Further Action determination may require the DOE to submit a Class III permit modification to remove this SWMU from the list of sites requiring evaluation under the RFI process. This type of permit modification would represent an unreasonable expense to remove the site with no potential to impact human health or the environment from the list of sites requiring corrective action at the WIPP. If this determination is supported by both the EPA and NMED, this site will be replanted with native vegetation, in accordance with guidelines developed in the *WIPP Land Management Plan (DOE WIPP 93-004)*.

3.0 RESULTS OF RELEASE ASSESSMENT SAMPLING AT SWMU 001M

3.1 Location of SWMU 001m

This section of the release assessment data summary report documents the results of release assessment sampling at SWMU 001m and describes the proposed corrective actions at this location. SWMU 001m is located in the SW 1/4 of the SW 1/4 of the NW 1/4 of Section 30, Township 22 South, Range 31 East. Boyles Brothers Drilling Company drilled P-6 potash exploration well in September 1976 (*USGS, 1978*). SWMU 001m is the abandoned mudpit generated by the drilling of the P-6 exploration well. As with other USGS potash resource evaluation boreholes, diesel fuel may have been used in the drilling fluid, along with saturated sodium and potassium chloride brine, starch, and salt gel (attapulgite). Access to this site by vehicle is difficult because the access roads and the surface of the site has been rough graded. The edges of the mudpit are not easily distinguished, so information from visual site inspection portion of the WIPP RFA was used to survey the location of the P-6 mudpit.

3.2 Geology and Hydrogeology in the Area of SWMU 001m

The USGS lithology logs describe the near surface geology at the P-6 borehole as approximately 8 feet of fine-to-medium-grained unconsolidated Holocene soils and Eolian sands (*USGS 1978*). Underlying the Holocene sands are 10 feet of Pleistocene Gatuna Formation. The RFA describes the soil development at this location as poor, and the release potential for soils in the immediate vicinity of SWMU 001m as high. There is no description of a caliche formation in the drilling logs for the P-6 borehole.

The Gatuna Formation overlays the Dewey Lake Red Bed Formation at this site. The Dewey Lake Formation is the shallowest potential water-bearing formation beneath the P-6 mudpit area. Drillers' logs indicate that the Dewey Lake Red Bed Formation is relatively shallow at this location. The top of the Dewey Lake Formations is 18 feet below surface, and the formation is approximately 339 feet thick. The RFA describes the groundwater migration potential at SWMU 001m as moderate relative to other SWMU locations at the WIPP. This description is based on the shallow depth of the Dewey Lake Red Bed formation, and the proximity of the SWMU site to the western boundary of the WIPP site. In the RFA the NMED expressed concern that a water well could be located outside of the WIPP land withdrawal area, but immediately adjacent to SWMU 001m. Although the 001m SWMU site is located approximately 200 feet from the western site boundary, regional geology and the lack of water in adjacent boreholes significantly reduces the probability that a water well would be located just outside the WIPP land withdrawal area in the vicinity of the 001m SWMU.

In this region the Dewey Lake Red Beds are characterized as a deltaic sequence of alternating, thinly bedded siltstone and mudstone with lenticular interbeds of fine-to coarse-grained sandstone (*Mercer, 1983; D'Appolonia 1982b*). Mercer (*1983*) contends that

groundwater occurs perched or semiperched in lenticular sands in the upper Dewey Lake. Subsurface logs suggest that the top of the Dewey Lake Red Beds may be relatively impermeable at this location, and it is unlikely that perched or semiperched water bearing zones exist at this location.

Drilling logs from the P-6 borehole do not describe contact with water bearing strata in the Dewey Lake Formation. Additionally, no moisture was described in the drill cuttings. Because air-foam circulation was not used to drill the P-6 well, moisture containing cutting may not have been logged by drilling crews.

The H-2 and H-14/P-1 boreholes are the closest drill holes to the P-6 well site. The H-2 borehole is located approximately 8,500 feet East-Northeast of the 001m SWMU site. The H-2 borehole was air foam drilled, and drilling logs indicate that minor zones of moisture were recorded at a depth of approximately 185 feet. Short-term pump test conducted at the H-2 well to determined fluid yield documented negligible flow (*TME 3059, 1980*).

The H-14/P-1 boreholes are located approximately 7,500 feet Southeast of the 001m SWMU site. Drilling logs from both the H-14 and the P-2 indicate that no water was encountered during the drill of either borehole. The RFA states that a short-term hydraulic test was conducted in the H-14 borehole, and testing concluded that the presence or absence of a water table at this site remains undetermined (*Beauheim, 1978a*). The lack of documented water bearing zones in adjacent wells further supports a position that regional groundwater does not exist in the vicinity of SWMU 001m.

Once drilling of the P-6 borehole was completed, all casing was removed and the hole was plugged to surface using a 500 gallon mud flush ahead of 260 sacks of 50 percent Pozmix "A" and 50 percent Class "C" cement, 2 percent gel and 19.4 pounds per sack salt. One joint of 3 1/2 inch O.D. casing set in soft cement and cut off 1 foot above the ground level to mark the hole. This method of plugging effectively sealed the borehole and eliminated any potential migration of surface constituents to the subsurface formations.

3.3 Sampling Protocols

During the sampling visits to the SWMU 001m, the sampling team located a large single rectangular mudpit measuring approximately 32 feet by 65 feet. The mudpit is located on the south edge of P-6 drill pad. The P-6 well pad is unvegetated, however, no discolored soil or liner material were identified during sampling activities. The lack of vegetation at this site may be the result of caliche materials laid down to construct the P-6 drill pad. Once compacted, these areas lack soil nutrients and inhibit plant germination.

A total of 22 soil samples were collected to characterize the vertical and horizontal extent of any releases from the mudpit located at SWMU 001m. A list of the number, type, and interval of samples collected at SWMU 001m is provided in Table 4.

TABLE 4

NUMBER, TYPE, AND SAMPLING INTERVAL FOR SAMPLES COLLECTED AT SWMU 001M (DRILL PAD P-6)		
	12 - 24"	**60 - 72"**
NUMBER OF SAMPLES:		
Inorganic Analysis	4	4
Organic Analysis	4	4
NUMBER OF DUPLICATE SAMPLES:		
Inorganic Analysis	1	0
Organic Analysis	1	0
NUMBER OF EQUIPMENT BLANKS:		
Inorganic Analysis	1	0
Organic Analysis	1	0
NUMBER OF FIELD BLANKS:		
Inorganic Analysis	1	0
Organic Analysis	1	0

The rationale for selecting sample depths at mudpits during the initial round of voluntary release assessment sampling was based on an evaluation of the 001m SWMU site, and historical information about this site contained in the RFA. Organic and metals samples collected at the mudpit area at the 12-24 inch depth were used to provide a sample from the depth where the highest concentration of potential hazardous constituents were anticipated. Samples collected at the 60-72 inch depth were used to quantify the maximum vertical extent of potential contamination migration. Figure 3 is the revised SWMU 001m sample location map showing sample locations and measurements between sample boreholes.

Up and down gradient samples were collected to evaluate the lateral extent of potential constituent migration and to establish background concentrations for constituents in the vicinity of the P-6 mudpit site. These samples were collected from an undisturbed location, immediately up and down gradient, of the SWMU area. Up-gradient and down-gradient metals and volatile samples were collected at both the 12-24 inch and 60-72 inch depth. Background sample locations were selected by the sampling team members during the sampling visit. Sample locations were noted in the sample logbook and sampling location maps revised to identify up gradient and down gradient samples.

A tractor mounted power auger was used to drill an 8-inch diameter borehole to the appropriate sampling depth. A stainless tube sampler was used to collect a core sample for organic analytes from both the 12-24 inch and 60-72 inch depths. A disposable teflon scoop was generally used to collect metals constituent samples from the 12-24 inch depth. Metal constituent samples were collected in one liter (1000 ml) clear glass bottles with teflon lined lids. Volatile organic constituent samples were collected in four ounce (125 ml) clear glass bottles with welded septum lids.

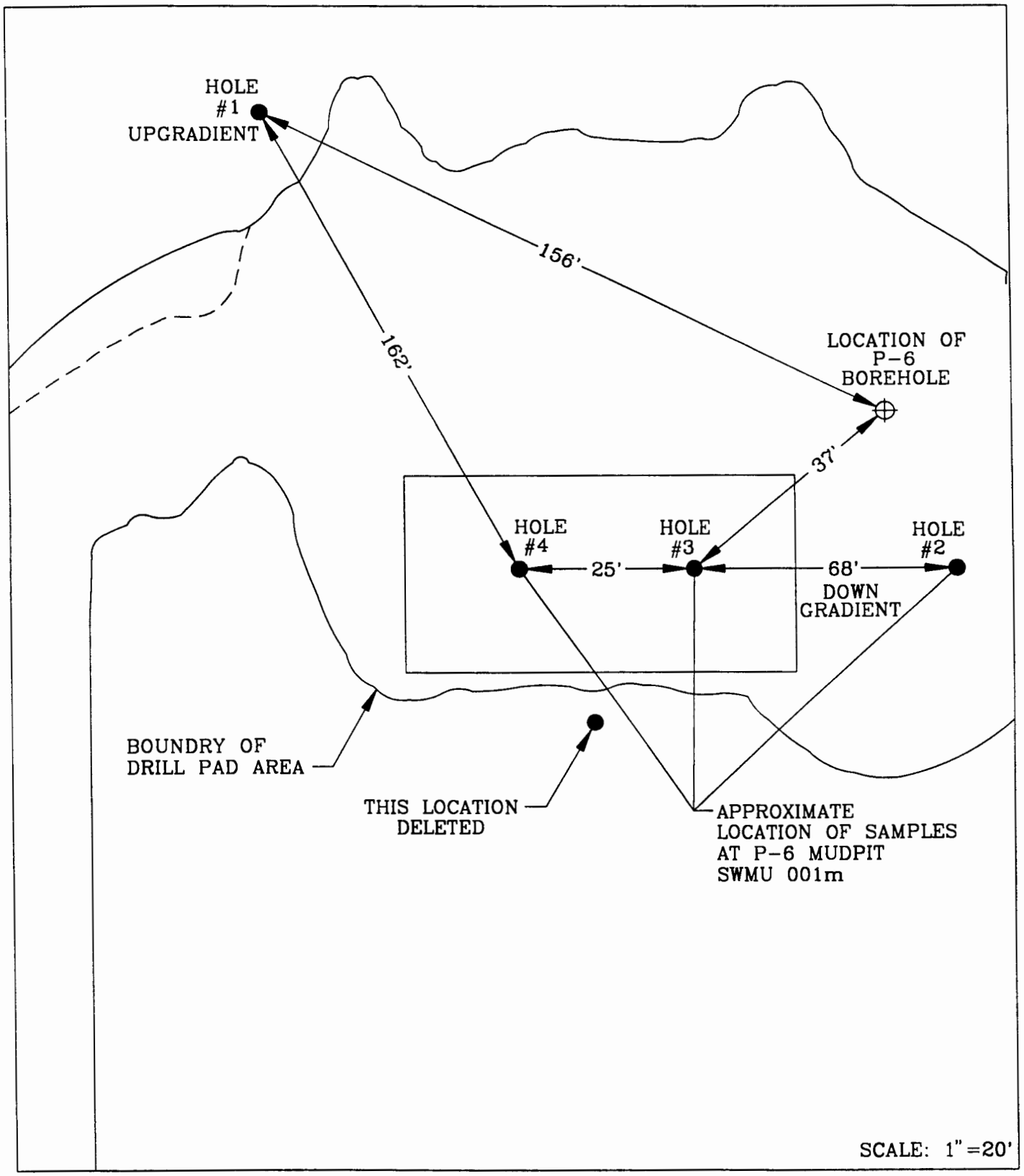
3.4 Data Quality Assurance

All sample analyses were completed in accordance with SW-846 or equivalent analytical protocols. Halliburton NUS Laboratories is the contract laboratory used to analyze all Release Assessment Samples. Sample analytical methods and Quality Assurance/Quality Control (QA/QC) requirements have been completed in accordance with the *Halliburton NUS Laboratories General Quality Assurance Plan*, March 10, 1995. The Halliburton QA plan defines all equipment calibration, sample handling, sample analyses, matrix blank, and method blank analyses required to meet SW-846 QA/QC requirements.

3.5 Independent Data Validation

An independent data quality review was completed by Harding Lawson & Associates (HLA) Engineering and Environmental Services. HLA developed a procedure to complete QA/QC data package reviews in accordance with the data quality requirements described in SW-846 and the *Halliburton NUS Laboratories General Quality Assurance Plan*. A copy of the independently reviewed analytical data package for SWMU 001m is provided as Appendix 3.

FIGURE 3
SAMPLE LOCATION MAP SWMU 001m (P-6)
SAMPLED 08/02/95



3.6 Comparison of Analytical Results and EPA Action Levels at SWMU 001m

Appendix D of proposed 40 CFR § 264.521(d), FR Vol. 55, No. 145, VI(D), p.30870, establishes criteria for selecting and calculating action levels for soils. Action level concentrations in Appendix D assume a chronic exposure through consumption of soil media contaminated with hazardous constituents. Criteria for establishing soil action levels can also be found in *40 CFR § 264.521(d), Appendix A*. The tables contained in Appendix A provide "Examples of Concentrations Meeting Criteria for Action Levels for Air, Water, and Soil Media." In order to complete Appendix D soil action level calculations the DOE multiplied all TCLP concentrations by 20 (the estimated total concentrations in mg/kg) to obtain the intake assumption used in the Appendix D formula to compute the actual action level.

For all but one constituent contained in either Appendix A and Appendix D, analytical results demonstrate that sample constituent concentrations are below soil action levels. The only exceptions were constituent concentrations for lead. Consistently the TCLP analytical concentration for lead was at the established TCLP method detection limit of <0.5 mg./l. None of the samples from SWMU 001m were included in the list of randomly selected samples that were re-analyzed to obtain a lower detection limit, a comparison of all the samples from SWMU 001j and 001t that were re-analyzed for lead, resulted in a detection concentration below the 0.05 mg/l MCL for lead. The results of voluntary release assessment samples collected at SWMU 001m are provided in Table 5.

No action levels are established in Appendices A, D, or F for Barium, Benzene, Thallium or Vinyl Chloride tested at SWMU 001m. For these analytes, only barium was detected above the method detection limit. It is important to note that the constituent concentrations of samples collected inside the mudpit area, and the concentrations of up gradient and down gradient samples, are both at or below the SW-846 method detection concentration.

TABLE 5

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001m, Mudpit P-6

Bore Number:	BORE #1	BORE #1	BORE #2	BORE #2	BORE #3	BORE #3	BORE #3	BORE #4	BORE #4
Depth (inches):	12-24	60-72	12-24	60-72	12-24	12-24	60-72	12-24	60-72
Sample Date:	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95
WID Sample Numbers:	RA-95-061	RA-95-063	RA-95-065	RA-95-067	RA-95-069	RA-95-070	RA-95-077	RA-95-079	RA-95-081
	RA-95-062	RA-95-064	RA-95-066	RA-95-068	RA-95-071	RA-95-072	RA-95-078	RA-95-080	RA-95-082
						Duplicate			
Analytes									
Leachable Metals (mg/L)									
Arsenic (As)	1 U	1 U	1 U	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U
Barium (Ba)	0.46 UB	0.26 UB	0.24 UB	0.95 B	0.46 UB	0.71 UB	0.35 UB	0.68 UB	1.2 B
Cadmium (Cd)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chromium (Cr)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Lead (Pb)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury (Hg)	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0003 UBJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ
Thallium (Tl)	2 U	2 U	2 U	2 U	0.2 U	2 U	0.2 U	2 U	2 U
Leachable Volatiles (mg/L)									
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Toluene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Xylenes, total	0.05 U	0.07	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

B Detected in the blank
EQ BLANK Equipment Rinse Blank
FD BLANK Field Blank
J Estimated value
R Rejected value
U Not detected, value is method reporting limit
UB Detected in the blank and qualified as not detected

TABLE 5 (cont.

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001m, Mudpit P-6

Bore Number:	EQ BLANK	FD BLANK
Depth (inches):		
Sample Date:	8/2/95	8/2/95
WID Sample Numbers:	RA-95-073	RA-95-075
	RA-95-074	RA-95-076
Analytes		
Leachable Metals (mg/L)		
Arsenic (As)	1 U	1 U
Barium (Ba)	0.1 UB	0.05 UB
Cadmium (Cd)	0.05 U	0.05 U
Chromium (Cr)	0.2 U	0.2 U
Lead (Pb)	0.5 U	0.5 U
Mercury (Hg)	0.0002 UJ	0.0002 UJ
Thallium (Tl)	2 U	2 U
Leachable Volatiles (mg/L)		
1,1,1-Trichloroethane	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U
Benzene	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U
Toluene	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U
Xylenes, total	0.05 U	0.05 U

B Detected in the blank
EQ BLANK Equipment Rinse Blank
FD BLANK Field Blank
J Estimated value
R Rejected value
U Not detected, value is method reporting limit
UB Detected in the blank and qualified as not detected

3.7 Evaluation of Selected Analytical Results Using Risk Based Concentrations

As previously discussed, the DOE used RBC levels, developed by EPA Region III to evaluate analytical results for Barium, Benzene, Thallium, and Vinyl Chloride at SWMU 001m. These criteria appeared to most closely match the parameters established in Appendix D. The use of SSLs for transfers to groundwater are not appropriate at this site because geologic data demonstrate that any potential release to groundwater of constituents contained in the SWMU 001m mudpit is extremely remote.

The RBC soil concentration for Barium is 140,000 mg/kg, the analytical results for Barium at SWMU 001m ranged from 0.24 mg/l to 1.2 mg/l. These TCLP concentrations can be converted to total concentrations (mg/kg equivalent) by multiplying the TCLP concentration by 20. Thus, the total concentration equivalent for Barium analytes at SWMU 001m range from 4.8 mg/kg to 24.0 mg/kg.

Using the same methodology, the Region III RBC soil concentration for Benzene is 200 mg/kg. Benzene concentrations at SWMU 001m are all below the TCLP method detection limit of <0.05 mg/l. Converting the TCLP concentration to total concentrations, the total Benzene concentration for all samples at SWMU 001m is <1.0 mg/kg, significantly below the 200 mg/kg RBC soil concentration.

