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## Sampling and Analysis Data Document

This document contains uninterpreted sampling and analytical data. The data will be interpreted by the DOE Environmental Survey Team and used to modify, as appropriate, the tentative Survey findings contained in the Environmental Survey Preliminary Report. Final Survey findings will be presented in the Environmental Survey Summary Report.

**DRAFT**

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**Volume I**
**September 1989**

DEPARTMENT OF ENERGY

ENVIRONMENTAL SURVEY

ORNL/TM-11236

# THE IDAHO NATIONAL ENGINEERING LABORATORY SAMPLING AND ANALYSIS DATA DOCUMENT (DRAFT)

## VOLUME I

September 1989


Prepared by:
DOE Environmental Survey and
Oak Ridge National Laboratory

Operated by
Martin Marietta Energy Systems, Inc.



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## LIST OF ABBREVIATIONS

| | |
|---|---|
| AA | Atomic absorption |
| ACD | Analytical Chemistry Department (or Division) |
| ACK | Analytical Chemistry Division - K25 |
| Ag-AgCl | Silver-silver chloride |
| ANL | Argonne National Laboratory |
| ANL-W | Argonne National Laboratory - West |
| ANP | Aircraft Nuclear Propulsion Program |
| AOC | Augmented Operator Capability |
| APG | Analytical Products Group |
| ARA | Auxiliary Reactor Area |
| ARVFS | Army Reentry Vehicle Facility Site |
| ASTM | American Society for Testing Materials |
| A-WMG | Wide-mouth glass (I-Chem cleaning protocol A) |
| BCD | Battelle-Columbus Division |
| Be | Beryllium |
| BFB | Bromofluorobenzene |
| BHC | Benzene hexachloride |
| BORAX | Boiling Water Reactor Experiment |
| $Br^-$ | Bromide |
| B-WMG | Wide-mouth glass (I-Chem cleaning protocol B) |
| C | Carbon |
| C | Centigrade (when preceeded by $^{o}$) |
| Ca | Calcium |
| $Ca^{+2}$ | Calcium ions |
| CAS Number | Chemical Abstract System Number |
| CFA | Central Facilities Area |
| CFR | Code of Federal Regulations |
| CH | Chicago Operations Office |
| $CH_4$ | Methane |
| $Cl^-$ | Chloride |
| $Cl_2$ | Chlorine |
| CLP | Contract Laboratory Program |
| cm | Centimeter |
| CN | Cyanide |
| CNCl | Cyanogen chloride |
| Co | Cobalt |
| $CO_2$ | Carbon dioxide |
| COC | Chain of Custody |
| COLIWASA | Composite Liquid Waste Sampler |
| cpm | Counts per minute |
| CPP | Chemical Processing Plant |
| Cr | Chromium |
| CRDL | Contract required detection limit |

| | |
|---|---|
| CRQL | Contract required quantitation limit |
| Cs | Cesium |
| Cu | Copper |
| CV | Calibration verification |
| CVFAA | Cold Vapor Flameless Atomic Absorption |
| C-WMHDPE | Wide-mouth high density polyethylene (I-Chem cleaning protocol C) |
| DBBP | Dibutyl butyl phosphonate |
| DBC | Dibutylchlorendate |
| DDD | Dichloro diphenyl dichloroethane |
| DDE | Dichloro diphenyl chloroethane |
| DDT | Dichloro diphenyl trichloroethane |
| DFTPP | Decafluorotriphenylphosphine |
| DMF | Dimethyl formamide |
| DO | Dissolved oxygen |
| DOE | Department of Energy |
| DOE-ES | Department of Energy Environmental Survey |
| DOE-HQ | Department of Energy Headquarters |
| dpm | Disintegrations per minute |
| EBR-I,II | Experimental Breeder Reactors I and II |
| ECH | Environmental Compliance and Health Protection Division |
| EE | Environmental engineer |
| EG&G | EG&G Idaho, Inc. |
| EMSL-LV | Environmental Monitoring and Systems Laboratory, Las Vegas |
| EPA | Environmental Protection Agency |
| EPTC | Extraction Toxicity Characteristic |
| ESD | Environmental Sciences Division |
| ESM | Environmental Survey Manual |
| ETR | Engineering Test Reactor |
| Eu | Europium |
| F | Farenheit (when preceeded by $^{o}$) |
| $F^-$ | Fluoride |
| FES | Flame emission photometry |
| FID | Flame ionization detector |
| FQC | Field quality control |
| ft | foot/feet |
| FW | Formula weight |
| g | Grams |
| GA | Gross alpha |
| gal. | Gallon |
| GB | Gross beta |
| GC | Gas chromatography |
| GC/ECD | Gas chromatography/electron capture detector |

| | |
|---|---|
| GC/MS | Gas chromatography/mass spectrometry or gas chromatograph/mass spectrometer |
| GFAA | Graphite Furnace Atomic Absorption |
| gpm | Gallons per minute |
| H | Hydrogen |
| HCl | Hydrochloric acid |
| HCN | Hydrocyanic acid |
| HDPE(B) | High density polyethylene bottles (I-Chem cleaning protocol B) |
| HDPE(C) | High density polyethylene bottles (I-Chem cleaning protocol C) |
| He | Helium |
| Hg | Mercury |
| HMX | Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine |
| HNS | Dipicrylethane |
| $HNO_3$ | Nitric acid |
| HNU | Photoionization detector |
| HP | Health physicist |
| HPLC | High performance liquid chromatography |
| H&SO | Health and Safety Officer |
| $H_2O$ | Water |
| $H_2SO_4$ | Sulfuric acid |
| $H_3$ | Tritium |
| IBM | International Business Machines |
| IC | Ion chromatography |
| ICP | Inductively coupled plasma |
| ICPP | Idaho Chemical Processing Plant |
| ID | Idaho Operations Office |
| IDL | Instrument detection limit |
| IET | Initial Engine Test |
| in. | inches |
| INEL | Idaho National Engineering Laboratory |
| IS1 (BCM) | Volatile organic internal standard compound (Bromochloromethane) |
| IS1 (DCB) | Semivolatile internal standard compound (1,4 -Dichlorobenzene-d4) |
| IS2 (DFB) | Volatile organic internal standard compound (1,4 -Difluorobenzene) |
| IS2 (NPT) | Semivolatile internal standard compound (Naphthalene-d8) |
| IS3 (ANT) | Semivolatile internal standard compound (Acenaphthene-d8) |
| IS3 (CBZ) | Volatile organic internal standard compound (Chlorobenzene) |
| IS4 (PHN) | Semivolatile internal standard compound (Phenanthrene-d10) |
| IS5 (CRY) | Semivolatile internal standard compound (Chrysene-d12) |
| IS6 (PRY) | Semivolatile internal standard compound (Perylene-d12) |

| | |
|---|---|
| JMC | Soil hand-core sampling device |
| K | Potassium |
| $K^+$ | Potassium ion |
| KCl | Potassium chloride |
| kg | Kilogram |
| $km^2$ | Square kilometers |
| L | Liter |
| LCCDA | Liquid Corrosive Chemical Disposal Area |
| LCS | Laboratory control samples |
| LOCA | loss-of-coolant accidents |
| LOCE | Loss-of-coolant experiments |
| LOFT | Loss-of-Fluid Test (Facility) |
| LWR | Light water reactor |
| m | Meter |
| M | Molar |
| MDL | Method detection limit |
| $MeCl_2$ | Methylene chloride |
| MEK | Methyl ethyl ketone |
| Met | Metals |
| Mg | Magnesium |
| $Mg^{+2}$ | Magnesium ion |
| mg/kg | Milligrams per kilogram |
| mg/L | Milligrams per liter |
| $Mg_2SO_4$ | Magnesium sulfate |
| min | Minute |
| MIBK | Methyl isobutyl ketone (4-methyl-2-pentanone) |
| mL | Milliliter |
| mm | Millimeter |
| MMES | Martin Marietta Energy Systems, Inc. |
| mR/hr | MilliRad per hour |
| m/s | Meters per second |
| mS/cm | milliSiemens per centimeter |
| MSA | Method of standard additions |
| MS%Rec | Matrix spike percent recovery |
| MSD%Rec | Matrix spike duplicate percent recovery |
| MTA | Mobile Test Assembly |
| MTR | Materials Test Reactor |
| MWe | Megawatts - electrical |
| N | Nitrate or Nitrogen |
| N | Normal |
| Na | Sodium |
| $Na^+$ | Sodium ion |
| NA | Not applicable, not available, not analyzed |
| NaOH | Sodium hydroxide |
| $Na_2SO_3$ | Sodium sulfate |
| NBC | National Bureau of Calibrations |