No RBC industrial soil ingestion concentration is provided in Table 1 for Thallium. However, an SSL for soil transfers to groundwater is provided. Geologic data from this site demonstrates that the release of hazardous constituents from the P-6 mudpit to groundwater is extremely remote. Thus, a soil screening concentration has limited application at this site.

Initial thallium analyses at SWMU 001m were all at a method detection limit of <2.0 mg/l. Based on these analytical results, a selected group of samples were re-analyzed for thallium. Re-analysis established a lower detection limit for thallium of <0.2 mg/l. A Risk Based soil concentration for Thallium is not provided in the EPA Region III RBC table. The TCLP analytical concentration for thallium samples collected both inside the mudpit area, and at up and down gradient sample locations are below SW-846 method detection limits.

The RBC soil concentration for Vinyl Chloride is 3.0 mg/kg. TCLP analyses for Vinyl Chloride at all of the boreholes sampled at SWMU 001m had concentrations of <0.1 mg. Converting the TCLP concentration to total concentrations as described earlier, the total Vinyl Chloride concentration at all of the SWMU 001m boreholes is <2.0 mg/kg. Thus, the Vinyl Chloride concentration at all locations and depths are below both the method detection limit and the Region III Risk Based Concentrations for industrial soils.

3.8 Proposed Corrective Actions at SWMU 001m

Based on the criteria provided in proposed *40 CFR § 264.514 FR Vol. 55, No. 145, VI(D), p. 30813*, the voluntary release assessment analytical data collected at SWMU 001m demonstrates that no release of hazardous constituents has occurred. This data clearly demonstrates that there is no threat to human health or the environment from drilling activities conducted at SWMU 001m and that additional RFI assessments are not required. In fact, thousands of similar mudpits exist immediately outside the WIPP boundary and the regulations do not require additional corrective actions at these sites.

Because it is the EPA's intent to encourage voluntary corrective actions as described in the preamble of the Proposed Subpart S Rule, the DOE requests that after appropriate public review and agency approval, a No Further Action determination be granted for SWMU 001m prior to the issuance of the RCRA Part B Permit for the WIPP. If this determination is supported by both the EPA and NMED, this site will be replanted with native vegetation, in accordance with guidelines developed in the *WIPP Land Management Plan (DOE WIPP 93-004)*.

4.0 RESULTS OF RELEASE ASSESSMENT SAMPLING AT SWMU 001T

4.1 Location of SWMU 001t

This section of the release assessment data summary report documents the results of release assessment sampling at SWMU 001t, and describes the proposed corrective actions at this location. SWMU 001t is located in the SE 1/4 of the SE 1/4 of the SW 1/4 of Section 30, Township 22 South, Range 31 East. The abandoned mudpit from the drilling of borehole number 374 by the International Mineral and Chemical Corporation (IMC-374) makes up the 001t SWMU site. A limited number of historical records have been located for the IMC-374 potash exploration borehole. The IMC 374 exploration borehole was drilled by Boyles Brothers Drilling Company in April, 1965. The total depth of the hole was 1149 feet. Drilling fluids that may have been used to complete the IMC-374 borehole include: saturated sodium and potassium chloride brine, starch, and salt gel (attapulgite).

The IMC-374 drill pad has been extensively graded and regraded since the mudpit was closed in 1965. During the sampling visit the sampling team surveyed the location of the drill pad based on information contained in the WIPP RFA. Visual inspections indicated that the mudpit area is located in a hummocky sandy area along the west side of the drill pad. The mudpit area measures approximately 15 feet by 70 feet. No mudpit liners were encountered during the boring of sampling sites. An area of slightly stained soil, originally referenced in the RFA was not evident during the sampling visit, and may have resulted from a precipitation event prior to the RFA site visit. The RFA noted that a used oil filter was located on the north side of the pad. This used oil filter has since been removed by WIPP personnel.

4.2 Geology and Hydrogeology in the Area of SWMU 001t

The RFA indicated that no substantive records were located for the IMC-374 borehole. The RFA field inspection revealed that stressed vegetation at SWMU 001t may be related to localized grading down to the subsurface caliche. DOE sampling personnel believe that stressed vegetation at this site is due to the compaction of caliche materials used to construct the 374 drill pad. The drill pad has been compacted and regraded several times reducing the volume of top soil at the site and inhibiting plant germination. The RFA described the release potential to surface soils at this site as high because the pad appears to sit directly on caliche. This suggests that the mudpit bottom may be founded in a relatively thin Pleistocene Gatuna sandstone at this location. The RFA went on to state that no drilling logs are available to confirm this interpretation.

In January 1996, drilling records describing the surface geology at this site were obtained from IMC Corporation. These logs describe the upper surface formation as Holocene sands characterized as 90 percent brown sand and 10 percent caliche. This zone extends from the ground surface to 20 feet in depth. Drilling at this site was completed using a rotary rock bit, and a good description of surface formations was not provided in drilling logs. No

continuous caliche layer was identified in the top 5 feet of strata during the drilling of sample boreholes in the mudpit area and at background sample locations. Exploration drill logs indicate that a relatively thin zone of Pleistocene Gatuna siltstone/sandstone underlay surface sands from 20 feet below surface to a depth of 40 feet. The Dewey Lake Redbed Formation underlay the Gatuna Formation from a depth of 41 feet below surface to a depth of 305 feet.

Although drilling logs and sampling activities did not clearly describe a continuous caliche formation at the IMC 374 borehole, a continuous zone of Mescalero Caliche Formation has been identified at an excavation in the vicinity of the 001t SWMU site. In February 1995, WIPP spill response personnel responded to a spill of approximately 200 gallons of diesel fuel that occurred when an oil field service truck rolled over on the WIPP South Access Road. This spill occurred approximately 250 feet south of SWMU 001t. During the excavation of diesel contaminated surface soils, the spill response team encountered a continuous caliche zone approximately 12 feet below surface. Excavation of the site revealed that the spilled diesel fuel filtered through the top 12 feet of medium to fine grained surface sands. DOE and NMED personnel removed the contaminated sands, and excavated into the caliche layer approximately 2 feet. Analytical data from this cleanup indicated that diesel contamination was confined to the top 12 inches of the caliche layer, and that the caliche layer at this locations effectively halted any vertical migration of the diesel spill.

Drilling logs from the IMC 374 potash exploration hole do not indicate that water or moisture was encountered during drilling. Once drilling of the IMC-374 borehole was completed, the hole was plugged to the surface using both cement and drilling mud. The hole was cased with 4 inch O.D. casing from the surface to 714 feet. The hole was cemented in four intervals. The first interval was from the bottom of the hole to 714 feet below surface. The second cementing interval went from 714 feet to 470 feet below surface. Drilling logs indicate that while pulling casing and cementing the hole, the casing twisted off at a depth of 437 feet. The casing was left in the hole from 437 feet to 714 feet. Drilling mud was used to seal the third cementing interval, plugging the hole from 470 feet to 20 feet below surface. The final cementing interval plugged the hole from 20 feet to surface. No information is provided in drilling logs describing the type or mixture of cement or drill mud used to plug the IMC-374 borehole.

The RFA recommended that further site investigations be completed at SWMU 001t because of the sites relative location to the site boundary, the possible proximity to the northern fringe of the Dewey Lake Perched water zone, and concern that diesel fuel was used as a drilling additive. Although drill logs do not clearly define the thickness of caliche layers in the IMC 374 borehole, excavation in the area clearly describes a continuous and relatively impervious caliche zone in the near vicinity. Additionally, analytical data provided in Table 7 demonstrates that no hazardous constituents have been released from SWMU 001t. Casing and plugging of the hole has effectively mitigated any potential migratory pathway down the borehole. Drilling logs do not indicate water in near surface formations, and

geologic data contained in the RFA describe the groundwater release potential as moderate to low relative to other locations on-site. The RFA goes on to describe the potential for migration to the Culebra Dolomite aquifer 530 feet below the surface as not credible.

4.3 Sampling Protocols

A total of 26 soil samples were collected to characterize the vertical and horizontal extent of any potential release from the IMC-374 mudpit. A list of the number and type of samples collected at SWMU 001t, and the their associated sample intervals is provided in Table 6.

The rationale for selecting sample depths at mudpits during the initial round of voluntary release assessment sampling was based on an evaluation of the 001t SWMU site and historical information contained in the RFA. Organic and metal samples collected at the mudpit area at the 12-24 inch depth were used to provide a sample from the depth where the highest concentration of potential hazardous constituents were anticipated. Samples collected at the 60-72 inch depth were used to quantify the maximum vertical extent of potential contamination. A revised sample location map showing sample locations and measurements between sample borehole locations at SWMU 001t is provided as Figure 4.

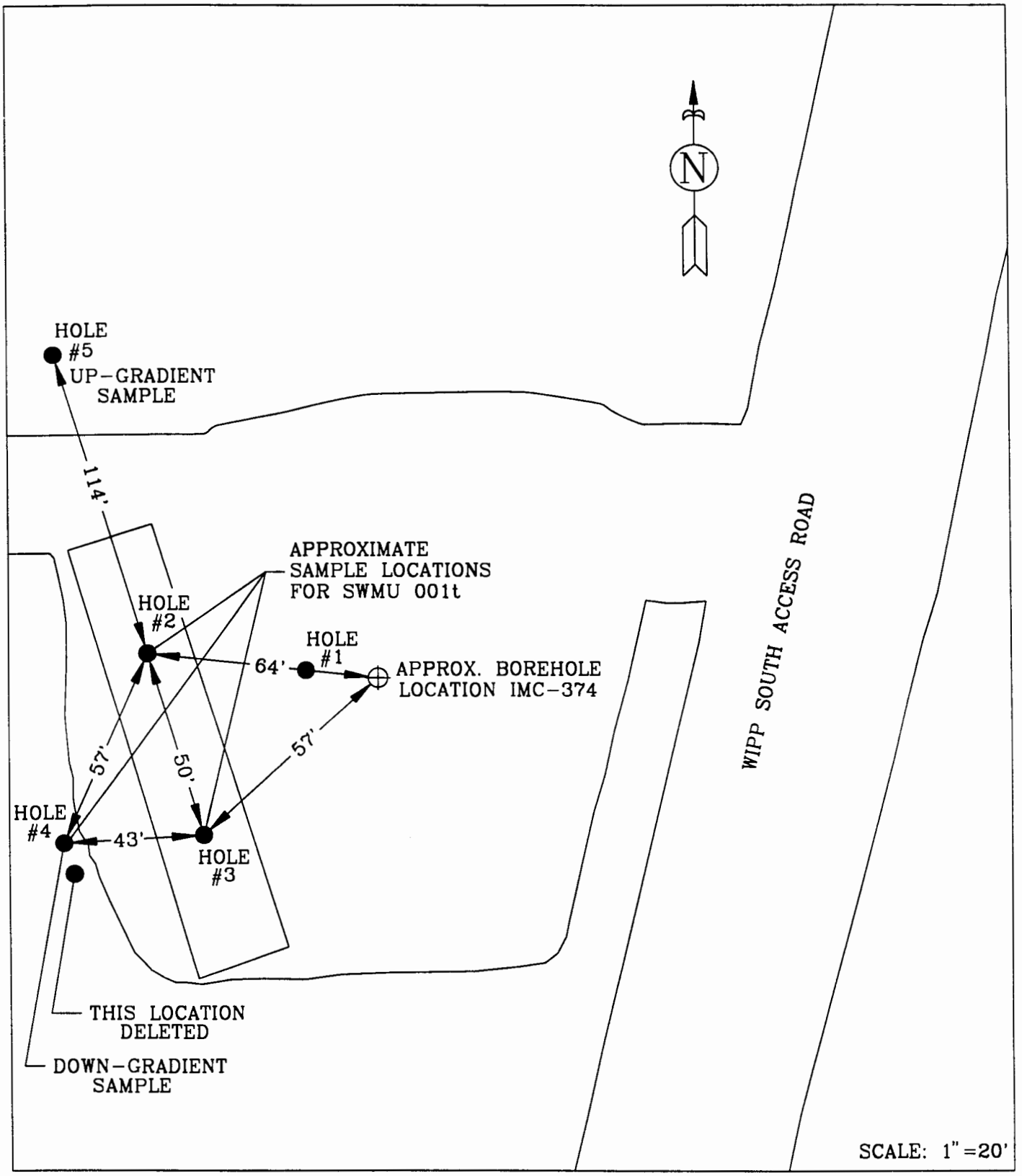
Up gradient and down gradient samples were collected to evaluate the lateral extent of potential constituent migration and to establish background soil constituent concentrations in the vicinity of the IMC-374 mudpit. These samples were collected from an undisturbed location, immediately up and down gradient, of the SWMU area. Up-gradient and down-gradient metals and volatile samples were collected at both the 12-24 inch and 60-72 inch depths. Background sample locations were selected by the sampling team members during the sampling visit. Sample locations were noted in the sample logbook, and sampling location maps revised to reflect the location of up gradient and down gradient samples.

A tractor mounted power auger was used to drill an 8-inch diameter borehole to the appropriate sampling depth. A stainless tube sampler was used to collect a core sample for organic analytes from both the 12-24 inch and 60-72 inch depths. A disposable teflon scoop was generally used to collect metals constituent samples from the 12-24 inch depth. Metal constituent samples were collected in one liter (1000 ml) clear glass bottles with teflon lined lids. Volatile organic constituent samples were collected in four ounce (125 ml) clear glass bottles with welded septum lids.

Table 6

SUMMARY OF THE NUMBER, TYPE, AND SAMPLING INTERVAL OF SAMPLES COLLECTED AT SWMU 001t (DRILL PAD IMC 374)		
	12 - 24"	**60 - 72"**
NUMBER OF SAMPLES:		
Inorganic Analysis	5	5
Organic Analysis	5	5
NUMBER OF DUPLICATE SAMPLES:		
Inorganic Analysis	2	0
Organic Analysis	2	0
NUMBER OF EQUIPMENT BLANKS:		
Inorganic Analysis	1	0
Organic Analysis	1	0
NUMBER OF FIELD BLANKS:		
Inorganic Analysis	0	0
Organic Analysis	0	0

FIGURE 4
SAMPLE LOCATION MAP SWMU 001t (IMC-374)
SAMPLED 07/31/95 & 08/02/95



4.4 Data Quality Assurance

All sample analyses were completed in accordance with SW-846 or equivalent analytical protocols. Halliburton NUS Laboratories is the contract laboratory used to analyze all Release Assessment Samples. Sample analytical methods and Quality Assurance/Quality Control (QA/QC) requirements have been completed in accordance with the *Halliburton NUS Laboratories General Quality Assurance Plan*, March 10, 1995. The Halliburton QA plan defines all equipment calibration, sample handling, sample analyses, matrix blank, and method blank analyses required to meet SW-846 QA/QC requirements.

4.5 Independent Data Validation

Independent data quality review was completed by Harding Lawson & Associates (HLA) Engineering and Environmental Services. HLA developed a procedure to complete QA/QC data package reviews in accordance with the data quality requirements described in SW-846 and the *Halliburton NUS Laboratories General Quality Assurance Plan*. A copy of the independently reviewed analytical data package for SWMU 001t is provided as Appendix 4.

4.6 Comparison of Analytical Results and EPA Action Levels at SWMU 001t

Appendix D of proposed 40 CFR § 264.521(d), FR Vol. 55, No. 145, VI(D), p.30870, establishes criteria for selecting and calculating action levels for soils. Action level concentrations in Appendix D assume a chronic exposure through consumption of soil media contaminated with hazardous constituents. Criteria for establishing soil action levels can also be found in *40 CFR § 264.521(d), Appendix A*. The tables contained in Appendix A provide "Examples of Concentrations Meeting Criteria for Action Levels for Air, Water, and Soil Media." In order to complete Appendix D soil action level calculations for samples collected at SWMU 001t, the DOE multiplied all TCLP concentrations by 20 (the total concentrations in mg/kg) to obtain the intake assumption used in the Appendix D formula to compute the actual action level.

For all but one constituent contained in either Appendix A and Appendix D, analytical results demonstrate that sample constituent concentrations are below soil action levels. The only exceptions were constituent concentration for lead. Consistently the TCLP analytical concentration for lead was at the established TCLP method detection limit of <0.5 mg/l. Upon receipt of these initial analytical results, the contract laboratory was contacted and a randomly selected group of samples were re-analyzed for lead to achieve a lower detection limit. Analytical results for all of these re-analyzed samples showed TCLP concentrations of <0.05 mg/l for lead. This concentration is below the Maximum Contaminant Level (MCL) for lead of 0.05 mg/l established in Appendix A. The results of voluntary release assessment samples collected at SWMU 001t are provided in Table 7.

TABLE 7

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001t, Mudpit IMC 374

Bore Number:	BORE #1	BORE #1	BORE #1	BORE #2	BORE #2	BORE #3	BORE #3	BORE #4	BORE #4
Depth (inches):	12-24	12-24	60-72	12-24	60-72	12-24	60-72	12-24	60-72
Sample Date:	7/31/95	7/31/95	7/31/95	7/31/95	7/31/95	7/31/95	7/31/95	8/2/95	8/2/95
WID Sample Numbers:	RA-95-035	RA-95-036	RA-95-041	RA-95-043	RA-95-045	RA-95-047	RA-95-049	RA-95-057	RA-95-059
	RA-95-037	RA-95-038	RA-95-042	RA-95-044	RA-95-046	RA-95-048	RA-95-050	RA-95-058	RA-95-060
		Duplicate							
Analytes									
Leachable Metals (mg/L)									
Arsenic (As)	0.1 U	1 U	1 U	0.2 UB	1 U	0.1 U	0.2 UB	1 U	1 U
Barium (Ba)	0.48 UB	0.66 UB	0.6 UB	0.68 UB	0.45 UB	0.83 B	0.48 UB	0.3 UB	0.36 UB
Cadmium (Cd)	0.05 U	0.05 U	0.06	0.05 U	0.05 U	0.05	0.05 U	0.05 U	0.07
Chromium (Cr)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Lead (Pb)	0.5 U	0.05 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury (Hg)	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ
Thallium (Tl)	0.2 U	2 U	2 U	0.2 U	2 U	0.2 U	0.2 U	2 U	2 U
Leachable Volatiles (mg/L)									
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Toluene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Xylenes, total	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

B Detected in the blank
EQ BLANK Equipment Rinse Blank
J Estimated value
R Rejected value
U Not detected, value is method reporting limit
UB Detected in the blank and qualified as not detected

TABLE 7 (cont.)