| | |
|---|---|
| NBS | National Bureau of Standards |
| NEIC | National Enforcement Investigation Center |
| ng | Nanograms |
| Ni | Nickel |
| NIOSH | National Institute for Occupational Safety and Health |
| nm | Nanometers |
| NOAA | National Oceanic and Atmospheric Administration |
| NODA | Naval Ordnance Disposal Area |
| $NO_3^-$ | Nitrate |
| NR | Not required |
| NRF | Naval Reactor Facility |
| NRTS | National Reactor Testing Station |
| O&G | Oil and grease |
| ODS | Octadecylsilane |
| OMRE | Organic Moderated Reactor Experiment |
| ORGDP | Oak Ridge Gaseous Diffusion Plant |
| ORNL | Oak Ridge National Laboratory |
| OSHA | Occupational Safety and Health Administration |
| OVA | Organic vapor analysis |
| P/P | Pesticide/PCB |
| Pb | Lead |
| PBLK | Pesticide method blank |
| PCB | Polychlorinated biphenyl |
| PCDD | Tetra-, penta-, hexa-, hepta-, and octachlorinated dibenzo-p-dioxin |
| pCi | PicoCuries |
| pCi/g | PicoCuries per gram |
| pCi/kg | PicoCuries per kilogram |
| pCi/L | PicoCuries per liter |
| pCi/mL | PicoCuries per milliliter |
| P.E. | Performance evaluation |
| PETN | Pentaerythritol tetranitrate |
| PID | Photoionization detector |
| PNRO | Pittsburgh Naval Reactor Office |
| $PO_4^{-3}$ | Phosphate |
| ppb | Parts per billion |
| ppm | Parts per million |
| ppt | Parts per trillion |
| PREPP | Process Experimental Pilot Plant |
| Pu | Plutonium |
| PVC | Polyvinyl chloride |
| QA | Quality assurance |
| QA/QC | Quality assurance/quality control |
| QB | Quarterly blind |
| QC | Quality control |
| r | Correlation coefficient |

| | |
|---|---|
| Rad. or RAD | Radionuclides, radioactivity, or radiological |
| RCRA | Resource Conservation and Recovery Act |
| RDX | Hexahydro-1,3,5-trinitro-1,3,5-triazine or cyclonite |
| RESL | Radiological and Environmental Services Laboratory |
| RPD | Relative percent difference |
| RRF | Relative response factor |
| RSD | Relative standard difference |
| RT | Retention time |
| RWCF | Radioactive Waste Concentration Facility |
| S&A | Sampling and analysis |
| S1(DCB) | Pesticide surrogate compound (Dibutylchlorendate) |
| S1(NBZ) | Semivolatile surrogate compound (Nitrobenzene-d5) |
| S1(TOL) | Volatile organic surrogate compound (Toluene-d8) |
| S2(BFB) | Volatile organic surrogate compound (Bromofluorobenzene) |
| S2(FBP) | Semivolatile surrogate compound (2-Fluorobiphenyl) |
| S3(DCE) | Volatile organic surrogate compound (1,2 Dichloroethane-d4) |
| S3(TPH) | Semivolatile surrogate compound (Terphenyl-d14) |
| S4(PHL) | Semivolatile surrogate compound (Phenol-d5) |
| S5(ZFP) | Semivolatile surrogate compound (2-Fluorophenol) |
| S6(TBP) | Semivolatile surrogate compound (2,4,6-Tribromophenol) |
| SAIC | Science Applications International Corporation |
| SAS | Special Analytical Services |
| SBLK | Semivolatile method blank |
| SC | Surrogate compounds |
| SCBA | Self contained breathing apparatus |
| SD | Standard deviation |
| SDG | Sample delivery group |
| SIS | Special Isotope Separation |
| SIUs | International System of Units |
| SMC | Specific Manufacturing Capability |
| $SO_4^{-2}$ | Sulfate |
| SOP | Standard operating procedure |
| SOW | Statement of work |
| SPCC | System performance check compounds |
| SPERT | Special Power Excursion Reactor Tests |
| SRC | Solvent refined coal |
| SS | Suspended soils |
| SSTD | Semivolatile standard |
| STD | Standard |
| STF | Security Training Facility |
| STP | Sewage Treatment Plant |
| SV | Semivolatile organic compound |
| SW | Surface water |
| SepF (Extraction) | Separatory funnel extraction |
| Sonc (Extraction) | Sonication extraction |

| | |
|---|---|
| TAN | Test Area North |
| TATB | Triamino-trinitro-benzene |
| TBP | Semivolatiles organics protocol |
| TC | Target compound |
| TCA | Trichloroethane |
| TCB | Trichlorobenzene |
| TCDD | 2,3,7,8-Tetrachloro-Dibenzo (p) Dioxin |
| TCE | Trichloroethylene |
| TCL | Target compound list |
| TCLP | Toxic characteristic leaching procedure |
| TCTNB | Trichloro-trinitro-benzene |
| TDS | Total dissolved solids |
| Tetryl | N-methyl-N-2,4,6-tetranitroanaline |
| TIC | Tentatively identified compound |
| TICH | Total identifiable chlorinated hydrocarbons |
| TICP | Total ion current profile |
| TIMS | Thermal ionization mass spectrometry |
| TIP | PhotoVac OVA instrument |
| TMI | Three Mile Island |
| TNT | 2,4,6-trinitrotoluene |
| TOC | Total organic carbon |
| TOPO | Trioctylphosphine oxide |
| TRA | Test Reactor Area |
| TREAT | Transient Reactor Test (Facility) |
| TRU | Transuranic |
| TSCA | Toxic Substance Control Act |
| TSF | Technical Support Facility |
| 2,4D | 2,4-Dichlorophenoxy acetic acid |
| 2,4-DNT | 2,4-dinitrotoluene |
| 2,6-DNT | 2,6-dinitrotoluene |
| 2,4,5-T | 2,4,5-Trichlorophenoxy |
| 2,4,5-TP | Propionic acid (Silvex) |
| 2NZN | 2 N (Normal) Zinc acetate |
| U | Uranium |
| ug | Micrograms |
| ug/kg | Micrograms per kilogram |
| ug/L | Micrograms per liter |
| USGS | United States Geological Survey |
| VBLK | Volatile organic method blank |
| VOA | Volatile organic analysis |
| VOC | Volatile organic compound |
| vol | Volume |
| VSTD | Volatile organic standard |
| W | Tungsten |
| WCF | Waste Calcining Facility |
| WEC | Westinghouse Electric Corporation |

| | |
|---|---|
| $W_i$ | Percent relative weight abundance |
| WINCO | Westinghouse Idaho Nuclear Corporation |
| WIPP | Waste Isolation Pilot Plant |
| WMO | Waste Management Office |
| WRRTF | Water Reactor Research Facility |
| Y | Yttrium |
| Zn | Zinc |
| ZPPR | Zero Power Physics Reactor |

## INORGANIC ANALYSIS DATA FLAGS

### Concentration Qualifiers

| | |
|---|---|
| B | Value less than the CRDL but greater than IDL |
| U | Analyte analyzed for but not detected |

### QA/QC Qualifiers

| | |
|---|---|
| E | Value estimated or not reported because of the presence of interference |
| M | Duplicate injection precision not met |
| N | Spiked sample recovery not within control limits |
| S | Value determined by the Method of Standard Additions (MSA) |
| * | Duplicate analysis not within control limits |
| + | Correlation coefficient for the MSA is less than 0.995 |

### Method Qualifiers

| | |
|---|---|
| A | Flame AA |
| AS | Semiautomated spectrophotometric |
| AV | Automated cold vapor AA |
| C | Manual spectrophotometric |
| CV | Manual cold vapor AA |
| F | Furnace AA |
| P | ICP |
| T | Titrimetric |
| NR | Analyte is not required to be analyzed |
| AE | Atomic emission - ICP |

## ORGANIC ANALYSIS DATA FLAGS

| | |
|---|---|
| A | TIC is a suspected aldol-condensation product |
| B | Analyte found in associated blank as well as in the sample |
| C | Pesticide identification confirmed by GC-MS |
| E | Concentration exceeds the calibration range of the instrument |
| J | Estimated value |
| U | Compound analyzed for but not detected |
| D | Compounds identified in an analysis at a secondary dilution factor |
| X, Y, Z | Wildcard flags (see explanation in Sect. 4.2.2.2) |

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# 1.0 INTRODUCTION

This document presents the Department of Energy's (DOE's) Environmental Survey with field and analytical data collected by the Oak Ridge National Laboratory (ORNL) Sampling and Analysis Team at the Idaho National Engineering Laboratory. Sampling activities at the INEL site were initiated during the week of June 13, 1988. Analyses of these samples were essentially completed by December 1988.

**NOTE**

> It should be noted that this document contains uninterpreted sampling and analysis data. The data will be interpreted by the DOE Environmental Survey Team and used with the tentative Survey findings contained in the Environmental Survey Preliminary Reports. Final Survey findings will be contained in the Environmental Survey Summary Report.

This INEL Sampling and Analysis Data Document includes information from the DOE Environmental Survey Sampling and Analysis Plan for the INEL Site (Ref. 1-1) and field and analytical data. Please refer to the August 1987 DOE Environmental Survey Manual (Ref. 1-2) for additional detailed descriptions of field and analytical procedures. For an overview of the DOE Environmental Survey Sampling and Analysis Program and for background information on the INEL environmental setting, please refer to the INEL Preliminary Report for the DOE Environmental Survey (Ref. 1-3) and the DOE Environmental Survey Sampling and Analysis Plan for the INEL Site.

Volume I of this document contains six chapters. Chapter 1.0 provides background information on site sampling and analysis efforts. Chapter 2.0 was deemed to be redundant and unnecessary and is retained only in title. Chapter 3.0 provides a brief description of field and analytical procedures. Chapter 4.0 describes how to evaluate the sampling and analysis data and presents the main data on each environmental problem. Quality assurance (QA) data are presented

and discussed in Chapter 5.0. References and bibliographic information are included in Chapter 6.0.

Volume II contains Appendices A through E. Appendix A contains a listing of sampling and analytical requests. Appendix B presents a discussion and listing of background concentrations of analytes. Appendix C includes audit findings. Appendix D contains a summary of analytical quality assurance/quality control (QA/QC) information. Appendix E includes radiological QA/QC data.

## 1.1 Site Sampling and Analysis

Oak Ridge National Laboratory was designated by DOE to provide a sampling team for the INEL Site and to perform the required laboratory analytical services. The requests for sampling and analysis were developed by the DOE Environmental Survey Team after careful consideration of the needs of the INEL Site to identify both actual and potential environmental problems. The Team based its requests on detailed and lengthy considerations of local environmental characteristics, historical environmental monitoring data, and an understanding of the production and research and development operations performed at the site.

The technical specialists of the Survey Team compared notes, reviewed objectives, and determined which actual or potential environmental problems required sampling and analysis in order to be completely and accurately evaluated. In some cases, a group of sample and analytical requests from different technical disciplines in the Survey Team supported the investigative needs for evaluating a single actual or potential environmental problem.

During the on-site portion of the INEL Survey (September 14 through October 2, 1987), meetings were held between members of the Survey Team and the leader of the INEL Sampling and Analysis Team to discuss required sampling and analytical needs. A draft list of sample requests was provided to ORNL's INEL Sampling and Analysis Team Leader in November 1987. The Survey Team revised

this list during a joint meeting with Sampling Team members in December 1987. The INEL Sampling and Analysis Plan (issued June 3, 1988) was based on the revised sample requests that resulted from the December 1987 meeting and continuing dialogue between DOE, ORNL, and the Survey Team technical specialists.

The purpose of the Sampling and Analysis Plan was to outline a plan for environmental field sampling and laboratory analysis in support of the DOE Environmental Survey at the INEL Site (see Figures 1.1 and 1.1a) located near Idaho Falls, Idaho. The Sampling and Analysis Plan was intended to be a guide that incorporated the standard procedures, analytical protocols, field sampling protocols, and other laboratory guidance from the DOE Environmental Survey Manual.

The INEL Sampling and Analysis Team involved personnel from many organizations. ORNL managed the project and was responsible for all sampling, laboratory analyses, field analyses, data management, and report preparation. Figure 1.2 shows the DOE and ORNL organizational structure for INEL sampling personnel. The chromium +6 analysis was completed at the INEL by EG+G Idaho, Inc., personnel. The short analytical holding time (24 hrs) precluded shipment to another laboratory, and the analysis method used was under development at the INEL.

This INEL Sampling and Analysis Data Document has been prepared by ORNL and subsequently reviewed by the Environmental Protection Agency's (EPA's) Environmental Monitoring Systems Laboratory in Las Vegas (EMSL-LV) and the DOE Survey Team. All comments are addressed or considered before the next draft is issued.

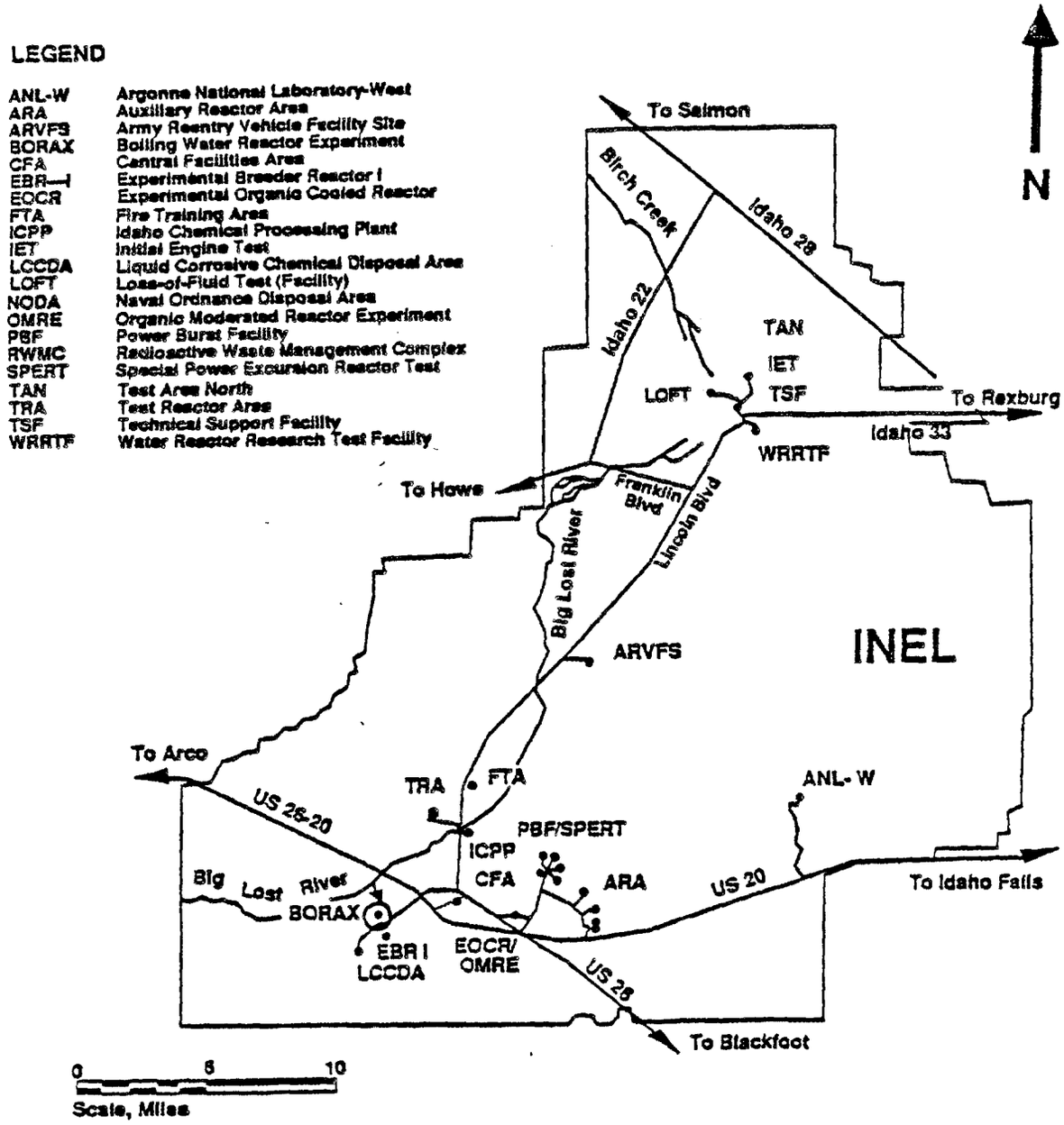



Figure 1.1. INEL Site Map (Primary Facilities)