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001t, Mudpit IMC 374

Bore Number:	BORE #5	BORE #5	BORE #5	EQ BLANK
Depth (inches):	12-24	12-24	60-72	
Sample Date:	8/2/95	8/2/95	8/2/95	7/31/95
WID Sample Numbers:	RA-95-051	RA-95-052	RA-95-055	RA-95-039
	RA-95-053	RA-95-054	RA-95-056	RA-95-040
		Duplicate		
Analytes				
Leachable Metals (mg/L)				
Arsenic (As)	1 U	1 U	0.1 UB	1 U
Barium (Ba)	0.25 UB	0.3 UB	0.27 UB	0.17 UB
Cadmium (Cd)	0.06	0.05 U	0.05 U	0.05 U
Chromium (Cr)	0.2 U	0.2 U	0.20 U	0.2 U
Lead (Pb)	0.5 U	0.5 U	0.5 U	0.05 U
Mercury (Hg)	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 U
Thallium (Tl)	2 U	2 U	0.2 U	2 U
Leachable Volatiles (mg/L)				
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U
Benzene	0.05 U	0.05 U	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U
Toluene	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U
Xylenes, total	0.05 U	0.05 U	0.05 U	0.05 U

B Detected in the blank
EQ BLANK Equipment Rinse Blank
J Estimated value
R Rejected value
U Not detected; value is method reporting limit
UB Detected in the blank and qualified as not detected

No action levels are established in Appendices A, D, or F for Barium, Benzene, Thallium or Vinyl Chloride tested at SWMU 001t. For these analytes, only barium was detected above the method detection limit. It is important to note that constituent concentrations for these analytes collected inside the SWMU mudpit areas are identical to concentrations for both up gradient and down gradient background samples. Selected samples from SWMU 001t were also re-analyzed for thallium. Re-analysis established a lower detection limit for thallium of <0.2 mg/l.

4.7 Evaluation of Selected Analytical Results Using Risk Based Concentrations

The DOE used the RBC table to evaluate the analytical results for Barium, Benzene, Thallium, and Vinyl Chloride samples collected at SWMU 001t. These criteria appeared to most closely match the parameters established in Appendix D. The SSL for transfers to groundwater are not appropriate because geologic data demonstrates that any potential release of hazardous constituents from SWMU 001t to groundwater is extremely remote.

The RBC soil concentration for Barium is 140,000 mg/kg, the analytical results for Barium at SWMU 001t ranged from 0.17 mg/l to 0.83 mg/l. These TCLP concentrations can be converted to total concentrations (mg/kg equivalent) by multiplying the TCLP concentration by 20. Thus the total concentration equivalent for Barium analytes at SWMU 001t range from 3.4 mg/kg to 16.6 mg/kg.

Using the same methodology, the Region III RBC soil concentration for Benzene is 200 mg/kg. Benzene concentrations at SWMU 001t were all listed at below the TCLP method detection limit of <0.05 mg/l. Converting the TCLP concentration to total concentrations, the total Benzene concentration for all samples at SWMU 001t is <1.0 mg/kg, significantly below the 200 mg/kg RBC soil concentration.

No RBC industrial soil ingestion concentration is provided in Table 1 for Thallium, however, an SSL for soil transfers to groundwater is provided. As discussed earlier, geologic data demonstrates that the release of constituents from SWMU 001t to groundwater is extremely remote. Thus, a soil screening concentration has limited application at this site.

Initial thallium analyses at SWMU 001t were all at a method detection limit of <2.0 mg/l. Based on these analytical results, a selected group of samples were re-analyzed for thallium. Re-analysis established a lower detection limit for thallium of <0.2 mg/l. No Risk Based soil concentration for Thallium is provided in the EPA Region III RBC table. However, TCLP analytical concentrations for samples collected inside the mudpit area, and for up and down gradient background samples are below SW-846 method detection limits.

The RBC soil concentration for Vinyl Chloride is 3.0 mg/kg. TCLP analyses for Vinyl chloride at all of the boreholes sampled at SWMU 001t had concentrations of <0.1 mg. Converting the TCLP concentration to total concentrations as described earlier, the total Vinyl Chloride concentration at all of the SWMU 001t sample sites is <2.0 mg/kg. Thus, the Vinyl Chloride concentration for all samples collected at the SWMU 001t are below both the method detection limit and the Region III Risk Based Concentrations for industrial soils.

4.8 Proposed Corrective Actions at SWMU 001t

Based on the criteria provided in proposed *40 CFR § 264.514 FR Vol. 55, No. 145, VI(D), p. 30813*, the voluntary release assessment analytical data collected at SWMU 001t demonstrates that no release of hazardous constituents has occurred. This data clearly demonstrates that there is no threat to human health or the environment from drilling activities conducted at SWMU 001t and that additional RFI assessments are not required. In fact, thousands of similar mudpits exist immediately outside the WIPP boundary and the regulations do not require additional corrective actions at these sites.

Because it is the EPA's intent to encourage voluntary corrective actions as described in the preamble of the Proposed Subpart S Rule, the DOE requests that after appropriate public review and agency approval, a No Further Action determination be granted for SWMU 001t prior to the issuance of the RCRA Part B Permit for the WIPP. If this determination is supported by both the EPA and NMED, this site will be replanted with native vegetation, in accordance with guidelines developed in the *WIPP Land Management Plan (DOE WIPP 93-004)*.

REFERENCES

Davies P.B, 1989, *Variable-density Groundwater Flow and Paleohydrology in the Waste Isolation Pilot Plant (WIPP) Region, Southeastern New Mexico*, U.S. Geological Survey, Open-File Report 88-490, p. 139.

D'Appolonia Consulting Engineers, 1982b, *Basic Data Report for Drill hole WIPP-12 (Waste Isolation Pilot Plant)*, Sandia National Laboratory Report SAND82-2336.

DOE/WIPP Draft 2115, *Voluntary Release Assessment/Corrective Action Work Plan for Solid Waste Management Units Located at the Waste Isolation Pilot Plant (WIPP)*

DOE/WIPP WP02-EM1, 1994, *Quality Assurance Project Plan for WIPP Site Effluent and Hazardous Materials Sampling Plan*, WP02-EM1, Rev.0

DOE/WIPP 91-005, 1993, *Resource Conservation and Recovery Act Part B Permit Application: Waste Isolation Pilot Plant*, (Rev. 5)

DOE WIPP 93-004, January 1996, *Waste Isolation Pilot Plant WIPP Land Management Plan*

DOE/WIPP, WP02-EM2, *WIPP Site Effluent and Hazardous Materials Sampling Plan*, WP02-EM2, Rev.0.

EPA, *Corrective Actions for Solid Waste Management Units at Hazardous Waste Management Facilities*, Proposed Rule, Federal Register, Vol. 55, No. 145, July 27, 1990.

EPA, 1994, EPA 520-R-94-004, *Final RCRA Corrective Action Plan*, OSWER Directive 9902.3-2A.

EPA, QA/G-41994, *Guidance for the Data Quality Objectives Process*.

EPA, May 1989. EPA 530/SW-89-031, *RCRA Facility Investigation (RFI) Guidance, Development of an RFI Work Plan and General Considerations for RCRA Facility Investigations*, (Vol. 1).

EPA, October 1995, *EPA Region III Risk-Based Concentration Table, July -December 1995*. EPA Region III Office of RCRA Technical & Program Support Branch (3HW70).

EPA, 1994, *Test Methods for Evaluating Solid Waste, Physical and Chemical Methods*, SW-846.

Halliburton NUS Laboratories, *Halliburton NUS Laboratories General Quality Assurance Plan*. March 10, 1995.

Harding Lawson and Associates, *Soil Sampling Program Data Review and Validation Procedure,* WIPP Release Assessment/Corrective Action Program, December 13, 1995.

Holt, R.M., and Powers, D.W., 1990, *Geologic Mapping of the Air Intake Shaft a the Waste Isolation Pilot Plant*, DOE/WIPP 90-051, U.S. Department of Energy, Carlsbad, NM.

International Minerals and Chemical Corporation, *Log of Prospect Well, IMC 374,* page 1, April 1965.

Lappin, A.R., Hunter, R.L., Graber, D.P., and Davies P.B., eds. 1989, *Systems analysis long-term radionuclide transport and dose assessments, Waste Isolation pilot Plant (WIPP), southeastern New Mexico: Sandia National Laboratory Report SAND89-0462.*

Mercer, J.W., 1983, *Geohydrology of the Proposed Waste Isolation Pilot Plant Site, Los Medanos Area, Southeastern New Mexico*, U.S. Geological Survey, Water-Resources Investigations Report 83-4016, p. 178.

Miller, D. N., 1955. *Petrology of the Pierce Canyon Formation, Delaware Basin, Texas and New Mexico*, PhD. Thesis, University of Texas, Austin.

Miller, D. N., 1966. *Petrology of the Pierce Canyon Red Beds, Delaware Basin, Texas and New Mexico*, American Association of Petroleum Geologists Bulletin, Vol. 80, pp. 283-307.

NMED/DOE/AIP 94/1, 1993, *Assessment of Solid Waste Management Units at the Waste Isolation Pilot Plant*, the WIPP RCRA Facility Assessment (RFA).

Schiel, K. A., 1988. *The Dewey Lake Formation: End Stage Deposit of a Peripheral Foreland Basin*, M.S. Thesis, University of Texas at El Paso, Tx., p. 181.

Schiel, K. A., 1994. *A New Look at the Age, Depositional Environment and Paleogeographic Setting of the Dewey Lake Formation (Late Permian)*, West Texas Geological Society Bulletin, Vol. 33, No. 9, pp. 5-13.

TME 3059, 1980, *Subsurface hydrology of strata overlying the Salado Formation at the Waste Isolation Pilot Plant site*, Eddy County New Mexico: DOE Contract No. DE-AC04-78AL05346.

USGS, 1978, *Test Drilling for Potash Resources: Waste Isolation Pilot Plant Site, Eddy County, New Mexico*, U.S. Geological Survey Open-File Report 78-592.

WIPP-CAO-95-1014, 1995., *Waste Isolation Pilot Plant Project Technical Baseline for Regulatory Compliance*, (Rev. 0).

WIPP Land Withdrawal Act, Public Law 102-579, October 30, 1992.

APPENDIX 1

EPA REGION III RISK-BASED CONCENTRATION TABLE

FOR THE PERIOD JULY 1995 - DECEMBER 1995

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region III
841 Chestnut Street
Philadelphia, Pennsylvania 19107

October 20, 1995

SUBJECT: Risk-Based Concentration Table, July - December 1995

FROM: Roy L. Smith, Ph.D.
Office of RCRA
Technical & Program Support Branch (3HW70)

TO: RBC Table mailing list

Attached is the EPA Region III risk-based concentration (RBC) table, which we distribute semi-annually to all interested parties.

IMPORTANT MESSAGE

EPA Region III has established a homepage on the World Wide Web which you can find at http://earth1.epa.gov:80/ or http://www.epa.gov/. Our homepage will soon include the RBC table in downloadable form. We strongly encourage all RBC table users having Internet access to obtain the table electronically rather than on paper. In this way, users can obtain the most current issue immediately in a form that can be used directly as input for risk assessment calculations. This distribution method will also save large amounts of paper and cost substantially less.

For those lacking Internet access, it's once again time to re-register to receive a paper copy of the RBC table. We need to hear from you periodically to ensure that you still have an interest and that we have your correct address. Please fax your registration request to Vanessa Sizer at 215-597-9890, including your name, address, and phone number. Please don't phone to re-register; we need hard copy to document your continued interest. If we don't hear from you by March 30, 1996, we'll assume you no longer need a paper copy. Thanks for your cooperation.

CONTENTS, USES, AND LIMITATIONS OF THE RBC TABLE

The table contains reference doses and carcinogenic potency slopes (obtained from IRIS through September 1, 1995, HEAST through May 1995, the EPA-NCEA Superfund Health Risk Technical Support Center, and other EPA sources) for nearly 600 chemicals. These toxicity constants have been combined with "standard" exposure scenarios to calculate RBCs--chemical concentrations corresponding to fixed levels of risk (*i.e.*, a hazard quotient of 1, or lifetime cancer risk of 10^{-6}, whichever occurs at a lower concentration) in water, air, fish tissue, and soil.

The RBC table also includes soil screening levels (SSLs) for protection of groundwater

ANSWERS TO FREQUENTLY ASKED QUESTIONS

To help you better understand the RBC table, here are answers to our most often-asked questions:

1. How can the age-adjusted inhalation factor (11.66) be less than either the inhalation rate for a child (12) or for an adult (20)?

Age-adjusted factors are not intake rates, but rather partial calculations which have different units than intake rates do. The fact that these partial calculations have values similar to intake rates is really coincidental, an artifact of the similar magnitude of years of exposure and time-averaged body weight.

2. Why does arsenic appear in the RBC table separately as a carcinogen and a non-carcinogen, while other contaminants do not?

Arsenic is double-entered to ensure that the risk assessor realizes that non-carcinogenic concerns are significant for arsenic. Otherwise, one might be tempted to accept a 1e-4 risk (37 ppm in residential soil), when the oral reference dose would be exceeded at 23 ppm.

Also, EPA has a little-known risk management policy for arsenic (dating from 1988) that suggests that arsenic-related cancer risks of up to 1e-3 can be accepted because the cancers are squamous cell carcinomas with a low mortality rate. Thus, noncarcinogenic RBCs represent an important limitation on acceptable arsenic concentrations.

3. Many contaminants have no inhaled reference dose or carcinogenic potency slope in IRIS, yet these numbers appear in the RBC table with IRIS given as the source. Where did the numbers come from?

Most inhaled reference doses and potency slopes in the RBC table are converted from reference concentrations and unit risk values which do appear in IRIS. These conversions assume 70-kg persons inhaling 20 m^3/d. For example, the inhalation unit risk for arsenic (4.3e-3 risk per $\mu g/m^3$) is divided by 20 m^3/d and multiplied by 70 kg times 1000 μg/mg, yielding a CPSi of 15.1 risk per mg/kg/d.

4. Why does the RBC table base soil RBCs for cadmium and manganese on reference doses that apply only to drinking water?

The RBC table's use of the drinking water RfDs for cadmium and manganese reflects (1) the limited space available in the already-crowded table, and (2) the intended use of the table as a screening tool rather than a source of cleanup levels (thereby making false positives acceptable). For a formal risk assessment, Region III would use the food RfDs for soil ingestion.

At this time, only two substances (as far as we know) have distinct oral RfDs for water and food--cadmium and manganese. Adding the two food RfDs to the table would require an entire column, which would be about 99.9% blank. The table has become so crowded that it would be difficult to accommodate another column. Also, we given this problem a relatively low

reference dose or potency slope for inorganic lead, so it wasn't possible to calculate risk-based concentrations. EPA considers lead a special case because:

(1) Lead is ubiquitous in all media, so human exposure comes from multiple sources. Comparing single-medium exposures with a reference dose would be misleading.

(2) If EPA did develop a reference dose for lead by the same methods other reference doses, we would probably find that most people already exceed it. Since EPA already knows this and is moving aggressively to lower lead releases nationally, such findings at individual sites would be irrelevant and unduly alarming.

(3) EPA decided to take a new approach to separate important lead exposures from trivial ones. EPA developed a computer model (the IEUBK model) which predicts children's blood lead concentrations using lead levels in various media as inputs. The idea is to evaluate a child's entire environment, and reduce lead exposures in the most cost-effective way.

On the practical side, there are several EPA policies which effectively substitute for RBCs. The EPA Office of Solid Waste has released a detailed directive on risk assessment and cleanup of residential soil lead. The directive recommends that soil lead levels less than 400 ppm be considered safe for residential use. Above that level, the document suggests collecting certain types of data and modeling children's blood lead with the IEUBK model. For the purposes of the RBC table, the de facto residential soil number would be 400 mg/kg. For water, we suggest 15 ppb (from the national EPA Action Level), and for air, the National Ambient Air Quality Standard.

9. Where did the potency slopes for carcinogenic PAHs come from?

The source of the potency slopes for PAHs is "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons", Final Draft, EPA Environmental Criteria and Assessment Office, Cincinnati, OH. It's available from NTIS as document number ECAO-CIN-842 (March, 1993). The slopes are expressed in terms of order-of-magnitude equivalence factors relating the compounds to benzo[a]pyrene; we have converted these TEQs to potency slopes to fit the format of the table.

10. May I please have a copy of the January 1991 RBC table?

We're sorry, but no. The RBC table doesn't represent regulation or guidance, so past issues should have no legal importance. Each time we update the table we destroy all obsolete copies, electronic and paper. We do this to ensure that only one set of RBCs, that based on current information, exists at any time.

11. I've noticed that some soil RBCs are 1 million parts per million. Since some of these substances are liquids, that's obviously ridiculous. What is that basis for these calculations?

A soil RBC of 1 million parts per million means that no amount of the contaminant in soil will cause a receptor to exceed the oral reference dose by incidental ingestion of soil. In

It has been NCEA's policy to deny requests for documentation of interim toxicity constants. Although Region 3 has sometimes provided this documentation on request, for the above-stated reasons we have no assurance that the documentation, or even the interim numbers, are current. We've decided to discontinue distributing information that may be misleading. If one of the "E"-coded contaminants is a major risk contributor at your site, we strongly suggest that you work with EPA to develop an up-to-date reference dose or slope factor.

CHANGES IN THIS ISSUE OF THE RBC TABLE

New or revised EPA toxicity constants are now marked with "**" before the contaminant name. This is to help users quickly pick out substances with new RBCs. Formerly these contaminants were printed in underlined boldface type that copied badly. A new basis code, "M" for MCL, has been added to the upper right corner of each page. This code denotes soil screening levels for groundwater protection that are based on EPA Maximum Contaminant Levels.

If you want to raise issues or get answers to questions about the RBC table, please call the Technical Support Help Line at 215-597-1116. The line has a voice mail system to take your calls if we're not available. We'll return your call as soon as we can. Please limit calls to RBC issues; if you have a question about applying RBCs to a site, please call the EPA Regional office handling the project. Thanks for your help and cooperation, and we hope the RBC table continues to be a useful resource.