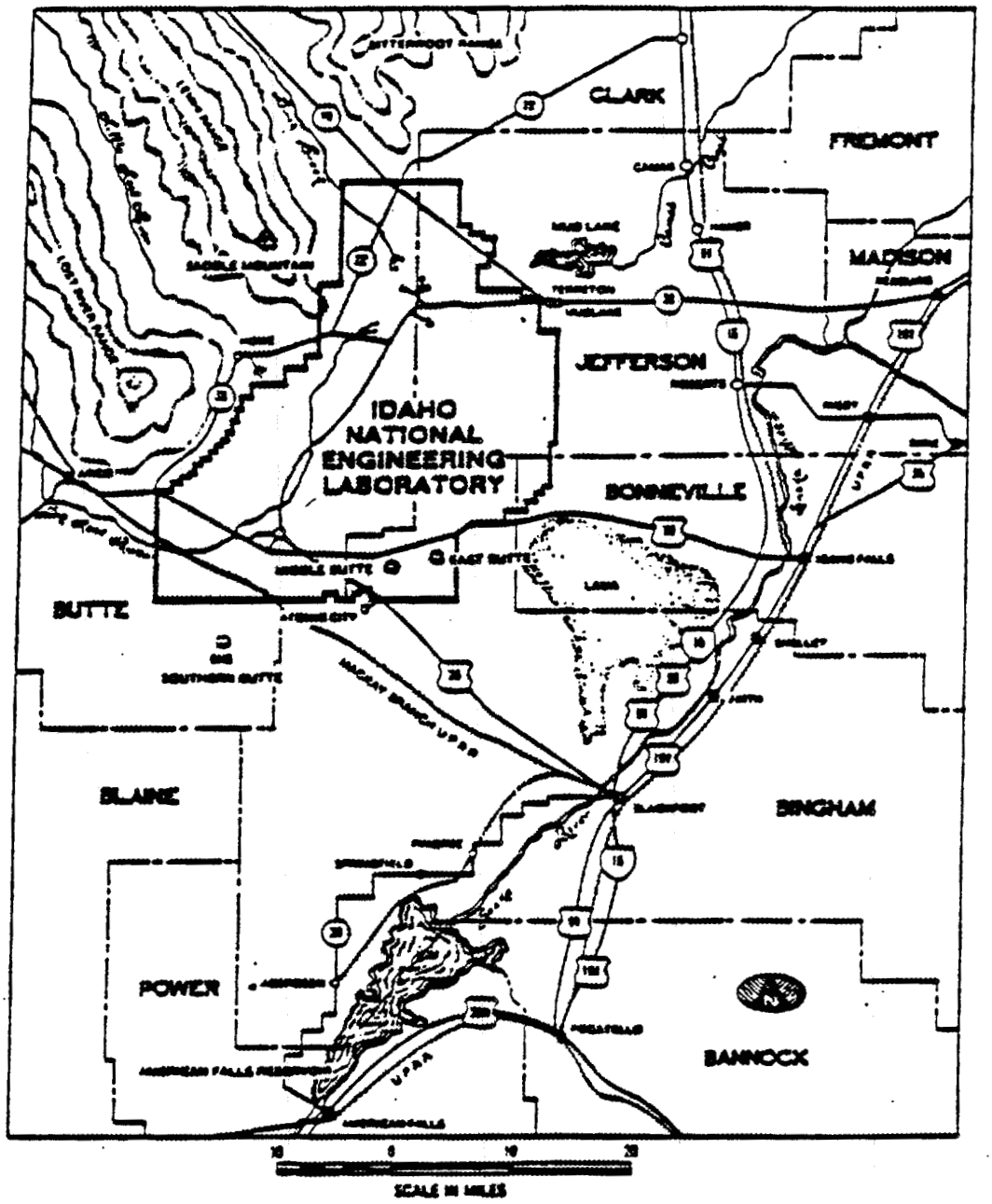
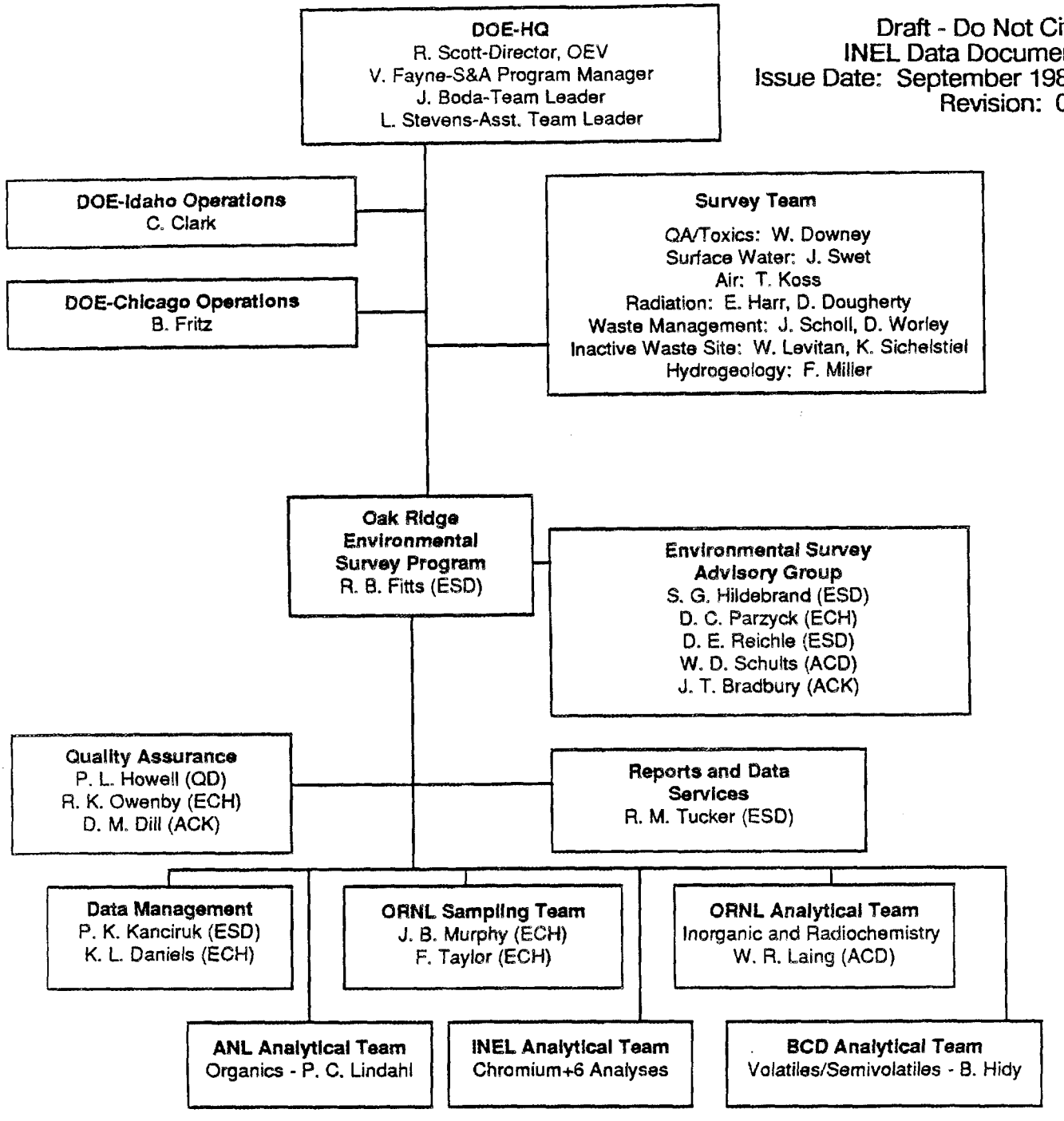



Figure 1.1a. The INEL Site Vicinity Map




Legend:

ORNL - Oak Ridge National Laboratory
ACD - Analytical Chemistry Division - ORNL
ACK - Analytical Chemistry Department - ORGDP
ECH - Environmental Compliance and Health Protection Division
ESD - Environmental Sciences Division
QD - Quality Department
BCD - Battelle-Columbus Division
ANL - Argonne National Laboratory

**Figure 1.2. DOE Leaders, Team Leaders, and Sampling and Analysis Teams for INEL**

# 2.0 SUMMARY OF SAMPLING AND ANALYSIS

Chapter 2.0 was originally reserved for a summary of the scope and data resulting from the sampling and analysis effort. After further consideration, it was decided that the Survey Team could just as effectively accomplish its objective of modifying the findings contained in the Environmental Survey Preliminary Report for this site by reviewing the data appearing in Chapter 4.0 (Data Presentation). Consequently, Chapter 2.0 was deemed redundant and unnecessary and is retained only in title so as to avoid inconsistencies with references in the Survey Manual and other section within the Data Document.

# 3.0 METHODS

Standard methods and procedures for sampling and analysis provide results which are representative of the site, of known analytical quality, and comparable with other Survey data. Field sampling protocols and analytical methods have been developed and documented in the DOE Environmental Survey Manual (Ref. 1-2). Appendices D and E of the DOE Environmental Survey Manual provide detailed technical descriptions of the sampling and analytical methods described in the following sections.

Sampling and analytical teams used sampling protocols developed by the American Society for Testing Materials (ASTM), The National Bureau of Standards (NBS), and the U.S. Environmental Protection Agency (EPA); EPA inorganic and organic laboratory analysis methods; and DOE radiological assessment procedures.

Standard practices to ensure sample integrity were in place for each field sampling method. Samples were handled with latex gloves, surface contamination was wiped or rinsed off, and samples were then labeled. Each sample was bagged in a zip-top bag and placed in an insulated ice chest. The samples were then logged in field books and chain-of-custody documents. Chain-of-custody documents were initiated at the time of sample collection and accompanied the samples until they arrived at the analytical laboratories.

For additional details on methods, please refer to the DOE Environmental Survey Manual (i.e., E4.2.1 refers to Section E4.2.1, "Sample Container Immersion," of Appendix E of the DOE Environmental Survey Manual). Section 6.0 of this data document contains a bibliography of sources and references used to develop and perform analyses.

## 3.1 Field Sampling Methods

### 3.1.1 Surface Water Sampling Methods

#### 3.1.1.1 Immersion Method

The immersion method was the preferred method for collection of grab samples from shallow streams, ponds, and effluent streams. The sample bottle was submerged below the water surface with the opening oriented upstream. The sample was collected, preserved, capped, and rinsed with deionized water (Sampling Method: Reference E4.2.1, "Sample Container Immersion").

#### 3.1.1.2 Time Composite Sampling

An automated sampler was used to determine mass per unit time concentrations and identify sporadically discharged contaminants from outfalls or streams. Composite samplers were located near the sample point and set to collect a selected volume at the desired frequency, e.g., 320 milliliters (mL) collected at the same time each hour. The sample was pumped through a tube to a 2-1/2 gallon (gal.) refrigerated collection jar. Samples were then dispersed from the collection jar to appropriate sample containers (Sampling Method: Reference E4.2.2, "Automated Composite Sampler").

#### 3.1.1.3 Volatile Organic Compounds by Vial

Grab samples for volatile organics were collected by submerging a 40-mL vial with a Teflon-coated septum in water. The vial was slowly submerged, upside down, in the water. The sample was then collected by righting the vial. The vial was removed from the water, capped, and inverted to check for air bubbles. A lack of bubbles verified an intact sample. It was then rinsed, wiped, labeled, and packed (Sampling Method: Reference E4.2.3A, "Volatile Organic Compounds by Vial").

#### 3.1.1.4 Volatile Organic Compounds by Dipper

A grab sample for volatile organics was obtained by slowly submerging a stainless steel dipper in water. The dipper was retrieved and a sample decanted into a 40-mL sample vial that was slightly tipped against the dipper. The vial was filled, capped, checked for air bubbles, and packaged (Sampling Method: Reference E4.2.3B, "Volatile Organic Compounds by Dipper").

### 3.1.2 Groundwater Sampling Methods

#### 3.1.2.1 Purging Wells

Grab samples from developed wells were taken after using an electronic sounder to indicate the depth to water level and calculating the well volume. Typically, a submersible pump was used to purge the well of 3 to 5 well volumes. Well purging ensured that a sample representative of the groundwater was secured. As the well was being purged, the purged water was monitored for temperature, conductivity, and pH. When these parameters stabilized, they indicated that the water being pumped was most likely from the aquifer and not the well casing. Types of pumps used for purging wells included peristaltic pumps (shallow wells) and bladder pumps (Sampling Method: Reference E4.4.4.1, "Purging and Sampling with a Submersible Pump").

#### 3.1.2.2 Groundwater Sample Collection

Well samples were collected from wells after adequate purging and stabilization of field parameters. Samples were then collected from the pump discharge or bailer (narrow bucket with check valve).

Grab samples collected using bailers were preferred for volatile organics, dissolved gases, or other samples that could be degraded by aeration.

Samples collected using submersible centrifugal pumps were not suitable for volatile organic analysis. The turbulence caused by the submersible pump may have released volatiles to vapor phase, excluding them from the sample. Logbook entries indicative of volatile organic samples collected in this manner were made by the Sampling Team Leader.

Other types of pumps used to collect samples were considered suitable for maintaining volatile sample integrity. Filtered samples were taken by connecting the pump outlet to the filter unit. Pump pressure was regulated to prevent filter breakthrough (Sampling Method: Reference E4.4, "Groundwater").

#### 3.1.2.3 Field Measurements

Unless otherwise noted in the specific environmental problem descriptions in Chapter 4.0, Horiba or Yellow Springs instruments were used to monitor water samples for pH, temperature, conductivity, and, in most cases, turbidity and dissolved oxygen. The presence of volatile organic compounds (VOCs) was determined with either a photoionization detector (PID) or a flame ionization detector (FID). A Sybron/Barnstead conductivity bridge was used to determine resistivity. The reduction-oxidation potential of samples was determined with a standard millivolt meter using a silver-silver chloride (Ag-AgCl)-platinum or calomel-platinum electrode system (Sampling Method: Reference E4.5, "Field Measurements").

### 3.1.3 Solids

The methods used for solids sampling (soils, sludge, and sediments) were designed to account for the heterogeneous composition of such solids. Several grab samples from selected locations were collected, pooled, homogenized in an aluminum pan using a stainless steel spoon, and bottled. A minimum of three pooled samples were collected from each sample location (Sampling Method:

Reference E5.0, "Solids"). In instances where the media to be collected were limited in distribution (e.g., sediment), grab samples were collected until a suitable volume was obtained.

### 3.1.4 Surface Soils

The top 3 inches (in.) of soil (with stones and vegetation removed) were collected using stainless steel spoons, spatulas, etc.; pooled; and placed in sample bottles. Volatile samples were collected without homogenization or pooling. Nonvolatile samples were collected in an aluminum pan, mixed, and placed in sample bottles.

For trenches and ditches, subsamples were systematically collected at random along the centerline of the trench. For spill areas, the subsamples were obtained from heavily stained areas; for large surface areas, a simple random grid was used to ensure a representative sample (Sampling Method: Reference E5.1, "Surface Soils").

### 3.1.5 Subsurface Soils

Subsurface soil samples [less than 50 feet (ft) in depth] were collected using a variety of techniques. Augers, core samplers, and drive tubes with split-spoon samplers were used as soil conditions dictated. Soil cores were preferable to augered samples, but were useful only in areas where gravel/cobble was not abundant and where there were no high hazard wastes (Sampling Method: Reference E5.2, "Subsurface Soils").

### 3.1.6 Auger and Thin-Wall Tube Sampling

Following augering to a desired sample depth, samples were collected by removing the auger and replacing it with a tube corer. The corer was lowered into position at the sample depth, forced into the soil, and the sample collected.

When the soil contained cobble which precluded use of the corer, the samples had to be collected directly from the auger. Continuous flight augers were used in some cases. Although samples from specific depths were difficult to collect directly off the auger, satisfactory composite samples were collected (Sampling Method: Reference E5.2.1, "Subsurface Solid Sampling with Auger and Thin-Wall Tube Sampler").