Attachment

Exposure variables	Value	Symbol
Occupational:		
Exposure frequency (d/y):	250	EFo
Exposure duration (y):	25	EDo
Fraction of contaminated soil ingested (unitless)	0.5	FC

*: Contaminant-specific toxicological constants. The priority among sources of toxicological constants was as follows: (1) IRIS, (2) HEAST, (3) HEAST alternative method, (4) EPA-NCEA Superfund Health Risk Technical Support Center, (5) withdrawn from IRIS or HEAST, and (6) other EPA documents. Each source was used only if numbers from higher-priority sources were unavailable. The EPA Superfund Health Risk Technical Support Center, part of the EPA National Center for Environmental Assessment in Cincinnati, develops provisional RfDs and CPSs on request for contaminants not in IRIS or HEAST. These provisional values are labeled "E = EPA-NCEA provisional" in the table. It is possible they may be obsolete. If one of the "E" constants is important to a Superfund risk assessment, consider requesting, through a Regional risk assessor, a new provisional value.

Age-adjusted factors

Because contact rates with tap water, ambient air, and residential soil are different for children and adults, carcinogenic risks during the first 30 years of life were calculated using age-adjusted factors. These factors approximated the integrated exposure from birth until age 30 by combining contact rates, body weights, and exposure durations for two age groups - small children and adults. The age-adjusted factor for soil was obtained from RAGS IB; the others were developed by analogy.

Air inhalation

$$IFAadj \quad \frac{m^3 \cdot y}{kg \cdot d} = \frac{EDc \cdot IRAc}{BWc} + \frac{(EDtot - EDc) \cdot IRAa}{BWa}$$

Tap water ingestion

$$IFWadj \quad \frac{L \cdot y}{kg \cdot d} = \frac{EDc \cdot IRWc}{BWc} + \frac{(EDtot - EDc) \cdot IRWa}{BWa}$$

Soil ingestion

$$IFSadj \quad \frac{mg \cdot y}{kg \cdot d} = \frac{EDc \cdot IRSc}{BWc} + \frac{(EDtot - EDc) \cdot IRSa}{BWa}$$

Residential water

Volatilization terms were calculated only for compounds with a mark in the "VOC" column. Compounds having a Henry's Law constant greater than 10^{-5} were considered volatile. The list may be incomplete, but is unlikely to include false positives. The equations and the volatilization factor (K, above) were obtained from RAGS IB. Oral potency slopes and reference doses were used for both oral and inhaled exposures for volatile compounds lacking inhalation values. Inhaled potency slopes were substituted for unavailable oral potency slopes only for volatile compounds; inhaled RfDs were substituted for unavailable

Commercial/industrial soil ingestion

RBCs were based on adult occupational exposure, including an assumption that only 50% of total soil ingestion is work-related.

Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR\ BWa\ ATc}{EFo\ EDo \cdot \frac{IRSa}{10^6\ \frac{mg}{kg}} \cdot FC \cdot CPSo}$$

Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ\ RfDo \cdot BWa \cdot ATn}{EFo \cdot EDo \cdot \frac{IRSa}{10^6\ \frac{mg}{kg}} \cdot FC}$$

Residential soil ingestion

RBCs for carcinogens were based on combined childhood and adult exposure; RBCs for non-carcinogens were based on childhood exposure only.

Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot ATc}{EFr \cdot \frac{IFSadj}{10^6\ \frac{mg}{kg}} \cdot CPSo}$$

Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ\ RfDo \cdot BWc \cdot ATn}{EFr \cdot EDc \cdot \frac{IRSc}{10^6\ \frac{mg}{kg}}}$$

Development of Soil Screening Levels

General

In December 1994 the EPA Office of Solid Waste and Emergency Response proposed Soil Screening Guidance (Document 9355.4-1, PB95-963530, EPA540/R-94/101, available through NTIS at 703-487-4650). This draft document provides (1) a framework in which soil screening levels are to be used, (2) a detailed methodology for calculating soil screening levels, and (3) soil screening levels for 107 substances.

Consistent with this new guidance, the risk-based concentration table now includes two columns of generic soil screening levels (SSLs). OSWER's 107 proposed soil screening levels have been added verbatim. In addition, the proposed SSL methodology has been used to calculate soil screening levels for more substances, which are also included in the

consulting that document. The "unofficial" SSLs were developed under the following conditions:

Soil Screening Levels for Inhalation

Inhaled reference doses and potency slopes were used if available. If inhalation values were not available, oral RfDs and potency slopes were substituted. SSLs were calculated only for substances for which aqueous solubility, Koc, Henry's Law constant, and diffusivity in air were available. SSLs were calculated only for substances for which a volatilization factor could be calculated. This was done because OSWER's large proposed particulate emission factor rendered it pointless to estimate SSLs for particulate emissions alone. The final calculated SSL shown in the RBC table is the smaller of the risk-based SSL and the soil saturation concentration. All calculated SSLs were rounded to 2 significant figures.

The OSWER risk algorithms for inhalation were revised in order to be consistent with the rest of the RBC table. Only calculated SSLs were affected by this; SSLs proposed by OSWER are presented verbatim. Calculated SSLs for inhalation of carcinogens were based on an integrated lifetime exposure rather than adult exposure. SSLs for inhalation of noncarcinogens were based on adult exposure for 350 days per year rather than 365 days per year. The following algorithms were used to calculate inhalation SSLs:

Carcinogens

$$SSL \ \frac{mg}{kg} = \frac{TR \cdot ATc}{EFr \cdot IFAadj \cdot \left(\frac{1}{VF} + \frac{1}{PEF}\right) \cdot CPSi}$$

Non-carcinogens

$$SSL \ \frac{mg}{kg} = \frac{THQ \cdot BWa \cdot ATn \cdot RfDi}{EFr \cdot EDtot \cdot IRAa \cdot \left(\frac{1}{VF} + \frac{1}{PEF}\right)}$$

Soil Screening Levels for Groundwater Use

All algorithms were as proposed by OSWER. MCLs were used as target groundwater concentrations if available. If MCLs were unavailable the risk-based concentration in the "tap water" column of the RBC table was used as the target groundwater concentration. All SSLs for groundwater are based on a dilution-attenuation factor (DAF) of 10. Since these SSLs scale linearly with DAF, the SSLs for DAF=1 would be ten times lower. They were omitted to conserve space. All groundwater SSLs were rounded to 2 significant figures and capped at unity.

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Arsine	7784421		1.43E-05 I				0.52 N	0.052 N					
Assure	76578148	9.00E-03 I					330 N	33 N	12 N	18000 N	700 N		
Asulam	3337711	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Atrazine	1912249	3.50E-02 I		2.22E-01 H			0.3 C	0.028 C	0.014 C	26 C	2.9 C		
Avermectin B1	65195553	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Azobenzene	103333			1.10E-01 I	1.08E-01 I		0.61 C	0.058 C	0.029 C	52 C	5.8 C		
Barium and compounds	7440393	7.00E-02 I	1.43E-04 A				2600 N	0.52 N	95 N	140000 N	5500 N	350000 E	32 E
Baygon	114261	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Bayleton	43121433	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Baythroid	68359375	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Benefin	1861401	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N		
Benomyl	17804352	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Bentazon	25057890	2.50E-03 I					91 N	9.1 N	3.4 N	5100 N	200 N		
Benzaldehyde	100527	1.00E-01 I				☒	610 N	370 N	140 N	200000 N	7800 N		
Benzene	71432		1.71E-03 E	2.90E-02 I	2.90E-02 I	☒	0.36 C	0.22 C	0.11 C	200 C	22 C	0.5 E	0.02 E
Benzenethiol	108985	1.00E-05 H					0.37 N	0.037 N	0.014 N	20 N	0.78 N		
Benzidine	92875	3.00E-03 I		2.30E+02 I	2.35E+02 I		0.00029 C	0.00003 C	0.00001 C	0.025 C	0.0028 C	1.3 C	1.100E-06 C
Benzoic acid	65850	4.00E+00 I					150000 N	15000 N	5400 N	1E+06 N	310000 N	320 S	280 E
Benzotrichloride	98077			1.30E+01 I			0.0052 C	0.00048 C	0.00024 C	0.44 C	0.049 C	0.012 C	0.000073 C
Benzyl alcohol	100516	3.00E-01 H					11000 N	1100 N	410 N	610000 N	23000 N		
Benzyl chloride	100447			1.70E-01 I		☒	0.062 C	0.037 C	0.019 C	34 C	3.8 C	0.5 C	0.00036 C
Beryllium and compounds	7440417	5.00E-03 I		4.30E+00 I	8.40E+00 I		0.016 C	0.00075 C	0.00073 C	1.3 C	0.15 C	690 E	180 E
Bidrin	141662	1.00E-04 I					3.7 N	0.37 N	0.14 N	200 N	7.8 N		
Biphenthrin (Talstar)	82657043	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
1,1-Biphenyl	92524	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N	9000 S	110 N
Bis(2-chloroethyl)ether	111444			1.10E+00 I	1.16E+00 I	☒	0.0092 C	0.0054 C	0.0029 C	5.2 C	0.58 C	0.3 E	0.0003 E
Bis(2-chloroisopropyl)ether	39638329	4.00E-02 I		7.00E-02 H	3.50E-02 H	☒	0.26 C	0.18 C	0.045 C	82 C	9.1 C		
Bis(chloromethyl)ether	542881			2.20E+02 I	2.17E+02 I	☒	0.00005 C	0.00003 C	0.00001 C	0.026 C	0.0029 C	0.00004 C	1.000E-07 C
Bis(2-chloro-1-methylethyl)ether				7.00E-02 W	7.00E-02 W		0.96 C	0.089 C	0.045 C	82 C	9.1 C		
Bis(2-ethylhexyl)phthalate (DEHP)	117817	2.00E-02 I		1.40E-02 I			4.8 C	0.45 C	0.23 C	410 C	46 C	210 E	11 E
Bisphenol A	80057	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Boron (and borates)	7440428	9.00E-02 I	5.71E-03 H				3300 N	21 N	120 N	180000 N	7000 N		
Boron trifluoride	7637072		2.00E-04 H				7.3 N	0.73 N					
Bromodichloromethane	75274	2.00E-02 I		6.20E-02 I		☒	0.17 C	0.1 C	0.051 C	92 C	10 C	1800 E	0.3 E
Bromoethene	593602				1.10E-01 H	☒	0.096 C	0.057 C					
Bromoform (tribromomethane)	75252	2.00E-02 I		7.90E-03 I	3.85E-03 I	☒	2.4 C	1.6 C	0.4 C	720 C	81 C	46 E	0.5 E
Bromomethane	74839	1.40E-03 I	1.43E-03 I			☒	8.7 N	5.2 N	1.9 N	2900 N	110 N	2 E	0.1 E
4-Bromophenyl phenyl ether	101553	5.80E-02 O					2100 N	210 N	78 N	120000 N	4500 N		
Bromophos	2104963	5.00E-03 H					180 N	18 N	6.8 N	10000 N	390 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Chlorodifluoromethane	75456		1.43e+01 I			☒	87000 N	52000 N					
Chloroethane	75003	4.00E-01 E	2.86E+00 I			☒	8600 N	10000 N	540 N	820000 N	31000 N	2600 S	33 N
2-Chloroethyl vinyl ether	110758	2.50E-02 O				☒	150 N	91 N	34 N	51000 N	2000 N		
Chloroform	67663	1.00E-02 I		6.10E-03 I	8.05E-02 I	☒	0.15 C	0.078 C	0.52 C	940 C	100 C	0.2 E	0.3 E
Chloromethane	74873			1.30E-02 H	6.30E-03 H	☒	1.4 C	0.99 C	0.24 C	440 C	49 C	0.063 C	0.0066 C
4-Chloro-2,2-methylaniline hydrochloride	3165933			4.60E-01 H			0.15 C	0.014 C	0.0069 C	12 C	1.4 C		
4-Chloro-2-methylaniline	95692			5.80E-01 H			0.12 C	0.011 C	0.0054 C	9.9 C	1.1 C		
beta-Chloronaphthalene	91587	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N	2.8 S	140 N
o-Chloronitrobenzene	88733			2.50E-02 H		☒	0.42 C	0.25 C	0.13 C	230 C	26 C		
p-Chloronitrobenzene	100005			1.80E-02 H		☒	0.59 C	0.35 C	0.18 C	320 C	35 C		
2-Chlorophenol	95578	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N	53000 E	2 E
2-Chloropropane	75296		2.86E-02 H			☒	170 N	100 N				22 N	0.64 N
Chlorothalonil	1897456	1.50E-02 I		1.10E-02 H			6.1 C	0.57 C	0.29 C	520 C	58 C		
o-Chlorotoluene	95498	2.00E-02 I				☒	120 N	73 N	27 N	41000 N	1600 N	1200 N	5.6 N
Chlorpropham	101213	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Chlorpyrifos	2921882	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Chlorpyrifos-methyl	5598130	1.00E-02 H					370 N	37 N	14 N	20000 N	780 N		
Chlorsulfuron	64902723	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Chlorthiophos	60238564	8.00E-04 H					29 N	2.9 N	1.1 N	1600 N	63 N		
Chromium III and compounds	16065831	1.00E+00 I	5.71E-07 W				37000 N	0.0021 N	1400 N	1E+06 N	78000 N		
Chromium VI and compounds	18540299	5.00E-03 I			4.20E+01 I		180 N	0.00015 C	6.8 N	10000 N	390 N	140 E	19 E
Coal tar	8001589				2.20E+00 W			0.0028 C					
Cobalt	7440484	6.00E-02 E					2200 N	220 N	81 N	120000 N	4700 N		
Coke Oven Emissions	8007452				2.17E+00 I			0.0029 C					
**Copper and compounds	7440508	4.00E-02 E					1500 N	150 N	54 N	82000 N	3100 N		
Crotonaldehyde	123739	1.00E-02 W		1.90E+00 H	1.90E+00 W		0.035 C	0.0033 C	0.0017 C	3 C	0.34 C		
Cumene	98828	4.00E-02 I	2.57E-03 H				1500 N	9.4 N	54 N	82000 N	3100 N	81 N	65 N
Cyanides:													
Barium cyanide	542621	1.00E-01 W					3700 N	370 N	140 N	200000 N	7800 N		
Calcium cyanide	592018	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Copper cyanide	544923	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Cyanazine	21725462	2.00E-03 H		8.40E-01 H			0.08 C	0.0075 C	0.0038 C	6.8 C	0.76 C		
Cyanogen	460195	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Cyanogen bromide	506683	9.00E-02 I					3300 N	330 N	120 N	180000 N	7000 N		
Cyanogen chloride	506774	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Free cyanide	57125	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Hydrogen cyanide	74908	2.00E-02 I	8.57E-04 I				730 N	3.1 N	27 N	41000 N	1600 N		
Potassium cyanide	151508	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Potassium silver cyanide	506616	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
4-(2,4-Dichlorophenoxy)butyric Acid	94826	8.00E-03 I					290 N	29 N	11 N	16000 N	630 N		
1,2-Dichloropropane	78875		1.14E-03 I	6.80E-02 H		☒	0.16 C	0.092 C	0.046 C	84 C	9.4 C	11 E	0.02 E
2,3-Dichloropropanol	616239	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
1,3-Dichloropropene	542756	3.00E-04 I	5.71E-03 I	1.75E-01 H	1.30E-01 H	☒	0.077 C	0.048 C	0.018 C	33 C	3.7 C	0.1 E	0.001 E
Dichlorvos	62737	5.00c-04 I	1.43E-04 I	2.90E-01 I			0.23 C	0.022 C	0.011 C	20 C	2.2 C	3.5 C	0.00072 C
Dicofol	115322			4.40E-01 W			0.15 C	0.014 C	0.0072 C	13 C	1.5 C		
Dicyclopentadiene	77736	3.00E-02 H	5.71E-05 A			☒	0.42 N	0.21 N	41 N	61000 N	2300 N		
Dieldrin	60571	5.00E-05 I		1.60E+01 I	1.61E+01 I		0.0042 C	0.00039 C	0.0002 C	0.36 C	0.04 C	2 E	0.001 E
Diesel emissions			1.43E-03 I				52 N	5.2 N					
Diethyl phthalate	84662	8.00E-01 I					29000 N	2900 N	1100 N	1E+06 N	63000 N	520 E	110 E
Diethylene glycol, monobutyl ether	112345		5.71E-03 H				210 N	21 N					
Diethylene glycol, monoethyl ether	111900	2.00E+00 H					73000 N	7300 N	2700 N	1E+06 N	160000 N		
Diethylforamide	617845	1.10E-02 H					400 N	40 N	15 N	22000 N	860 N		
Di(2-ethylhexyl)adipate	103231	6.00E-01 I		1.20E-03 I			56 C	5.2 C	2.6 C	4800 C	530 C		
Diethylstilbestrol	56531			4.70E+03 H			0.00001 C	1E-06 C	7E-07 C	0.0012 C	0.00014 C		
Difenzoquat (Avenge)	43222486	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Diflubenzuron	35367385	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
1,1-Difluoroethane	75376		1.14E+01 I			☒	69000 N	42000 N					
Diisopropyl methylphosphonate (DIMP)	1445756	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Dimethipin	55290647	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Dimethoate	60515	2.00E-04 I					7.3 N	0.73 N	0.27 N	410 N	16 N		
3,3'-Dimethoxybenzidine	119904			1.40E-02 H			4.8 C	0.45 C	0.23 C	410 C	46 C		
Dimethylamine	124403		5.71E-06 W				0.21 N	0.021 N					
2,4-Dimethylaniline hydrochloride	21436964			5.80E-01 H			0.12 C	0.011 C	0.0054 C	9.9 C	1.1 C		
2,4-Dimethylaniline	95681			7.50E-01 H			0.09 C	0.0083 C	0.0042 C	7.6 C	0.85 C		
N-N-Dimethylaniline	121697	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
3,3'-Dimethylbenzidine	119937			9.20E+00 H			0.0073 C	0.00068 C	0.00034 C	0.62 C	0.069 C	29 C	0.00039 C
N,N-Dimethylformamide	68122	1.00E-01 H	8.57E-03 I				3700 N	31 N	140 N	200000 N	7800 N		
1,1-Dimethylhydrazine	57147			2.60E+00 W	3.50E+00 W		0.026 C	0.0018 C	0.0012 C	2.2 C	0.25 C		
1,2-Dimethylhydrazine	540738			3.70E+01 W	3.70E+01 W		0.0018 C	0.00017 C	0.00009 C	0.15 C	0.017 C		
2,4-Dimethylphenol	105679	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N	5400 S	3 E
2,6-Dimethylphenol	576261	6.00E-04 I					22 N	2.2 N	0.81 N	1200 N	47 N		
3,4-Dimethylphenol	95658	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Dimethyl phthalate	131113	1.00E+01 H					370000 N	37000 N	14000 N	1E+06 N	780000 N	1600 E	1200 E
Dimethyl terephthalate	120616	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
1,2-Dinitrobenzene	528290	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
1,3-Dinitrobenzene	99650	1.00E-04 I					3.7 N	0.37 N	0.14 N	200 N	7.8 N		
1,4-Dinitrobenzene	100254	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
4,6-Dinitro-o-cyclohexyl phenol	131895	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Ethyl p-nitrophenyl phenylphosphorothioate	2104645	1.00E-05 I					0.37 N	0.037 N	0.014 N	20 N	0.78 N		
Ethylnitrosourea	759739			1.40E+02 W			0.00048 C	0.00005 C	0.00002 C	0.041 C	0.0046 C		
Ethylphthalyl ethyl glycolate	84720	3.00E+00 I					110000 N	11000 N	4100 N	1E+06 N	230000 N		
Express	10120	8.00E-03 I					290 N	29 N	11 N	16000 N	630 N		
Fenamiphos	22224926	2.50E-04 I					9.1 N	0.91 N	0.34 N	510 N	20 N		
Fluometuron	2164172	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Fluoride	7782414	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N		
Fluoridone	59756604	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Flurprimidol	56425913	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Flutolanil	66332965	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N		
Fluvalinate	69409945	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Folpet	133073	1.00E-01 I		3.50E-03 I			19 C	1.8 C	0.9 C	1600 C	180 C		
Fomesafen	72178020			1.90E-01 I			0.35 C	0.033 C	0.017 C	30 C	3.4 C		
Fonofos	944229	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Formaldehyde	50000	2.00E-01 I			4.55E-02 I		7300 N	0.14 C	270 N	410000 N	16000 N		
Formic Acid	64186	2.00E+00 H					73000 N	7300 N	2700 N	1E+06 N	160000 N		
Fosetyl-al	39148248	3.00E+00 I					110000 N	11000 N	4100 N	1E+06 N	230000 N		
Furan	110009	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Furazolidone	67458			3.80E+00 H			0.018 C	0.0016 C	0.00083 C	1.5 C	0.17 C		
Furfural	98011	3.00E-03 I	1.43E-02 A				110 N	52 N	4.1 N	6100 N	230 N		
Furium	531828			5.00E+01 H			0.0013 C	0.00013 C	0.00006 C	0.11 C	0.013 C		
Furmecyclox	60568050			3.00E-02 I			2.2 C	0.21 C	0.11 C	190 C	21 C		
Glufosinate-ammonium	77182822	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Glycidaldehyde	765344	4.00E-04 I	2.86E-04 H				15 N	1 N	0.54 N	820 N	31 N		
Glyphosate	1071836	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Haloxyfop-methyl	69806402	5.00E-05 I					1.8 N	0.18 N	0.068 N	100 N	3.9 N		
Harmony	79277273	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
HCH (alpha)	319846			6.30E+00 I	6.30E+00 I		0.011 C	0.00099 C	0.0005 C	0.91 C	0.1 C	0.9 E	0.0004 E
HCH (beta)	319857			1.80E+00 I	1.80E+00 I		0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C	16 E	0.002 E
HCH (gamma) Lindane	58899	3.00E-04 I		1.30E+00 H			0.052 C	0.0048 C	0.0024 C	4.4 C	0.49 C	4.2 C	0.006 E
HCH-technical	608731			1.80E+00 I	1.79E+00 I		0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C		
Heptachlor	76448	5.00E-04 I		4.50E+00 I	4.55E+00 I	☒	0.0023 C	0.0014 C	0.0007 C	1.3 C	0.14 C	0.3 E	0.06 E
Heptachlor epoxide	1024573	1.30E-05 I		9.10E+00 I	9.10E+00 I	☒	0.0012 C	0.00069 C	0.00035 C	0.63 C	0.07 C	1 E	0.03 E
Hexabromobenzene	87821	2.00E-03 I				☒	12 N	7.3 N	2.7 N	4100 N	160 N		
Hexachlorobenzene	118741	8.00E-04 I		1.60E+00 I	1.61E+00 I	☒	0.0066 C	0.0039 C	0.002 C	3.6 C	0.4 C	1 E	0.8 E
Hexachlorobutadiene	87683	2.00E-04 H		7.80E-02 I	7.70E-02 I	☒	0.14 C	0.081 C	0.04 C	73 C	8.2 C	1 E	0.1 E
Hexachlorocyclopentadiene	77474	7.00E-03 I	2.00E-05 H			☒	0.15 N	0.073 N	9.5 N	14000 N	550 N	2 E	10 E
Hexachlorodibenzo-p-dioxin mixture	19408743			6.20E+03 I	4.55E+03 I		0.00001 C	1E-06 C	5E-07 C	0.0009 C	0.0001 C		
Hexachloroethane	67721	1.00E-03 I		1.40E-02 I	1.40E-02 I	☒	0.75 C	0.45 C	0.23 C	410 C	46 C	49 E	0.2 E

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg-d/mg	CPSi kg-d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Methamidophos	10265926	5.00E-05 I					1.8 N	0.18 N	0.068 N	100 N	3.9 N		
Methanol	67561	5.00E-01 I					18000 N	1800 N	680 N	1E+06 N	39000 N		
Methidathion	950378	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Methomyl	16752775	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Methoxychlor	72435	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N	41 S	62 E
2-Methoxyethanol acetate	110496	2.00E-03 A					73 N	7.3 N	2.7 N	4100 N	160 N		
2-Methoxyethanol	109864	1.00E-03 H	5.71E-03 I				37 N	21 N	1.4 N	2000 N	78 N		
2-Methoxy-5-nitroaniline	99592			4.60E-02 H			1.5 C	0.14 C	0.069 C	120 C	14 C		
Methyl acetate	79209	1.00E+00 H					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Methyl acrylate	96333	3.00E-02 A					1100 N	110 N	41 N	61000 N	2300 N		
2-Methylaniline hydrochloride	636215			1.80E-01 H			0.37 C	0.035 C	0.018 C	32 C	3.5 C		
2-Methylaniline	95534			2.40E-01 H			0.28 C	0.026 C	0.013 C	24 C	2.7 C		
Methyl chlorocarbonate	79221	1.00E+00 W					37000 N	3700 N	1400 N	1E+06 N	78000 N		
4-(2-Methyl-4-chlorophenoxy) butyric acid	94815	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
2-Methyl-4-chlorophenoxyacetic acid	94746	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
2-(2-Methyl-14-chlorophenoxy)propionic acid	93652	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Methylcyclohexane	108872		8.57E-01 H				31000 N	3100 N				60 S	1500 N
Methylene bromide	74953	1.00E-02 A				☒	61 N	37 N	14 N	20000 N	780 N		
Methylene chloride	75092	6.00E-02 I	8.57E-01 H	7.50E-03 I	1.64E-03 I	☒	4.1 C	3.8 C	0.42 C	760 C	85 C	7 E	0.01 E
4,4'-Methylene bis(2-chloroaniline)	101144	7.00E-04 H		1.30E-01 H	1.30E-01 H		0.52 C	0.048 C	0.024 C	44 C	4.9 C		
4,4'-Methylenebisbenzeneamine	101779			2.50E-01 W			0.27 C	0.025 C	0.013 C	23 C	2.6 C		
4,4'-Methylene bis(N,N'-dimethyl)aniline	101611			4.60E-02 I			1.5 C	0.14 C	0.069 C	120 C	14 C		
4,4'-Methylenediphenyl isocyanate	101688		5.71E-06 I			☒	0.035 N	0.021 N					
Methyl ethyl ketone	78933	6.00E-01 I	2.86E-01 I			☒	1900 N	1000 N	810 N	1E+06 N	47000 N		
Methyl hydrazine	60344			1.10E+00 W			0.061 C	0.0057 C	0.0029 C	5.2 C	0.58 C		
Methyl isobutyl ketone	108101	8.00E-02 H	2.29E-02 A				2900 N	84 N	110 N	160000 N	6300 N		
Methyl methacrylate	80626	8.00E-02 H					2900 N	290 N	110 N	160000 N	6300 N		
2-Methyl-5-nitroaniline	99558			3.30E-02 H			2 C	0.19 C	0.096 C	170 C	19 C		
Methyl parathion	298000	2.50E-04 I					9.1 N	0.91 N	0.34 N	510 N	20 N	28 S	0.041 N
2-Methylphenol (o-cresol)	95487	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N	12000 S	6 E
3-Methylphenol (m-cresol)	103394	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
4-Methylphenol (p-cresol)	106445	5.00E-03 H					180 N	18 N	6.8 N	10000 N	390 N		
Methyl styrene (mixture)	25013154	6.00E-03 A	1.14E-02 A			☒	60 N	42 N	8.1 N	12000 N	470 N	100 N	1 N
Methyl styrene (alpha)	98839	7.00E-02 A				☒	430 N	260 N	95 N	140000 N	5500 N	8.8 S	7.5 N
Methyl tertbutyl ether (MTBE)	1634044	5.00E-03 E	8.57E-01 I			☒	180 N	3100 N	6.8 N	10000 N	390 N		
Metolaclor (Dual)	51218452	1.50E-01 H					5500 N	550 N	200 N	310000 N	12000 N		
Metribuzin	21087649	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Mirex	2385855	2.00E-04 I		1.80E+00 W			0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C		
Molinate	2212671	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg-d/mg	CPSi kg-d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Oxadiazon	19666309	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Oxamyl	23135220	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Oxyfluorfen	42874033	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Paclobutrazol	76738620	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Paraquat	1910425	4.50E-03 I					160 N	16 N	6.1 N	9200 N	350 N		
Parathion	56382	6.00E-03 H					220 N	22 N	8.1 N	12000 N	470 N	110 S	3.9 N
Pebulate	1114712	5.00E-02 H					1800 N	180 N	68 N	100000 N	3900 N		
Pendimethalin	40487421	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Pentabromo-6-chloro cyclohexane	87843			2.30E-02 H			2.9 C	0.27 C	0.14 C	250 C	28 C		
Pentabromodiphenyl ether	32534819	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Pentachlorobenzene	608935	8.00E-04 I				☒	4.9 N	2.9 N	1.1 N	1600 N	63 N	570 N	48 N
Pentachloronitrobenzene	82688	3.00E-03 I		2.60E-01 H		☒	0.041 C	0.024 C	0.012 C	22 C	2.5 C		
Pentachlorophenol	87865	3.00E-02 I		1.20E-01 I			0.56 C	0.052 C	0.026 C	48 C	5.3 C	7.9 C	0.2 E
Permethrin	52645531	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Phenmedipham	13684634	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Phenol	108952	6.00E-01 I					22000 N	2200 N	810 N	1E+06 N	47000 N	21000 S	49 E
m-Phenylenediamine	108452	6.00E-03 I					220 N	22 N	8.1 N	12000 N	470 N		
p-Phenylenediamine	106503	1.90E-01 H					6900 N	690 N	260 N	390000 N	15000 N		
Phenylmercuric acetate	62384	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
2-Phenylphenol	90437			1.94E-03 H			35 C	3.2 C	1.6 C	3000 C	330 C		
Phorate	298022	2.00E-04 H					7.3 N	0.73 N	0.27 N	410 N	16 N		
Phosmet	732116	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
**Phosphine	7803512	3.00E-04 I	8.57E-05 H				11 N	0.31 N	0.41 N	610 N	23 N		
**Phosphoric acid	7664382	I	2.86E-03				100 N	10 N					
Phosphorus (white)	7723140	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
p-Phthalic acid	100210	1.00E+00 H					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Phthalic anhydride	85449	2.00E+00 I	3.43E-02 H				73000 N	130 N	2700 N	1E+06 N	160000 N		
Picloram	1918021	7.00E-02 I					2600 N	260 N	95 N	140000 N	5500 N		
Pirimiphos-methyl	29232937	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Polybrominated biphenyls		7.00E-06 H		8.90E+00 H			0.0076 C	0.0007 C	0.00035 C	0.64 C	0.072 C		
Polychlorinated biphenyls (PCBs)	1336363			7.70E+00 I			0.0087 C	0.00081 C	0.00041 C	0.74 C	0.083 C		
Aroclor 1016	12674112	7.00E-05 I					2.6 N	0.26 N	0.095 N	140 N	5.5 N		
Aroclor 1254	11097691	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Polychlorinated terphenyls (PCTs)				4.50E+00 E			0.015 C	0.0014 C	0.0007 C	1.3 C	0.14 C		
Polynuclear aromatic hydrocarbons												110000 S	
Acenaphthene	83329	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N	120 S	200 E
Anthracene	120127	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N	6.8 S	4300 E
Benz[a]anthracene	56553			7.30E-01 E	6.10E-01 E		0.092 C	0.01 C	0.0043 C	7.8 C	0.88 C	27 S	0.7 E
Benzo[b]fluoranthene	205992			7.30E-01 E	6.10E-01 E		0.092 C	0.01 C	0.0043 C	7.8 C	0.88 C	23 S	4 E

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg-d/mg	CPSi kg-d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Silver and compounds	7440224	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Simazine	122349	5.00E-03 I		1.20E-01 H			0.56 C	0.052 C	0.026 C	48 C	5.3 C		
Sodium azide	26628228	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Sodium diethyldithiocarbamate	148185	3.00E-02 I		2.70E-01 H			0.25 C	0.023 C	0.012 C	21 C	2.4 C		
Sodium fluoroacetate	62748	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Sodium metavanadate	13718268	1.00E-03 H					37 N	3.7 N	1.4 N	2000 N	78 N		
Strontium, stable	7440246	6.00E-01 I					22000 N	2200 N	810 N	1E+06 N	47000 N		
Strychnine	57249	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Styrene	100425	2.00E-01 I	2.86E-01 I			☒	1600 N	1000 N	270 N	410000 N	16000 N	1400 E	2 E
Systhane	88671890	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
2,3,7,8-TCDD (dioxin)	1746016			1.56E+05 H	1.16E+05 H		4E-07 C	5E-08 C	C	4E-05 C	4E-06 C		
Tebuthiuron	34014181	7.00E-02 I					2600 N	260 N	95 N	140000 N	5500 N		
Temephos	3383968	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N		
Terbacil	5902512	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Terbufos	13071799	2.50E-05 H					0.91 N	0.091 N	0.034 N	51 N	2 N		
Terbutryn	886500	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
1,2,4,5-Tetrachlorobenzene	95943	3.00E-04 I				☒	1.8 N	1.1 N	0.41 N	610 N	23 N	91 N	0.69 N
1,1,1,2-Tetrachloroethane	630206	3.00E-02 I		2.60E-02 I	2.59E-02 I	☒	0.41 C	0.24 C	0.12 C	220 C	25 C		
1,1,2,2-Tetrachloroethane	79345			2.00E-01 I	2.03E-01 I	☒	0.052 C	0.031 C	0.016 C	29 C	3.2 C	0.4 E	0.001 E
Tetrachloroethylene (PCE)	127184	1.00E-02 I		5.20E-02 E	2.03E-03 E	☒	1.1 C	3.1 C	0.061 C	110 C	12 C	11 E	0.04 E
2,3,4,6-Tetrachlorophenol	58902	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
p,a,a,a-Tetrachlorotoluene	5216251			2.00E+01 H		☒	0.00053 C	0.00031 C	0.00016 C	0.29 C	0.032 C		
Tetrachlorovinphos	961115	3.00E-02 I		2.40E-02 H			2.8 C	0.26 C	0.13 C	240 C	27 C		
Tetraethyldithiopyrophosphate	3689245	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
Tetraethyl lead	78002	1.00E-07 I					0.0037 N	0.00037 N	0.00014 N	0.2 N	0.0078 N	0.00068 N	0.000034 N
**1,1,1,2-Tetrafluoroethane	811972	I	2.29E+01			☒	140000 N	84000 N					
Thallic oxide	1314325	7.00E-05 W					2.6 N	0.26 N	0.095 N	140 N	5.5 N		
Thallium													0.4 E
Thallium acetate	563688	9.00E-05 I					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium carbonate	6533739	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thallium chloride	7791120	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thallium nitrate	10102451	9.00E-05 I					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium selenite	12039520	9.00E-05 W					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium sulfate	7446186	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thiobencarb	28249776	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
2-(Thiocyanomethylthio)-benzothiazole	21564170	3.00E-02 H					1100 N	110 N	41 N	61000 N	2300 N		
Thiofanox	39196184	3.00E-04 H					11 N	1.1 N	0.41 N	610 N	23 N		
Thiophanate-methyl	23564058	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Thiram	137268	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Vanadium sulfate	36907423	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N		
Vernam	1929777	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Vinclozolin	50471448	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Vinyl acetate	108054	1.00E+00 H	5.71E-02 I				37000 N	210 N	1400 N	1E+06 N	78000 N	370 E	84 E
Vinyl bromide	593602		8.57E-04 I			☒	5.2 N	3.1 N				2 N	0.018 N
Vinyl chloride	75014			1.90E+00 H	3.00E-01 H	☒	0.019 C	0.021 C	0.0017 C	3 C	0.34 C	0.002 E	0.01 E
Warfarin	81812	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N	0.046 N	1800 N
m-Xylene	108323	2.00E+00 H	2.00E-01 W			☒	1400 N	730 N	2700 N	1E+06 N	160000 N	950 S	240 M
o-Xylene	9.55E+04	2.00E+00 H	2.00E-01 W			☒	1400 N	730 N	2700 N	1E+06 N	160000 N	730 S	1.50E+02 M
p-Xylene	1.06E+05		8.57E-02 W			☒	520 N	310 N				1000 S	2.20E+02 M
Xylene (mixed)	1.33E+06	2.00E+00 I				☒	12000 N	7300 N	2700 N	1E+06 N	160000 N	320 E	7.40E+01 E
Zinc	7.44E+06	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N		4.20E+04 E
Zinc phosphide	1.31E+06	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Zineb	1.21E+07	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		

APPENDIX 2

RESULTS OF VOLUNTARY RELEASE ASSESSMENT SAMPLES

COLLECTED AT SWMU 001J

WIPP Soil Samples
Data Review Form

Statement of Purpose:

To review laboratory data packages for soil samples collected at SWMUs, evaluate data package completeness, and compare analytical quality control data to program objectives.

Section 1: Data Package Identification

P.O. Number: 67763 - Report 27110 No. Of Samples In Package: 26
Sample Collection Date: 7/26/95, 7/27/95 Sample Receipt Date: 7/28/95
Sample Report Date: 8/17/95 Analytical Parameters: TCLP - VOCs, Metals
Sample Numbers in Data Package: RA-95-001 (P0316870), RA-95-003 (P0316871), RA-95-004 (P0316872), RA-95-006 (P0316873), RA-95-009 (P0316874), RA-95-012 (P0316875), RA-95-013 (P0316876), RA-95-015 (P0316877), RA-95-016 (P0316878), RA-95-018 (P0316879), RA-95-019 (P0316880), RA-95-020 (P0316881), RA-95-021 (P0316882), RA-95-022 (P0316883), RA-95-023 (P0316884), RA-95-024 (P0316885), RA-95-025 (P0316886), RA-95-026 (P0316887), RA-95-027 (P0316888), RA-95-028 (P0316889), RA-95-029 (P0316890), RA-95-030 (P0316891), RA-95-031 (P0316892), RA-95-032 (P0316893), RA-95-033 (P0316894), RA-95-034 (P0316895)

Data Reviewer: Donald K. Wambold Date of Review: 12/19/95

Symbols used in the sections below are defined as follows:

X	Included: no problem	R	Resubmission
*	Included: problems noted	NR	Not Required
O	Not Included		

Section 2. Data Summary

Data for the above listed samples are:

____ Acceptable for use
X Acceptable for use with qualifications noted
____ Preliminary - pending action or verification
____ Unacceptable for use
____ To be reviewed by senior chemist
Reviewed by: _____ Date: ____

Section 3. Data Package Completeness Review

*[1]	Chain of Custody/Request for Analysis
X	Laboratory Analysis Report
X	Holding Times
X[2]	Method Reporting Limits
X[3]	Dilution Factors
*[4]	Quality Control Report

Section 4. QC Review (from Laboratory Quality Control Report)

Volatiles

X	Method Blank
O[5]	Leachate Blank
X	Surrogate Standard Recovery
NR[6]	Matrix Spike/Matrix Spike Duplicate Samples
X	Laboratory Control Sample
NR	Duplicate Sample

Metals

X	Method Blank
*[7]	Leachate Blank
X	Matrix Spike/Matrix Spike Duplicate Samples
X[8]	Laboratory Control Sample
NR	Duplicate Sample

Section 5. Calibration Data

Volatiles

X	GC/MS Analysis Log
X	GC/MS Initial Calibration Data
X	GC/MS Continuing Calibration Data

Metals

X[9]	ICP Analysis Log
X[9]	ICP Initial Calibration Data
X[9]	ICP Continuing Calibration Data
X[9]	CVAA Analysis Log
X[9]	CVAA Initial Calibration Data
X[9]	CVAA Continuing Calibration Data

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001j, Mudpit P-3

Bore Number:	BORE #1	BORE #1	BORE #2	BORE #2	BORE #3	BORE #3	BORE #3	BORE #3
Depth (inches):	12-24	60-72	12-24	60-72	12-24	12-24	60-72	60-72
Sample Date:	7/26/95	7/26/95	7/26/95	7/26/95	7/26/95	7/26/95	7/27/95	7/27/95
WID Sample Numbers:	RA-95-001	RA-95-004	RA-95-013	RA-95-016	RA-95-019	RA-95-021	RA-95-024	RA-95-023
	RA-95-003	RA-95-006	RA-95-015	RA-95-018	RA-95-020	RA-95-022	RA-95-025	RA-95-026
						Duplicate		Duplicate
Analytes								
Leachable Metals (mg/L)								
Arsenic (As)	0.2 UB	0.2 UB	0.2 UB	0.2 UB	0.1 UB	1 U	1 U	1 U
Barium (Ba)	0.47 UB	0.75 B	0.71 UB	1.1 B	0.35 UB	0.42 UB	0.48 UB	0.69 UB
Cadmium (Cd)	0.005 U	0.005 U	0.005 U	0.005 U	0.05 U	0.05 U	0.05 U	0.05 U
Chromium (Cr)	0.02 U	0.02 U	0.02 U	0.02 U	0.2 U	0.2 U	0.2 U	0.2 U
Lead (Pb)	0.05 U	0.05 U	0.05 U	0.05 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury (Hg)	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Thallium (Tl)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	2 U	2 U
Leachable Volatiles (mg/L)								
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Toluene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Xylenes, total	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

B	Detected in the blank
BR	Sample was broken in transit
EQ BLANK	Equipment Rinse Blank
FD BLANK	Field Blank
J	Estimated value
NA	Not analyzed
R	Rejected value
U	Not detected; value is method reporting limit
UB	Detected in the blank and qualified as not detected

Samples RA-95-002, RA-95-005, RA-95-008, RA-95-011, RA-95-014, RA-95-017 were not analyzed. Samples RA-95-007 and RA-95-010 were broken in transit.

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001j, Mudpit P-3

Bore Number:	BORE #4	BORE #4	BORE #4	BORE #4	EQ BLANK	FD BLANK
Depth (inches):	12-24	12-24	60-72	60-72		
Sample Date:	7/27/95	7/27/95	7/27/95	7/27/95	7/26/95	7/26/95
WID Sample Numbers:	RA-95-027	RA-95-028	RA-95-031	RA-95-032	RA-95-009	RA-95-012
	RA-95-029	RA-95-030	RA-95-033	RA-95-034		
		Duplicate		Duplicate		
Analytes						
Leachable Metals (mg/L)						
Arsenic (As)	1 U	0.1 U	1 U	1 U	0.1 U	0.1 U
Barium (Ba)	0.68 UB	1.2 B	0.67 UB	0.76 B	0.019 UB	0.016 UB
Cadmium (Cd)	0.05 U	0.06	0.06	0.05 U	0.005 U	0.005 U
Chromium (Cr)	0.2 U	0.2 U	0.2 U	0.2 U	0.02 U	0.02 U
Lead (Pb)	0.5 U	0.5 U	0.5 U	0.5 U	0.05 U	0.05 U
Mercury (Hg)	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0008 U	0.0008 U
Thallium (Tl)	2 U	0.2 U	2 U	2 U	0.2 U	0.2 U
Leachable Volatiles (mg/L)						
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U		
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U		
Benzene	0.05 U	0.05 U	0.05 U	0.05 U		
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U		
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U		
Toluene	0.05 U	0.05 U	0.05 U	0.05 U		
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U		
Xylenes, total	0.05 U	0.05 U	0.05 U	0.05 U		

B	Detected in the blank
BR	Sample was broken in transit
EQ BLANK	Equipment Rinse Blank
FD BLANK	Field Blank
J	Estimated value
NA	Not analyzed
R	Rejected value
U	Not detected; value is method reporting limit
UB	Detected in the blank and qualified as not detected

Samples RA-95-002, RA-95-005, RA-95-008, RA-95-011, RA-95-014, RA-95-017 were not analyzed. Samples RA-95-007 and RA-95-010 were broken in transit.

Section 6. Comments

1. Samples RA-95-007, RA-95-010, and WST-95-192 were included on the chain of custody and request for analysis forms, however, analytical results were not included in the data package for these samples. Based on telephone conversations with the laboratory on December 18 and 19, 1995, it is believed that these samples were frozen during shipment and the containers were broken upon receipt at the laboratory. The condition of the samples was not recorded by the laboratory on the chain of custody forms.

2. The method reporting limits (MRLs) and sample results for 1,1,1-trichloroethane, ethyl benzene, chloroform, total xylenes, and thallium were not evaluated relative to the toxicity characteristic regulatory levels because limits have not been promulgated for these analytes.

3. Dilution factor information was not provided on the laboratory analysis reports. However, the laboratory noted two mercury results (samples RA-95-009 and RA-95-012) which had elevated detection limits due to matrix interferences. Several metals results for other samples also had elevated detection limits that were indicative of sample dilution. Based on a telephone conversation with the laboratory on December 19, 1995, elevated detection limits generally reflect sample dilutions due to high salt content. Diluted sample results were below regulatory levels; therefore, action is not required.

4. The information provided in the quality control (QC) summary was not complete for all reported samples and could not be directly referenced to the sample results and/or analysis logs. The "supplemental information" section of the quality control summary provides analytical and extraction batch numbers which can be referenced to the appropriate QC samples in the QC summary. The laboratory relies on these batch references, which are stored in the laboratory information management system (LIMS), to relate the appropriate QC data to sample batches, and does not typically include the batch numbers or internal laboratory QC sample numbers on the analysis logs. Therefore, QC sample results generally cannot be traced to the raw analytical data.

5. A leachate blank analysis was not provided for the TCLP volatiles analyses in this package. Based on the laboratory's procedures, leachate blanks are performed once per twenty samples processed through the TCLP extraction procedure on each extraction apparatus. The leachate blank associated with the samples in this package may not be reported because it is reported in another package with the remaining samples in the extraction batch. The volatiles results for samples in this package were reported as non-detected, therefore, the leachate blank results were not required to evaluate potential sample contamination through the TCLP extraction process. Sample qualification is not necessary.

6. A matrix spike/matrix spike duplicate was not performed for the TCLP volatile analyses due to limited sample volume produced during the TCLP extraction.

7. The laboratory provided metal leachate blank sample results for extraction batches 337, 339, and 340, which were considered representative of the extraction conditions for the WIPP samples in this data package. Results for the blank from batch 338, which was also extracted and analyzed in the same time frame as the other blanks, was not included. Because specific sample associations for each blank were not included, the highest results from the representative blanks were used to evaluate the WIPP sample results. Arsenic results for samples RA-95-006 and RA-95-018, barium results for samples RA-95-009, RA-95-012, RA-95-020, RA-95-022, RA-95-025, RA-95-026, RA-95-029, and RA-95-033, and arsenic and barium results for samples RA-95-003 and RA-95-015 were less than five times the blank concentration, and therefore were qualified as "UB" due to blank contamination. The barium results for samples RA-95-006, RA-95-018, RA-95-030, and RA-95-034 were not less than five times the blank concentration, and therefore were qualified with a "B" to indicate that the analyte was detected in the blank.

8. The metals LCS recoveries were within the EPA Functional Guidelines criteria, but did not necessarily meet the laboratory's internal quality control criteria (established by ongoing statistical control charting). The data were considered technically acceptable and qualification was not performed.

9. Representative calibration data provided with the data package were reviewed to evaluate the calibration procedures and protocols followed by the laboratory, and to assess the operating conditions of the instruments used for analysis of the samples in the data package. Specific items reviewed include: 1) analysis run logs, and initial and continuing calibration summaries for volatiles analyses of laboratory batches 36578, 36617, and 36648; 2) analysis run logs and initial and continuing calibration summaries for ICP metals analyses of laboratory batches 36570 and 36597; and 3) analysis run logs, and initial and continuing calibration data for CVAA mercury analyses of laboratory batches 36581 and 36637. WIPP sample results did not require qualification based on the representative calibration information that was provided in the data package.

Signatures below constitutes validation of this record.

Validator: Daniel G. Constance for Donald K. Wimbrid		12/27/95
Printed Name	Signature	Date
QA/QC Reviewer: MARK R. COLSMAN		12/27/95
Printed Name	Signature	Date

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 1

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-001 TCLP
NUS SAMPLE NO: P0316870
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNIT
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/03(1245)	
		End Date/Time	08/04(0725)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 2

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-003 TCLP
NUS SAMPLE NO: P0316871
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time	08/03(1320)	
		End Date/Time	08/04(0725)	
		Extraction Fluid	1	
		Final Leachate pH	5.1	
3	AASL	Arsenic, Leachable (As)	0.2	mg/L JB
4	ABAL	Barium, Leachable (Ba)	0.47	mg/L JB
5	ACDL	Cadmium, Leachable (Cd)	< 0.005	mg/L
6	ACRL	Chromium, Leachable (Cr)	< 0.02	mg/L
7	APBL	Lead, Leachable (Pb)	< 0.05	mg/L
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L
9	ATLL	Thallium, Leachable (Tl)	< 0.2	mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 3

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-004 TCLP
NUS SAMPLE NO: P0316872
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/07(1220)	
		End Date/Time	08/08(0730)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 4

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-006 TCLP
NUS SAMPLE NO: P0316873
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time	08/03(1320)	
		End Date/Time	08/04(0725)	
		Extraction Fluid	1	
		Final Leachate pH	6.5	
3	AASL	Arsenic, Leachable (As)	0.2	mg/L UB
4	ABAL	Barium, Leachable (Ba)	0.75	mg/L B
5	ACDL	Cadmium, Leachable (Cd)	< 0.005	mg/L
6	ACRL	Chromium, Leachable (Cr)	< 0.02	mg/L
7	APBL	Lead, Leachable (Pb)	< 0.05	mg/L
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L
9	ATLL	Thallium, Leachable (Tl)	< 0.2	mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 5

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-009 TCLP
NUS SAMPLE NO: P0316874
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS	
1	S903	TCLP Bottle Extraction			
		Final Leachate pH	6.7		
3	AASL	Arsenic, Leachable (As)	< 0.1	mg/L	
4	ABAL	Barium, Leachable (Ba)	0.019	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	< 0.005	mg/L	
6	ACRL	Chromium, Leachable (Cr)	< 0.02	mg/L	
7	APBL	Lead, Leachable (Pb)	< 0.05	mg/L	
8	AHGL	Mercury, Leachable (Hg)	< 0.0008	mg/L	
9	ATLL	Thallium, Leachable (Tl)	< 0.2	mg/L	

COMMENTS:

1 This sample was less than 0.5% solid, thus the sample was filtered, not extracted.

8 An elevated reporting limit was reported for Mercury due to sample matrix interference.

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-012 TCLP
NUS SAMPLE NO: P0316875
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	S903	TCLP Bottle Extraction		
		Final Leachate pH	6.0	
3	AASL	Arsenic, Leachable (As)	< 0.1	mg/L
4	ABAL	Barium, Leachable (Ba)	0.016	mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	< 0.005	mg/L
6	ACRL	Chromium, Leachable (Cr)	< 0.02	mg/L
7	APBL	Lead, Leachable (Pb)	< 0.05	mg/L
8	AHGL	Mercury, Leachable (Hg)	< 0.0008	mg/L
9	ATLL	Thallium, Leachable (Tl)	< 0.2	mg/L

COMMENTS:

1 This sample was less than 0.5% solid, thus the sample was filtered, not extracted.

8 An elevated reporting limit was reported for Mercury due to sample matrix interference.

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 7

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-013 TCLP
NUS SAMPLE NO: P0316876
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/07(1220)	
		End Date/Time	08/08(0730)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED

Reviewed By

Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 8

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-015 TCLP
NUS SAMPLE NO: P0316877
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time	08/03(1320)	
		End Date/Time	08/04(0725)	
		Extraction Fluid	1	
		Final Leachate pH	6.4	
3	AASL	Arsenic, Leachable (As)	0.2	mg/L UB
4	ABAL	Barium, Leachable (Ba)	0.71	mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	< 0.005	mg/L
6	ACRL	Chromium, Leachable (Cr)	< 0.02	mg/L
7	APBL	Lead, Leachable (Pb)	< 0.05	mg/L
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L
9	ATLL	Thallium, Leachable (Tl)	< 0.2	mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 9

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-016 TCLP
NUS SAMPLE NO: P0316878
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/07(1220)	
		End Date/Time	08/08(0730)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-018 TCLP
NUS SAMPLE NO: P0316879
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS	
1	S903	TCLP Bottle Extraction			
		Begin Date/Time	08/03(1320)		
		End Date/Time	08/04(0725)		
		Extraction Fluid	1		
		Final Leachate pH	6.4		
3	AASL	Arsenic, Leachable (As)	0.2	mg/L	UB
4	ABAL	Barium, Leachable (Ba)	1.1	mg/L	B
5	ACDL	Cadmium, Leachable (Cd)	< 0.005	mg/L	
6	ACRL	Chromium, Leachable (Cr)	< 0.02	mg/L	
7	APBL	Lead, Leachable (Pb)	< 0.05	mg/L	
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	< 0.2	mg/L	

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 11

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-019 TCLP
NUS SAMPLE NO: P0316880
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/07(1220)	
		End Date/Time	08/08(0730)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]
Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-020 TCLP
NUS SAMPLE NO: P0316881
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS	
1	S903	TCLP Bottle Extraction			
		Begin Date/Time	08/07(1340)		
		End Date/Time	08/08(0730)		
		Extraction Fluid	1		
		Final Leachate pH	4.9		
3	AASL	Arsenic, Leachable (As)	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	0.35	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	< 2	mg/L	

COMMENTS:

VALIDATED
Reviewed By
Date 12/4/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-021 TCLP
NUS SAMPLE NO: P0316882
P.O. NO.: 67763

DATE SAMPLED: 26-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/07(1220)	
		End Date/Time	08/08(0730)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]
Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 14

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-022 TCLP
NUS SAMPLE NO: P0316883
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS	
1	S903	TCLP Bottle Extraction			
		Begin Date/Time	08/07(1340)		
		End Date/Time	08/08(0730)		
		Extraction Fluid	1		
		Final Leachate pH	4.9		
3	AASL	Arsenic, Leachable (As)	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	0.42	mg/L	JB
5	ACDL	Cadmium, Leachable (Cd)	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	< 2	mg/L	

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 15

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-023 TCLP
NUS SAMPLE NO: P0316884
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/08(1255)	
		End Date/Time	08/09(0725)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 16

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-024 TCLP
NUS SAMPLE NO: P0316885
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/08(1255)	
		End Date/Time	08/09(0725)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 17

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-025 TCLP
NUS SAMPLE NO: P0316886
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS	
1	S903	TCLP Bottle Extraction			
		Begin Date/Time	08/07(1340)		
		End Date/Time	08/08(0730)		
		Extraction Fluid	1		
		Final Leachate pH	4.9		
3	AASL	Arsenic, Leachable (As)	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	0.48	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	< 2	mg/L	

COMMENTS:

VALIDATED
Reviewed By
Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 18

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-026 TCLP
NUS SAMPLE NO: P0316887
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS	
1	S903	TCLP Bottle Extraction			
		Begin Date/Time	08/07(1340)		
		End Date/Time	08/08(0730)		
		Extraction Fluid	1		
		Final Leachate pH	4.9		
3	AASL	Arsenic, Leachable (As)	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	0.69	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	< 2	mg/L	

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-027 TCLP
NUS SAMPLE NO: P0316888
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/08(1255)	
		End Date/Time	08/09(0725)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 20

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-028 TCLP
NUS SAMPLE NO: P0316889
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/08(1255)	
		End Date/Time	08/09(0725)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED

Reviewed By

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 21

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-029 TCLP
NUS SAMPLE NO: P0316890
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS	
1	S903	TCLP Bottle Extraction			
		Begin Date/Time	08/07(1340)		
		End Date/Time	08/08(0730)		
		Extraction Fluid	1		
		Final Leachate pH	6.5		
3	AASL	Arsenic, Leachable (As)	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	0.68	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	< 2	mg/L	

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 22

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-030 TCLP
NUS SAMPLE NO: P0316891
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time	08/07(1340)	
		End Date/Time	08/08(0730)	
		Extraction Fluid	2	
		Final Leachate pH	5.8	
3	AASL	Arsenic, Leachable (As)	< 1	mg/L
4	ABAL	Barium, Leachable (Ba)	1.2	mg/L B
5	ACDL	Cadmium, Leachable (Cd)	0.06	mg/L
6	ACRL	Chromium, Leachable (Cr)	< 0.2	mg/L
7	APBL	Lead, Leachable (Pb)	< 0.5	mg/L
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L
9	ATLL	Thallium, Leachable (Tl)	< 2	mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 23

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-031 TCLP
NUS SAMPLE NO: P0316892
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/08(1255)	
		End Date/Time	08/09(0725)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 2/10/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 24

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-032 TCLP
NUS SAMPLE NO: P0316893
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time	08/08(1255)	
		End Date/Time	08/09(0725)	
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	< 0.05	mg/L
		1,2-dichloroethane	< 0.05	mg/L
		benzene	< 0.05	mg/L
		chloroform	< 0.05	mg/L
		ethyl benzene	< 0.05	mg/L
		toluene	< 0.05	mg/L
		vinyl chloride	< 0.1	mg/L
		xylenes, total	< 0.05	mg/L

COMMENTS:

VALIDATED

Reviewed By

Date 12/14/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-033 TCLP
NUS SAMPLE NO: P0316894
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS	
1	S903	TCLP Bottle Extraction			
		Begin Date/Time	08/07(1340)		
		End Date/Time	08/08(0730)		
		Extraction Fluid	1		
		Final Leachate pH	5.8		
3	AASL	Arsenic, Leachable (As)	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	0.67	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	0.06	mg/L	
6	ACRL	Chromium, Leachable (Cr)	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	< 2	mg/L	

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/14/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 17, 1995
Report No.: 00027110
Section A Page 26

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATION, WID/WIPP
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO:

Carbon Copy:

SAMPLE ID: RA-95-034 TCLP
NUS SAMPLE NO: P0316895
P.O. NO.: 67763

DATE SAMPLED: 27-JUL-95
DATE RECEIVED: 28-JUL-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time	08/07(1340)	
		End Date/Time	08/08(0730)	
		Extraction Fluid	1	
		Final Leachate pH	6.5	
3	AASL	Arsenic, Leachable (As)	< 1	mg/L
4	ABAL	Barium, Leachable (Ba)	0.76	mg/L
5	ACDL	Cadmium, Leachable (Cd)	< 0.05	mg/L
6	ACRL	Chromium, Leachable (Cr)	< 0.2	mg/L
7	APBL	Lead, Leachable (Pb)	< 0.5	mg/L
8	AHGL	Mercury, Leachable (Hg)	< 0.0002	mg/L
9	ATLL	Thallium, Leachable (Tl)	< 2	mg/L

PRL
ØB

COMMENTS:

VALIDATED
Reviewed By
Date 12/14/95

APPENDIX 3

RESULTS OF VOLUNTARY RELEASE ASSESSMENT SAMPLES

COLLECTED AT SWMU 001M

WIPP Soil Samples
Data Review Form

Statement of Purpose:

To review laboratory data packages for soil samples collected at SWMUs, evaluate data package completeness, and compare analytical quality control data to program objectives.

Section 1: Data Package Identification

P.O. Number: 67763 - Report 27176 No. Of Samples In Package: 32
Sample Collection Date: 8/2/95 Sample Receipt Date: 8/4/95
Sample Report Date: 8/22/95 Analytical Parameters: TCLP - VOCs, Metals
Sample Numbers in Data Package: RA-95-051 (P0317310), RA-95-052 (P0317311), RA-95-053 (P0317312), RA-95-054 (P0317313), RA-95-055 (P0317314), RA-95-056 (P0317315), RA-95-057 (P0317316), RA-95-058 (P0317317), RA-95-059 (P0317318), RA-95-060 (P0317319), RA-95-061 (P0317320), RA-95-062 (P0317321), RA-95-063 (P0317322), RA-95-064 (P0317323), RA-95-065 (P0317324), RA-95-066 (P0317325), RA-95-067 (P0317326), RA-95-068 (P0317327), RA-95-069 (P0317328), RA-95-070 (P0317329), RA-95-071 (P0317330), RA-95-072 (P0317331), RA-95-073 (P0317332), RA-95-074 (P0317333), RA-95-075 (P0317334), RA-95-076 (P0317335), RA-95-077 (P0317336), RA-95-078 (P0317337), RA-95-079 (P0317338), RA-95-080 (P0317339), RA-95-081 (P0317340), RA-95-082 (P0317355)
Data Reviewer: Donald K. Wambold Date of Review: 12/20/95

Symbols used in the sections below are defined as follows:

X	Included: no problem	R	Resubmission
*	Included: problems noted	NR	Not Required
O	Not Included		

Section 2. Data Summary

Data for the above listed samples are:

____ Acceptable for use
X Acceptable for use with qualifications noted
____ Preliminary - pending action or verification
____ Unacceptable for use
____ To be reviewed by senior chemist

Reviewed by: _____ Date: _____

Section 3. Data Package Completeness Review

X Chain of Custody/Request for Analysis
X Laboratory Analysis Report
X Holding Times
X[1] Method Reporting Limits
X Dilution Factors
X[2] Quality Control Report

Section 4. QC Review (from Laboratory Quality Control Report)

Volatiles

X Method Blank
O[3] Leachate Blank
X Surrogate Standard Recovery
NR[4] Matrix Spike/Matrix Spike Duplicate Samples
X Laboratory Control Sample
NR Duplicate Sample

Metals

X Method Blank
*[5] Leachate Blank
*[6] Matrix Spike/Matrix Spike Duplicate Samples
X Laboratory Control Sample
NR Duplicate Sample

Section 5. Calibration Data

Volatiles

X GC/MS Analysis Log
X GC/MS Initial Calibration Data
X GC/MS Continuing Calibration Data

Metals

X[7] ICP Analysis Log
X[7] ICP Initial Calibration Data
X[7] ICP Continuing Calibration Data
X[7] CVAA Analysis Log
X[7] CVAA Initial Calibration Data
X[7] CVAA Continuing Calibration Data

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001m, Mudpit P-6

Bore Number:	BORE #1	BORE #1	BORE #2	BORE #2	BORE #3	BORE #3	BORE #3	BORE #4	BORE #4
Depth (inches):	12-24	60-72	12-24	60-72	12-24	12-24	60-72	12-24	60-72
Sample Date:	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95	8/2/95
WID Sample Numbers:	RA-95-061	RA-95-063	RA-95-065	RA-95-067	RA-95-069	RA-95-070	RA-95-077	RA-95-079	RA-95-081
	RA-95-062	RA-95-064	RA-95-066	RA-95-068	RA-95-071	RA-95-072 Duplicate	RA-95-078	RA-95-080	RA-95-082
Analytes									
Leachable Metals (mg/L)									
Arsenic (As)	1 U	1 U	1 U	1 U	0.1 U	0.1 U	0.1 U	1 U	1 U
Barium (Ba)	0.46 UB	0.26 UB	0.24 UB	0.95 B	0.46 UB	0.71 UB	0.35 UB	0.68 UB	1.2 B
Cadmium (Cd)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chromium (Cr)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Lead (Pb)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury (Hg)	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0003 UBJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ
Thallium (Tl)	2 U	2 U	2 U	2 U	0.2 U	2 U	0.2 U	2 U	2 U
Leachable Volatiles (mg/L)									
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Toluene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Xylenes, total	0.05 U	0.07	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

B	Detected in the blank
EQ BLANK	Equipment Rinse Blank
FD BLANK	Field Blank
J	Estimated value
R	Rejected value
U	Not detected; value is method reporting limit
UB	Detected in the blank and qualified as not detected

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001m, Mudpit P-6

Bore Number:	EQ BLANK	FD BLANK
Depth (inches):		
Sample Date:	8/2/95	8/2/95
WID Sample Numbers:	RA-95-073	RA-95-075
	RA-95-074	RA-95-076
Analytes		
Leachable Metals (mg/L)		
Arsenic (As)	1 U	1 U
Barium (Ba)	0.1 UB	0.05 UB
Cadmium (Cd)	0.05 U	0.05 U
Chromium (Cr)	0.2 U	0.2 U
Lead (Pb)	0.5 U	0.5 U
Mercury (Hg)	0.0002 UJ	0.0002 UJ
Thallium (Tl)	2 U	2 U
Leachable Volatiles (mg/L)		
1,1,1-Trichloroethane	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U
Benzene	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U
Toluene	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U
Xylenes, total	0.05 U	0.05 U

B	Detected in the blank
EQ BLANK	Equipment Rinse Blank
FD BLANK	Field Blank
J	Estimated value
R	Rejected value
U	Not detected; value is method reporting limit
UB	Detected in the blank and qualified as not detected

Section 6. Comments

1. The method reporting limits (MRLs) and sample results for 1,1,1-trichloroethane, ethyl benzene, chloroform, total xylenes, and thallium were not evaluated relative to the toxicity characteristic regulatory levels because limits have not been promulgated for these analytes.

2. The information provided in the quality control (QC) summary was not complete for all reported samples and could not be directly referenced to the sample results and/or analysis logs. The "supplemental information" section of the quality control summary provides analytical and extraction batch numbers which can be referenced to the appropriate QC samples in the QC summary. The laboratory relies on these batch references, which are stored in the laboratory information management system (LIMS), to relate the appropriate QC data to sample batches, and does not typically include the batch numbers or internal laboratory QC sample numbers on the analysis logs. Therefore, QC sample results generally cannot be traced to the raw analytical data.

3. A leachate blank analysis was not provided for the TCLP volatiles analyses in this package. Based on the laboratory's procedures, leachate blanks are performed once per twenty samples processed through the TCLP extraction procedure on each extraction apparatus. The leachate blank associated with the samples in this package may not be reported because it is reported in another package with the remaining samples in the extraction batch. The volatiles results for samples in this package were reported as non-detected, therefore, the leachate blank results were not required to evaluate potential sample contamination through the TCLP extraction process. Sample qualification is not necessary.

4. A matrix spike/matrix spike duplicate was not performed for the TCLP volatile analyses due to limited sample volume produced during the TCLP extraction.

5. The laboratory provided metal leachate blank sample results for extraction batches 339, 340, 341, 342, and 343 which were considered representative of the extraction conditions for the WIPP samples in this data package. Because specific sample associations for each blank were not included, the highest results from the representative blanks were used to evaluate the WIPP sample results. Arsenic, barium, and mercury were detected at or above the MRL in one or more of the leachate blank samples. Barium results for samples RA-95-053, RA-95-054, RA-95-056, RA-95-058, RA-95-060, RA-95-062, RA-95-064, RA-95-066, RA-95-072, RA-95-074, RA-95-076, RA-95-078, and RA-95-080, and barium and mercury results for sample RA-95-071 were less than five times the blank concentration, and therefore were qualified as "UB" due to blank contamination. The barium results for samples RA-95-068 and RA-95-082 were not less than five times the blank concentration, and therefore were qualified with a "B" to indicate that the analyte was detected in the blank.

6. The matrix spike recovery of 41% for mercury from analytical batch 36783 was below the EPA Functional Guidelines lower acceptance limit of 75%. The matrix spike duplicate

recovery was acceptable at 102%. Due to the low MS recovery, and the resulting high RPD for the MS and MSD results (71%), the mercury results for samples RA-95-071, RA-95-072, RA-95-074, RA-95-076, RA-95-078, RA-95-080, and RA-95-82 (all from batch 36783) were considered estimated and qualified as "J".

Samples RA-95-053, RA-95-054, RA-95-056, RA-95-058, RA-95-060, RA-95-062, RA-95-064, RA-95-066, and RA-95-068 were analyzed in analytical batch 36737. The mercury recoveries of the MS/MSD pair analyzed with this batch, which were reported in laboratory report number 27176, were also below the EPA acceptance limit (see the Data Review Form for laboratory report number 27176). Therefore, the mercury results for these samples were also qualified as estimated ("J").

7. Representative calibration data provided with the data package were reviewed to evaluate the calibration procedures and protocols followed by the laboratory, and to assess the operating conditions of the instruments used for analysis of the samples in the data package. Specific items reviewed include: 1) analysis run logs, and initial and continuing calibration summaries for volatiles analyses of laboratory batches 36712 and 36807; 2) analysis run logs and initial and continuing calibration summaries for ICP metals analyses of laboratory batches 36661 and 36718; and 3) analysis run logs, and initial and continuing calibration data for CVAA mercury analyses of laboratory batches 36737 and 36783. WIPP sample results did not require qualification based on the representative calibration information that was provided in the data package.

Signatures below constitutes validation of this record.

Validator: Daniel G. Constance for Donald K. Wamsley — Signature — Date 12/28/95

Printed Name

QA/QC Reviewer: MARK R. COLSMAN — Signature — Date 12/28/95

Printed Name

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 1

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-051 TCLP
NUS SAMPLE NO: P0317310
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/09(1240)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 2

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-052 TCLP
NUS SAMPLE NO: P0317311
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/10(1130)
		End Date/Time		08/11(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 3

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-053 TCLP
NUS SAMPLE NO: P0317312
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS	
1	S903	TCLP Bottle Extraction				
		Begin Date/Time		08/09(1340)		
		End Date/Time		08/10(0600)		
		Extraction Fluid		1		
		Final Leachate pH		5.0		
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	1	0.25	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	1	0.06	mg/L	
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L	J ①
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L	

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/20/95

① Added 12/28/95
MRC

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 4

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-054 TCLP
NUS SAMPLE NO: P0317313
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS	
1	S903	TCLP Bottle Extraction				
		Begin Date/Time		08/09(1340)		
		End Date/Time		08/10(0600)		
		Extraction Fluid		1		
		Final Leachate pH		5.0		
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	1	0.30	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L	J ①
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L	

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/10/95

① Added 12/23/95
[signature]

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 5

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-055 TCLP
NUS SAMPLE NO: P0317314
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/10(1130)
		End Date/Time		08/11(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 6

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-056 TCLP
NUS SAMPLE NO: P0317315
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/09(1340)
		End Date/Time		08/10(0600)
		Extraction Fluid		1
		Final Leachate pH		5.0
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.27 mg/L JB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J (1)
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/20/95

(1) Added 12/28/95
MRC

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-057 TCLP
NUS SAMPLE NO: P0317316
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/10(1130)
		End Date/Time		08/11(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 8

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-058 TCLP
NUS SAMPLE NO: P0317317
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS	
1	S903	TCLP Bottle Extraction				
		Begin Date/Time		08/09(1340)		
		End Date/Time		08/10(0600)		
		Extraction Fluid		1		
		Final Leachate pH		5.0		
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	1	0.30	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L	J ①
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L	

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/20/95

① Added 12/28/95
MRC

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-059 TCLP
NUS SAMPLE NO: P0317318
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/10(1130)
		End Date/Time		08/11(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/28/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 10

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-060 TCLP
NUS SAMPLE NO: P0317319
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/09(1340)
		End Date/Time		08/10(0600)
		Extraction Fluid		1
		Final Leachate pH		5.0
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.36 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	0.07 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J ①
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/20/95

① Added 12/25/95
MRC

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 11

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-061 TCLP
NUS SAMPLE NO: P0317320
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/10(1130)
		End Date/Time		08/11(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 12

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-062 TCLP
NUS SAMPLE NO: P0317321
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/09(1340)
		End Date/Time		08/10(0600)
		Extraction Fluid		1
		Final Leachate pH		5.0
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.46 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J ①
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/22/95

① Added 12/28/95
MRC

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-063 TCLP
NUS SAMPLE NO: P0317322
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/10(1130)
		End Date/Time		08/11(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	0.07 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 8/22/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-064 TCLP
NUS SAMPLE NO: P0317323
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/09(1340)
		End Date/Time		08/10(0600)
		Extraction Fluid		1
		Final Leachate pH		5.0
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.26 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J ①
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/20/95

① Added 12/28/95
TRC

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-065 TCLP
NUS SAMPLE NO: P0317324
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction (ZHE)		
		Begin Date/Time		08/14(1330)
		End Date/Time		08/15(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.1 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-066 TCLP
NUS SAMPLE NO: P0317325
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/10(1230)
		End Date/Time		08/11(0725)
		Extraction Fluid		1
		Final Leachate pH		5.0
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.24 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J ①
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/28/95

① Added 12/28/95
JMR

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 17

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-067 TCLP
NUS SAMPLE NO: P0317326
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/14(1330)
		End Date/Time		08/15(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.1 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 18

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-068 TCLP
NUS SAMPLE NO: P0317327
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/10(1230)
		End Date/Time		08/11(0725)
		Extraction Fluid		2
		Final Leachate pH		5.8
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.95 mg/L B
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J ⊙
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/28/95

⊙ Added 12/28/95
TTRL

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 19

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-069 TCLP
NUS SAMPLE NO: P0317328
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction (ZHE)		
		Begin Date/Time		08/14(1330)
		End Date/Time		08/15(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.1 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 20

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-070 TCLP
NUS SAMPLE NO: P0317329
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/14(1330)
		End Date/Time		08/15(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.1 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By [signature]
Date 12/28/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 21

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-071 TCLP
NUS SAMPLE NO: P0317330
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/10(1230)
		End Date/Time		08/11(0725)
		Extraction Fluid		1
		Final Leachate pH		5.1
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.46 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	0.0003 mg/L UBJ
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

8 This sample was analyzed as a matrix spike. Recovery of the spike was outside established acceptance limits indicating the presence of a possible matrix interference.

12 This sample was analyzed as a matrix spike. Recovery of the spike was outside established acceptance limits indicating the presence of a possible matrix interference.

VALIDATED

Reviewed By [signature]

Date 12/20/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-072 TCLP
NUS SAMPLE NO: P0317331
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/10(1230)
		End Date/Time		08/11(0725)
		Extraction Fluid		1
		Final Leachate pH		5.6
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.71 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-073 TCLP
NUS SAMPLE NO: P0317332
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/14(1330)
		End Date/Time		08/15(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.1 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:
2 This sample was less than 0.5% solid, thus the sample was filtered, not extracted.

VAL
Reviewed By
Date 12/22/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 24

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-074 TCLP
NUS SAMPLE NO: P0317333
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Final Leachate pH		6.1
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.10 mg/L JB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:
1 This sample was less than 0.5% solid, thus the sample was filtered, not extracted.

VALIDATED
Reviewed By
Date 12/22/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-075 TCLP
NUS SAMPLE NO: P0317334
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/14(1330)
		End Date/Time		08/15(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.1 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:
2 This sample was less than 0.5% solid, thus the sample was filtered, not extracted.

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176
Section A Page 26

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-076 TCLP
NUS SAMPLE NO: P0317335
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Final Leachate pH		5.7
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.05 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L J
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:
1 This sample was less than 0.5% solid, thus the sample was filtered, not extracted.

VALIDATED
Reviewed By [signature]
Date 12/28/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-077 TCLP
NUS SAMPLE NO: P0317336
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/14(1330)
		End Date/Time		08/15(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.1 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-078 TCLP
NUS SAMPLE NO: P0317337
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS	
1	S903	TCLP Bottle Extraction				
		Begin Date/Time		08/10(1230)		
		End Date/Time		08/11(0725)		
		Extraction Fluid		1		
		Final Leachate pH		5.0		
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	1	0.35	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L	J
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L	

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/27/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 22, 1995
Report No.: 00027176

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-079 TCLP
NUS SAMPLE NO: P0317338
P.O. NO.: 67763

DATE SAMPLED: 02-AUG-95
DATE RECEIVED: 04-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/14(1330)
		End Date/Time		08/15(0725)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.1 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]
Date 12/20/95

APPENDIX 4

RESULTS OF VOLUNTARY RELEASE ASSESSMENT SAMPLES

COLLECTED AT SWMU 001M

WIPP Soil Samples
Data Review Form

Statement of Purpose:

To review laboratory data packages for soil samples collected at SWMUs, evaluate data package completeness, and compare analytical quality control data to program objectives.

Section 1: Data Package Identification

P.O. Number: 67763 - Report 27136 No. Of Samples In Package: 16
Sample Collection Date: 7/31/95 Sample Receipt Date: 8/2/95
Sample Report Date: 8/18/95 Analytical Parameters: TCLP - VOCs, Metals
Sample Numbers in Data Package: RA-95-035 (P0317145), RA-95-036 (P0317146), RA-95-037 (P0317147), RA-95-038 (P0317148), RA-95-039 (P0317149), RA-95-040 (P0317150), RA-95-041 (P0317151), RA-95-042 (P0317152), RA-95-043 (P0317153), RA-95-044 (P0317154), RA-95-045 (P0317155), RA-95-046 (P0317156), RA-95-047 (P0317157), RA-95-048 (P0317158), RA-95-049 (P0317159), RA-95-050 (P0317160)

Data Reviewer: Donald K. Wambold Date of Review: 12/20/95

Symbols used in the sections below are defined as follows:

X	Included: no problem	R	Resubmission
*	Included: problems noted	NR	Not Required
O	Not Included		

Section 2. Data Summary

Data for the above listed samples are:

____ Acceptable for use
X Acceptable for use with qualifications noted
____ Preliminary - pending action or verification
____ Unacceptable for use
____ To be reviewed by senior chemist
Reviewed by: _____ Date: _____

Section 3. Data Package Completeness Review

X[1] Chain of Custody/Request for Analysis
X Laboratory Analysis Report
X Holding Times
X[2] Method Reporting Limits
X Dilution Factors
X[3] Quality Control Report

Section 4. QC Review (from Laboratory Quality Control Report)

Volatiles

X Method Blank
O[4] Leachate Blank
X Surrogate Standard Recovery
NR[5] Matrix Spike/Matrix Spike Duplicate Samples
X Laboratory Control Sample
NR Duplicate Sample

Metals

X Method Blank
*[6] Leachate Blank
*[7] Matrix Spike/Matrix Spike Duplicate Samples
X Laboratory Control Sample
NR Duplicate Sample

Section 5. Calibration Data

Volatiles

X GC/MS Analysis Log
X GC/MS Initial Calibration Data
X GC/MS Continuing Calibration Data

Metals

X[8] ICP Analysis Log
X[8] ICP Initial Calibration Data
X[8] ICP Continuing Calibration Data
X[8] CVAA Analysis Log
X[8] CVAA Initial Calibration Data
X[8] CVAA Continuing Calibration Data

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001t, Mudpit IMC 374

Bore Number:	BORE #1	BORE #1	BORE #1	BORE #2	BORE #2	BORE #3	BORE #3	BORE #4	BORE #4
Depth (inches):	12-24	12-24	60-72	12-24	60-72	12-24	60-72	12-24	60-72
Sample Date:	7/31/95	7/31/95	7/31/95	7/31/95	7/31/95	7/31/95	7/31/95	8/2/95	8/2/95
WID Sample Numbers:	RA-95-035	RA-95-036	RA-95-041	RA-95-043	RA-95-045	RA-95-047	RA-95-049	RA-95-057	RA-95-059
	RA-95-037	RA-95-038	RA-95-042	RA-95-044	RA-95-046	RA-95-048	RA-95-050	RA-95-058	RA-95-060
		Duplicate							
Analytes									
Leachable Metals (mg/L)									
Arsenic (As)	0.1 U	1 U	1 U	0.2 UB	1 U	0.1 U	0.2 UB	1 U	1 U
Barium (Ba)	0.48 UB	0.66 UB	0.6 UB	0.68 UB	0.45 UB	0.83 B	0.48 UB	0.3 UB	0.36 UB
Cadmium (Cd)	0.05 U	0.05 U	0.06	0.05 U	0.05 U	0.05	0.05 U	0.05 U	0.07
Chromium (Cr)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Lead (Pb)	0.5 U	0.05 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Mercury (Hg)	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ
Thallium (Tl)	0.2 U	2 U	2 U	0.2 U	2 U	0.2 U	0.2 U	2 U	2 U
Leachable Volatiles (mg/L)									
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Toluene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Xylenes, total	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

B Detected in the blank
EQ BLANK Equipment Rinse Blank
J Estimated value
R Rejected value
U Not detected; value is method reporting limit
UB Detected in the blank and qualified as not detected

Soil TCLP Analytical Results
Voluntary Release Assessment
SWMU #001t, Mudpit IMC 374

Bore Number:	BORE #5	BORE #5	BORE #5	EQ BLANK
Depth (inches):	12-24	12-24	60-72	
Sample Date:	8/2/95	8/2/95	8/2/95	7/31/95
WID Sample Numbers:	RA-95-051	RA-95-052	RA-95-055	RA-95-039
	RA-95-053	RA-95-054	RA-95-056	RA-95-040
		Duplicate		
Analytes				
Leachable Metals (mg/L)				
Arsenic (As)	1 U	1 U	0.1 UB	1 U
Barium (Ba)	0.25 UB	0.3 UB	0.27 UB	0.17 UB
Cadmium (Cd)	0.06	0.05 U	0.05 U	0.05 U
Chromium (Cr)	0.2 U	0.2 U	0.20 U	0.2 U
Lead (Pb)	0.5 U	0.5 U	0.5 U	0.05 U
Mercury (Hg)	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 U
Thallium (Tl)	2 U	2 U	0.2 U	2 U
Leachable Volatiles (mg/L)				
1,1,1-Trichloroethane	0.05 U	0.05 U	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U	0.05 U	0.05 U
Benzene	0.05 U	0.05 U	0.05 U	0.05 U
Chloroform	0.05 U	0.05 U	0.05 U	0.05 U
Ethyl benzene	0.05 U	0.05 U	0.05 U	0.05 U
Toluene	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl chloride	0.1 U	0.1 U	0.1 U	0.1 U
Xylenes, total	0.05 U	0.05 U	0.05 U	0.05 U

B Detected in the blank
EQ BLANK Equipment Rinse Blank
J Estimated value
R Rejected value
U Not detected; value is method reporting limit
UB Detected in the blank and qualified as not detected

Section 6. Comments

1. Several chain of custody and request for analysis forms were included for samples that were not included in this data package. These samples were identified as being in a separate data package, therefore, additional action is not required.

2. The method reporting limits (MRLs) and sample results for 1,1,1-trichloroethane, ethyl benzene, chloroform, total xylenes, and thallium were not evaluated relative to the toxicity characteristic regulatory levels because limits have not been promulgated for these analytes.

3. The information provided in the quality control (QC) summary was not complete for all reported samples and could not be directly referenced to the sample results and/or analysis logs. The "supplemental information" section of the quality control summary provides analytical and extraction batch numbers which can be referenced to the appropriate QC samples in the QC summary. The laboratory relies on these batch references, which are stored in the laboratory information management system (LIMS), to relate the appropriate QC data to sample batches, and does not typically include the batch numbers or internal laboratory QC sample numbers on the analysis logs. Therefore, QC sample results generally cannot be traced to the raw analytical data.

4. A leachate blank analysis was not provided for the TCLP volatiles analyses in this package. Based on the laboratory's procedures, leachate blanks are performed once per twenty samples processed through the TCLP extraction procedure on each extraction apparatus. The leachate blank associated with the samples in this package may not be reported because it is reported in another package with the remaining samples in the extraction batch. The volatiles results for samples in this package were reported as non-detected, therefore, the leachate blank results were not required to evaluate potential sample contamination through the TCLP extraction process. Sample qualification is not necessary.

5. A matrix spike/matrix spike duplicate was not performed for the TCLP volatile analyses due to limited sample volume produced during the TCLP extraction.

6. The laboratory provided metal leachate blank sample results for extraction batch 339 which was considered representative of the extraction conditions for the WIPP samples in this data package (which were extracted one day after the blank). Specific sample associations for the blank were not included. Barium results for samples RA-95-037, RA-95-038, RA-95-040, RA-95-042, RA-95-044, RA-95-046, and RA-95-050 were less than five times the blank concentration, and therefore were qualified as "UB" (not detected) due to blank contamination. The barium result for sample RA-95-048 was not less than five times the blank concentration, and therefore was qualified with a "B" to indicate that the analyte was detected in the blank.

7. The matrix spike and matrix spike duplicate recoveries for mercury from analytical batch 36737 were below the EPA Functional Guidelines 75% lower acceptance limit at 69% and

42%, respectively. Therefore, the mercury results for samples RA-95-048 and RA-95-50 (both from batch 36737) were considered estimated and qualified as "J".

8. Representative calibration data provided with the data package were reviewed to evaluate the calibration procedures and protocols followed by the laboratory, and to assess the operating conditions of the instruments used for analysis of the samples in the data package. Specific items reviewed include: 1) analysis run logs, and initial and continuing calibration summaries for volatiles analyses of laboratory batch 36712; 2) analysis run logs and initial and continuing calibration summaries for ICP metals analyses of laboratory batches 36633 and 36661; and 3) analysis run logs, and initial and continuing calibration data for CVAA mercury analyses of laboratory batch 36637. WIPP sample results did not require qualification based on the representative calibration information that was provided in the data package.

Signatures below constitutes validation of this record.

Validator:

Printed Name	Signature	Date
Daniel G. Constance for Donald K. Wimbrid		12/27/95

QA/QC Reviewer:

Printed Name	Signature	Date
MARK R. COLEMAN		12/27/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 1

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-035 TCLP
NUS SAMPLE NO: P0317145
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/09(1240)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-036 TCLP
NUS SAMPLE NO: P0317146
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/09(1240)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 3

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-037 TCLP
NUS SAMPLE NO: P0317147
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS	
1	S903	TCLP Bottle Extraction				
		Begin Date/Time		08/08(1330)		
		End Date/Time		08/09(0725)		
		Extraction Fluid		1		
		Final Leachate pH		5.1		
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	1	0.48	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L	

COMMENTS:

VALIDATED
Reviewed
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 4

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-038 TCLP
NUS SAMPLE NO: P0317148
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS	
1	S903	TCLP Bottle Extraction				
		Begin Date/Time		08/08(1330)		
		End Date/Time		08/09(0725)		
		Extraction Fluid		1		
		Final Leachate pH		5.7		
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	1	0.66	mg/L	UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L	

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 5

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-039 TCLP
NUS SAMPLE NO: P0317149
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/10(0600)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:
2 This sample was less than 0.5% solid, thus the sample was filtered, not extracted.

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 6

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-040 TCLP
NUS SAMPLE NO: P0317150
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Final Leachate pH		5.7
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.17 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:
1 This sample was less than 0.5% solid, thus the sample was filtered, not extracted.

VALIDATED
Reviewed By [signature]
Date 12/20/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 7

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-041 TCLP
NUS SAMPLE NO: P0317151
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/09(1240)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 8

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-042 TCLP
NUS SAMPLE NO: P0317152
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS
1	S903	TCLP Bottle Extraction			
		Begin Date/Time		08/08(1330)	
		End Date/Time		08/09(0725)	
		Extraction Fluid		1	
		Final Leachate pH		5.2	
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.60	mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	0.06	mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/20/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-043 TCLP
NUS SAMPLE NO: P0317153
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/09(1240)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-044 TCLP
NUS SAMPLE NO: P0317154
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/08(1330)
		End Date/Time		08/09(0725)
		Extraction Fluid		1
		Final Leachate pH		5.4
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.68 mg/L UB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 11

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-045 TCLP
NUS SAMPLE NO: P0317155
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/09(1240)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 12

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-046 TCLP
NUS SAMPLE NO: P0317156
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS	
1	S903	TCLP Bottle Extraction				
		Begin Date/Time		08/08(1330)		
		End Date/Time		08/09(0725)		
		Extraction Fluid		1		
		Final Leachate pH		5.0		
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	1	0.45	mg/L	JB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L	
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L	

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS
CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-047 TCLP
NUS SAMPLE NO: P0317157
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/09(1240)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED
Reviewed By
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 14

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-048 TCLP
NUS SAMPLE NO: P0317158
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT	UNITS	
1	S903	TCLP Bottle Extraction				
		Begin Date/Time		08/09(1340)		
		End Date/Time		08/10(0600)		
		Extraction Fluid		1		
		Final Leachate pH		6.4		
3	AASL	Arsenic, Leachable (As)	1	< 1	mg/L	
4	ABAL	Barium, Leachable (Ba)	1	0.83	mg/L	B
5	ACDL	Cadmium, Leachable (Cd)	1	0.05	mg/L	
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2	mg/L	
7	APBL	Lead, Leachable (Pb)	1	< 0.5	mg/L	
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002	mg/L	J
9	ATLL	Thallium, Leachable (Tl)	1	< 2	mg/L	

COMMENTS:

8 This sample was analyzed as a matrix spike. Recovery of the spike was outside established acceptance limits indicating the presence of a possible matrix interference.

VALIDATED

Reviewed By [signature]

Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136
Section A Page 15

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-049 TCLP
NUS SAMPLE NO: P0317159
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
2	S904	Zero Headspace Extraction [ZHE]		
		Begin Date/Time		08/09(1240)
		End Date/Time		08/10(0600)
10	OVZHE	VOLATILES - TCLP/ZHE		
		1,1,1-trichloroethane	10	< 0.05 mg/L
		1,2-dichloroethane	10	< 0.05 mg/L
		benzene	10	< 0.05 mg/L
		chloroform	10	< 0.05 mg/L
		ethyl benzene	10	< 0.05 mg/L
		toluene	10	< 0.05 mg/L
		vinyl chloride	10	< 0.10 mg/L
		xylenes, total	10	< 0.05 mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]
Date 12/20/95

Halliburton NUS CORPORATION

NUS LABORATORY
5350 Campbells Run Road
Pittsburgh, Pennsylvania 15205

TEL: (412) 747-2500
FAX: (412) 747-2559

August 18, 1995
Report No.: 00027136

LABORATORY ANALYSIS REPORT

CLIENT NAME: WESTINGHOUSE ELECTRIC CORPORATIO
ADDRESS: P.O. BOX 2078
CARLSBAD, NM 88221-2078
ATTENTION: MR. RICK CHAVEZ

NUS CLIENT NO: 1783 0003
WORK ORDER NO: 55830
VENDOR NO: 01830727

SAMPLE ID: RA-95-050 TCLP
NUS SAMPLE NO: P0317160
P.O. NO.: 67763

DATE SAMPLED: 31-JUL-95
DATE RECEIVED: 02-AUG-95
APPROVED BY: Kieda, Chuck

LN	TEST CODE	DETERMINATION	DILUTION FACTOR	RESULT UNITS
1	S903	TCLP Bottle Extraction		
		Begin Date/Time		08/09(1340)
		End Date/Time		08/10(0600)
		Extraction Fluid		1
		Final Leachate pH		5.2
3	AASL	Arsenic, Leachable (As)	1	< 1 mg/L
4	ABAL	Barium, Leachable (Ba)	1	0.48 mg/L JB
5	ACDL	Cadmium, Leachable (Cd)	1	< 0.05 mg/L
6	ACRL	Chromium, Leachable (Cr)	1	< 0.2 mg/L
7	APBL	Lead, Leachable (Pb)	1	< 0.5 mg/L
8	AHGL	Mercury, Leachable (Hg)	1	< 0.0002 mg/L
9	ATLL	Thallium, Leachable (Tl)	1	< 2 mg/L

COMMENTS:

VALIDATED

Reviewed By [signature]

Date 12/20/95