### 3.1.7 Core Sampling

The core tube was driven into the ground to a desired depth, withdrawn, and the sample placed in an aluminum tray. The core was then examined with field survey instruments for radioactivity and organic vapor concentrations. The sample site having the highest concentrations was resampled, and an undisturbed sample collected for volatile organic analysis. Three additional cores from the same sample location were collected, pooled, and placed in sample bottles. This procedure was completed three additional times to collect a total of three composite samples (Sampling Method: Reference E5.2.2, "Core Sample"). When sampling boreholes that penetrated the soil 10 ft or more, split-spoon samples were taken. The contents of the split-spoon were screened for VOCs and radioactivity. Immediately following screening, the VOC samples were taken. Following collection of the VOC samples, the split-spoon sample was emptied into a stainless steel pan and homogenized. The remaining samples were then taken from this composite.

### 3.1.8 Sludge and Sediments

Sludge is a semidry material ranging from dewatered solids to high viscosity liquids. Sediments are the deposited materials underlying a body of water. When sediments are exposed by evaporation, stream rerouting, or other means, they are collected by soil or sludge collection methods.

Sludge and sediment were usually sampled using a scoop if the liquid layer over the material was shallow (Sampling Method: Reference E5.3, "Sludges and Sediments").

### 3.1.9 Scoop Sampling

Although sample collection with a scoop may disturb the liquid-solid interface and alter the sample integrity, sample integrity can be maintained by using extreme care.

The scoop method was used to collect a composite sample by inserting the scoop and removing a sample. For sludge exposed to air, the first 1 to 2 centimeters (cm) of material were removed prior to collecting the sample. The sample was placed in an aluminum tray, mixed, and transferred to an appropriate bottle (Sampling Method: Reference E5.3.1, "Scoop").

### 3.1.10 Photoionization Detector (PID) and Flame Ionization Detector (FID)

When used, the PID was calibrated with benzene using the headspace method. A specified volume of vapor was removed from the headspace in a benzene reagent bottle and injected into a known volume Tedlar air bag containing zero air. The benzene atmosphere in the bag was calculated from the atmospheric pressure and the vapor pressure of the benzene at the ambient temperature. The PID was spanned to the resultant concentration and periodically checked throughout the sampling procedure. In sampling, the soil core was removed from the bore hole and a portion placed into a container to prevent loss of volatiles. The remaining portion was placed into a container fitted with a gas-tight sampling port. After 10 to 20 minutes (min), the PID sampling tube was inserted into the container through the port and the vapor concentrations measured. The results were recorded as "ppm benzene equivalent." The depth with the highest PID measurement was selected for sample submission and the portion previously placed in the container to prevent loss of volatiles constituted the sample.

When used, the FID was calibrated using a methane/air mixture. A gas chromatograph mass spectrometer (GC/MS) was used to determine the methane concentration (usually 93 ppm) in the cylinder containing the compressed methane/air mixture. Daily calibrations of the FID were performed by filling a Tedlar air bag with the calibration gas, making the necessary adjustments to the FID, and then "locking" the instrument dials. This ensured that the readings on the FID were correct.

### 3.1.11 Soil Gas Collection

Soil gas samples for the determination of volatile organic compounds were collected by the active method. The active method utilizes a pump for the continuous withdrawal of subsurface gases with syringe sampling and in situ gas chromatography (GC) analysis, or the subsurface gases are pumped through adsorbent tubes and analyzed in the laboratory by GC. The active sampling method is preferred because the zone of sampling is effectively enlarged by the moving air stream, thereby providing a more representative sample from the interstitial spaces. Soil gas sampling at INEL was accomplished by the active method, with the sample tubes returned to ORNL for analysis by GC.

Samples for soil gas analysis were collected using solid sorbent tubes (Carbotrap 300). The Carbotrap 300 tube was designed to trap hydrocarbons, whether present individually or in complex mixtures. The tube contained three distinct adsorbent beds. The back bed trapped vinyl chloride and other light compounds, while the middle bed trapped the C5-C8 compounds, and the front bed (gas inlet) trapped the heaviest compounds. The tube was constructed to allow sampling volumes of up to 10 L without breakthrough. The soil gas stream was pulled through the tube with a personal air monitor pump which had an adjustable sample rate of 0.2 to 4 L per minute.

### 3.1.12 Field Radioactivity Measurements

Field radioactivity measurements were made using a portable beta/gamma meter. The instrument was calibrated at the Sampling Team's laboratory prior to the team's departure to the site.

## 3.2 Analytical Methods

Descriptions of the methods outlined in Sect. 3.2 are found in Appendix D of the DOE Environmental Survey Manual unless otherwise noted.

### 3.2.1 Organic Analysis Methods

#### 3.2.1.1 Volatile Organics

Volatile organic contaminants in low- and medium-level concentration samples of water, soil, or sediment were determined using the 7/87 Contract Laboratory Program (CLP) Statement of Work (SOW) and Appendix D of the DOE Environmental Survey Manual. The method cited in these two sources is appropriate for the determination of volatile organics in typical environmental matrices, using purge and trap sample introduction into a GC/MS. Thirty-four volatile target compounds can be identified and quantitated with the technique. Table 3.1 summarizes these analytes and their respective detection limits, as specified in the DOE Environmental Survey Manual and the 7/87 CLP SOW.

Volatile organics are purged from an aqueous sample or a mixture of soil and distilled water at ambient temperature using an inert gas. The vapor is swept through a sorbent column where the volatiles are trapped. After purging is completed, the sorbent column is heated and backflushed with the inert gas to desorb the volatiles onto a gas chromatograph (GC) column. The GC is temperature programmed to separate the volatiles, which are then detected with a mass spectrometer. Target compounds (TCs) are identified by: (1) elution of

Table 3.1. Analytes Determined by CLP Volatiles Analysis Method

| | Analyte | CAS Number | Contract Required Detection Limits[a] Water (ug/L) | Low Soil/Sediment[b,c] (ug/kg) |
|---|---|---|---|---|
| 1. | Chloromethane | 74-87-3 | 10 | 10 |
| 2. | Bromomethane | 74-83-9 | 10 | 10 |
| 3. | Vinyl chloride | 75-00-4 | 10 | 10 |
| 4. | Chloroethane | 75-00-3 | 10 | 10 |
| 5. | Methylene chloride | 75-09-2 | 5 | 5 |
| 6. | Acetone | 67-64-1 | 10 | 10 |
| 7. | Carbon disulfide | 75-15-0 | 5 | 5 |
| 8. | 1,1-Dichloroethene | 75-35-4 | 5 | 5 |
| 9. | 1,1-Dichloroethane | 75-35-3 | 5 | 5 |
| 10. | 1,2-Dichloroethene (total) | 540-59-0 | 5 | 5 |
| 11. | Chloroform | 67-66-3 | 5 | 5 |
| 12. | 1,2-Dichloroethane | 107-06-2 | 5 | 5 |
| 13. | 2-Butanone | 78-93-3 | 10 | 10 |
| 14. | 1,1,1-Trichloroethane | 71-55-6 | 5 | 5 |
| 15. | Carbon Tetrachloride | 56-23-5 | 5 | 5 |
| 16. | Vinyl acetate | 108-05-4 | 10 | 10 |
| 17. | Bromodichloromethane | 75-27-4 | 5 | 5 |
| 18. | 1,1,2,2-Tetrachloroethane | 79-34-5 | 5 | 5 |
| 19. | 1,2-Dichloropropane | 78-87-5 | 5 | 5 |
| 20. | cis-1,3-Dichloropropene | 10061-01-5 | 5 | 5 |
| 21. | Trichloroethene | 79-01-6 | 5 | 5 |
| 22. | Dibromochloromethane | 124-48-1 | 5 | 5 |
| 23. | 1,1,2-Trichloroethane | 79-00-5 | 5 | 5 |
| 24. | Benzene | 71-43-2 | 5 | 5 |
| 25. | trans-1,3-Dichloropropene | 10061-02-6 | 5 | 5 |
| 26. | Bromoform | 75-25-2 | 5 | 5 |
| 27. | 2-Hexanone | 591-78-6 | 10 | 10 |
| 28. | 4-Methyl-2-pentanone | 108-10-1 | 10 | 10 |
| 29. | Tetrachloroethene | 127-18-4 | 5 | 5 |
| 30. | Toluene | 108-88-3 | 5 | 5 |
| 31. | Chlorobenzene | 108-90-7 | 5 | 5 |
| 32. | Ethyl benzene | 100-41-4 | 5 | 5 |
| 33. | Styrene | 100-42-5 | 5 | 5 |
| 34. | Xylenes (total) | 133-02-7 | 5 | 5 |

Table 3.1. Analytes Determined by CLP Volatiles Analysis Method (Continued)

a. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable.
b. Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.
c. Contract required detection limits (CRDL) for volatiles at medium levels in soil/sediment are 100 times the listed CRDL for volatiles at low levels in soil/sediment.

the sample component at the same GC relative retention time as the standard component, and (2) correspondence of the sample component and standard component mass spectra. A combined search of the 1985 National Bureau of Standards (NBS) and Wiley Mass Spectral Library is used to tentatively identify up to ten nontarget analytes of greatest concentration in the chromatogram.

Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that could lead to artifacts and/or elevated baselines in the total ion profile. Laboratory reagent blanks are used to monitor the presence of such interferences. Interferences introduced by the sample matrix are monitored by the use of internal standards and matrix and surrogate spike recoveries.

Interpretation of volatiles data requires an assessment of the impact of holding times on data quality. The Survey protocol requires that the analysis be conducted within 14 days of sample collection. Samples which may exceed this holding time can still provide useful information, as long as the data are interpreted with caution.

#### 3.2.1.2 Semivolatile Organics

Semivolatile organic contaminants in low- and medium-level concentration samples of water, soil, or sediment were determined using the 7/87 CLP SOW and Appendix D of the DOE Environmental Survey Manual. The method described in these two sources is appropriate for the determination of a number of organic compounds that are partitioned into an organic solvent and are amenable to gas chromatography. The target compound list (TCL) and required detection limits specified in the DOE Environmental Survey Manual are listed in Table 3.2.

Semivolatile organics are serially extracted from aqueous samples with methylene chloride at a pH greater than 11, and again at a pH less than 2. The methylene chloride extracts are dried and concentrated separately. Low-level soil samples

Table 3.2. Analytes Determined by CLP Semivolatiles Analysis Method

| Analyte | CAS Number | Contract Required Detection Limits[a] Water (ug/L) | Low Soil/Sediment[b,c] (ug/kg) |
|---|---|---|---|
| 35. Phenol | 108-95-2 | 10 | 330 |
| 36. bis(2-Chloroethyl) ether | 111-44-4 | 10 | 330 |
| 37. 2-Chlorophenol | 95-57-8 | 10 | 330 |
| 38. 1,3-Dichlorobenzene | 541-73-1 | 10 | 330 |
| 39. 1,4-Dichlorobenzene | 106-46-7 | 10 | 330 |
| 40. Benzyl alcohol | 100-51-6 | 10 | 330 |
| 41. 1,2-Dichlorobenzene | 95-50-1 | 10 | 330 |
| 42. 2-Methylphenol | 95-48-7 | 10 | 330 |
| 43. bis(2-Chloroisopropyl) ether | 39638-32-9 | 10 | 330 |
| 44. 4-Methylphenol | 106-44-5 | 10 | 330 |
| 45. N-Nitroso-di-n-propylamine | 621-64-7 | 10 | 330 |
| 46. Hexachloroethane | 67-72-1 | 10 | 330 |
| 47. Nitrobenzene | 98-95-3 | 10 | 330 |
| 48. Isophorone | 78-59-1 | 10 | 330 |
| 49. 2-Nitrophenol | 88-75-5 | 10 | 330 |
| 50. 2,4-Dimethylphenol | 105-67-9 | 10 | 330 |
| 51. Benzoic acid | 65-85-0 | 50 | 1600 |
| 52. bis(2-Chloroethoxy) methane | 111-91-1 | 10 | 330 |
| 53. 2,4-Dichlorophenol | 120-83-2 | 10 | 330 |
| 54. 1,2,4-Trichlorobenzene | 120-82-1 | 10 | 330 |
| 55. Naphthalene | 91-20-3 | 10 | 330 |
| 56. 4-Chloroaniline | 106-47-8 | 10 | 330 |
| 57. Hexachlorobutadiene | 87-68-3 | 10 | 330 |
| 58. 4-Chloro-3-methylphenol (para-chloro-meta-cresol) | 59-50-7 | 10 | 330 |
| 59. 2-Methylnaphthalene | 91-57-6 | 10 | 330 |
| 60. Hexachlorocyclopentadiene | 77-47-4 | 10 | 330 |
| 61. 2,4,6-Trichlorophenol | 88-06-2 | 10 | 330 |
| 62. 2,4,5-Trichlorophenol | 95-95-4 | 50 | 1600 |
| 63. 2-Chloronaphthalene | 91-58-7 | 10 | 330 |
| 64. 2-Nitroaniline | 88-74-4 | 50 | 1600 |
| 65. Dimethyl phthalate | 131-11-3 | 10 | 330 |
| 66. Acenaphthylene | 208-96-8 | 10 | 330 |
| 67. 2,6-Dinitrotoluene | 606-20-2 | 10 | 330 |
| 68. 3-Nitroaniline | 99-09-2 | 50 | 1600 |
| 69. Acenaphthene | 83-32-9 | 10 | 330 |

Table 3.2. Analytes Determined by CLP Semivolatiles Analysis Method (Continued)

| | Analyte | CAS Number | Contract Required Detection Limits[a] Water (ug/L) | Low Soil/Sediment[b,c] (ug/kg) |
|---|---|---|---|---|
| 70. | 2,4-Dinitrophenol | 51-28-5 | 50 | 1600 |
| 71. | 4-Nitrophenol | 100-02-7 | 50 | 1600 |
| 72. | Dibenzofuran | 132-64-9 | 10 | 330 |
| 73. | 2,1-Dinitrotoluene | 121-14-2 | 10 | 330 |
| 74. | Diethylphthalate | 84-66-2 | 10 | 330 |
| 75. | 4-Chlorophenyl phenyl ether | 7005-72-3 | 10 | 330 |
| 76. | Fluorene | 86-73-7 | 10 | 330 |
| 77. | 4-Nitroaniline | 100-01-6 | 50 | 1600 |
| 78. | 4,6-Dinitro-2-methylphenol | 534-52-1 | 50 | 1600 |
| 79. | N-Nitrosodiphenylamine | 86-30-6 | 10 | 330 |
| 80. | 4-Bromophenyl phenyl ether | 101-55-3 | 10 | 330 |
| 81. | Hexachlorobenzene | 118-74-1 | 10 | 330 |
| 82. | Pentachlorophenol | 87-86-5 | 50 | 1600 |
| 83. | Phenanthrene | 85-01-8 | 10 | 330 |
| 84. | Anthracene | 120-12-7 | 10 | 330 |
| 85. | Di-n-butylphthalate | 84-74-2 | 10 | 330 |
| 86. | Fluoranthene | 206-44-0 | 10 | 330 |
| 87. | Pyrene | 129-00-0 | 10 | 330 |
| 88. | Butylbenzylphthalate | 85-68-7 | 10 | 330 |
| 89. | 3,3'-Dichlorobenzidine | 91-94-1 | 20 | 660 |
| 90. | Benzo(a)anthracene | 56-55-3 | 10 | 330 |
| 91. | Chrysene | 218-01-9 | 10 | 330 |
| 92. | bis(2-ethylhexyl)phthalate | 117-81-7 | 10 | 330 |
| 93. | Di-n-octylphthalate | 117-84-0 | 10 | 330 |
| 94. | Benzo(b)fluoranthene | 205-99-2 | 10 | 330 |
| 95. | Benzo(k)fluoranthene | 207-08-9 | 10 | 330 |
| 96. | Benzo(a)pyrene | 50-32-8 | 10 | 330 |
| 97. | Indeno(1,2,3-cd)Pyrene | 193-39-5 | 10 | 330 |
| 98. | Dibenzo(a,h)anthracene | 53-70-3 | 10 | 330 |
| 99. | Benzo(g,h,i)perylene | 191-24-2 | 10 | 330 |

a. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable.
b. Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.
c. Contract required detection limits (CRDL) for semivolatiles at medium levels in soil/sediment are 60 times the listed CRDL for semivolatiles at low levels in soil/sediment.

are mixed with anhydrous powdered sodium sulfate and serially extracted with 1:1 methylene chloride/acetone using an ultrasonic probe. The methylene chloride and extracted semivolatile organics are then collected by decanting and concentrated. All extracts are stored at 4°C in the dark until they are analyzed using GC/MS. If extracts are to be held for greater than 40 days, they are stored at -20°C. Target compounds are identified on a cross-correlation basis of: (1) relative retention times (compound elution times) compared to internal standard retention times, and (2) correspondence of the sample component and standard component mass spectra. A combined search of the NBS and Wiley Mass Spectral Libraries and interpretation by a mass spectrometer specialist are used to provide tentative identification for up to 20 nontargeted compounds meeting EPA concentration criteria.

Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to artifacts or elevated baselines in the total ion profiles. Laboratory reagent blanks are used to monitor the presence of such interferences. Matrix interferences may be caused by soil acting as a sorbent for semivolatile organics, or by contaminants that are co-extracted with the sample. Sample matrix effects are monitored by internal standards, as well as surrogate and matrix spike recoveries.

Interpretation of semivolatile organics data requires an assessment of the impact of holding times on data quality. The Survey protocol requires that aqueous samples must be extracted within 7 days of sample collection; soil samples must be extracted within 14 days. Samples that have exceeded this holding time can still provide useful information as long as the data are interpreted with caution.

#### 3.2.1.3 Pesticides/Polychlorinated Biphenyls

Pesticides and polychlorinated biphenyls (PCBs) in low- and medium-level concentration water, soil, or sediment samples were determined using the 7/87 CLP SOW and the DOE Environmental Survey Manual. The analytical method

described in these two sources involves extraction of the chlorinated hydrocarbon contaminants from the environmental matrices with methylene chloride, concentration of the extracts, and the analysis of the extracts on a gas chromatograph/electron capture detector (GC/ECD). If pesticides or PCBs are tentatively identified, a second GC/ECD analysis is performed using an alternate chromatographic column for positive identification. Confirmation by GC/MS is seldom done due to insufficient concentration of the pesticides and PCBs in the samples.

Survey protocol requires the identification of 27 target compounds at the Contract Required Quantitation Limits (CRQL) listed in Table 3.3.

Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware. The presence of these artifacts is determined by running a laboratory method blank under the same conditions as the samples. Poor extraction efficiency due to sample matrix effects is monitored by the use of surrogate and matrix spike recoveries.

Interpretation of pesticide/PCB data requires an assessment of the impact of holding times on data quality. The Survey protocol requires that aqueous samples be extracted within 7 days of sample collection and soil samples completed within 14 days. Samples that have exceeded these holding times can still provide useful information as long as the data are interpreted with caution. Extracts are stored at less than $0^{o}C$ between the time of extraction and analysis to ensure that the sample quality is not compromised.

#### 3.2.1.4 Soil Gases

Analyses of soil gas samples were performed using a special analytical services (SAS) protocol. The SAS protocol developed at ANL is based on the volatile organic analysis (VOA) method of the 7/87 CLP SOW. Samples are analyzed by GC/MS using thermal desorption of multibed Carbotrap tubes onto a packed GC

Table 3.3. Analytes Determined by CLP Pesticide/PCB Analysis Method

| Analyte | CAS Number | Contract Required Detection Limits[a] Water (ug/L) | Low Soil/Sediment[b,c] (ug/kg) |
|---|---|---|---|
| 100. alpha-BHC | 319-84-6 | 0.05 | 8.0 |
| 101. beta-BHC | 319-85-7 | 0.05 | 8.0 |
| 102. delta-BHC | 319-86-8 | 0.05 | 8.0 |
| 103. gamma-BHC (Lindane) | 58-89-9 | 0.05 | 8.0 |
| 104. Heptachlor | 76-44-8 | 0.05 | 8.0 |
| 105. Aldrin | 309-00-2 | 0.05 | 8.0 |
| 106. Heptachlor epoxide | 1024-57-3 | 0.05 | 8.0 |
| 107. Endosulfan I | 959-98-8 | 0.05 | 8.0 |
| 108. Dieldrin | 60-57-1 | 0.10 | 16.0 |
| 109. 4,4'-DDE | 72-55-9 | 0.10 | 16.0 |
| 110. Endrin | 72-20-8 | 0.10 | 16.0 |
| 111. Endosulfan II | 33213-65-9 | 0.10 | 16.0 |
| 112. 4,4'-DDD | 72-54-8 | 0.10 | 16.0 |
| 113. Endosulfan sulfate | 1031-07-8 | 0.10 | 16.0 |
| 114. 4,4'-DDT | 50-29-3 | 0.10 | 16.0 |
| 115. Endrin ketone | 53494-70-5 | 0.10 | 16.0 |
| 116. Methoxychlor | 72-43-5 | 0.5 | 80.0 |
| 117. alpha-chlordane | 5103-71-9 | 0.5 | 80.0 |
| 118. gamma-chlordane | 5103-74-2 | 0.5 | 80.0 |
| 119. Toxaphene | 8001-35-2 | 1.0 | 160.0 |
| 120. Aroclor-1016 | 12674-11-2 | 0.5 | 80.0 |
| 121. Aroclor-1221 | 11104-28-2 | 0.5 | 80.0 |
| 122. Aroclor-1232 | 11141-16-5 | 0.5 | 80.0 |
| 123. Aroclor-1242 | 53469-21-9 | 0.5 | 80.0 |
| 124. Aroclor-1248 | 12672-29-6 | 0.5 | 80.0 |
| 125. Aroclor-1254 | 11097-69-1 | 1.0 | 160.0 |
| 126. Aroclor-1260 | 11096-82-5 | 1.0 | 160.0 |

a. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable.

b. Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

c. Contract Required Detection Limits (CRDL) for pesticides/PCBs at medium levels in soil/sediment are 15 times the listed CRDL for pesticides/PCBs at low levels in soil/sediment.

column. An external standard calibration method is used for quantitation of VOA target compounds. The initial and continuing calibration curves are prepared using the low-level VOA CLP methodology, which meets CLP criteria. All VOA TCs detected in the sample are quantitated and identified by comparison of their mass spectra with those of the corresponding standards from the calibration curves. Considering the methodology used (a sample could be analyzed only once) and the very high levels of analytes found in the field samples (outside of the calibration range), the results obtained should be considered as semiquantitative only.

### 3.2.1.5 Dioxins

This method is appropriate for the determination of tetra-, penta-, hexa-, hepta-, and octachlorinated dibenzo-p-dioxins (PCDDs) in chemical wastes including still bottoms, fuel oils, sludges, fly ash, reactor residues, soil, and water. The procedure uses matrix-specific extraction, analyte-specific cleanup, and high-resolution capillary column gas chromatography/low resolution mass spectrometry techniques. Toluene or benzene is used to extract dioxins from sludge, fuel oils, still bottoms, and fly ash. A 20/80 (v/v) mixture of methanol/petroleum ether is used to extract dioxins from soils; methylene chloride is used to extract dioxins from aqueous solutions. All sample extracts are evaporated to reduce the volume of the solvent. The condensed solutions are then diluted with hexane. The hexane sample is then cleaned with repeated washing with concentrated sulfuric acid before the volume of hexane is reduced to near dryness. The residue containing the dioxins is then passed through an alumina column, followed by a elution through a carbon clean-up column. An aliquot of the treated sample, contained in toluene, is then spiked with a 1,2,3,4-tetrachlorodibenzo-p-dioxin-$^{13}C_{12}$ recovery standard prior to GC/MS analysis. The sensitivity of the method is dependent upon the level of interferences within a given matrix. If interferences are encountered, the method provides selected cleanup procedures to aid the analyst in their elimination. Certain 2,3,7,8-substituted congeners are used to provide calibration and method recovery

information. Proposed quantitation levels for target analytes were 2 parts per billion (ppb) in soil samples, up to 10 parts per billion (ppb) in other solid wastes, and 10 parts per trillion (ppt) in water. Actual values have been shown to vary by homologous series and by individual isomer. The analyses follows the guidelines of a BCD SOP based on EPA Test Method 8280 for evaluating solid wastes.

### 3.2.2 Inorganic Analysis Methods

#### 3.2.2.1 CLP Metals Determination by Atomic Emission or Absorption Techniques

The determination of low levels of metal contaminants was accomplished using a protocol based on the EPA 7/87 CLP SOW for Inorganic Analysis Multi-media, Multi-concentration and Appendix D of DOE Environmental Survey Manual. Table 3.4 summarizes the analytical method and the required detection limit for a total of 23 specific metal contaminants. The metals determined by the inductively coupled plasma (ICP) technique according to the full CLP technical criteria include most of the elements specified by the DOE protocol. Exceptions to the CLP protocol include potassium analysis by flame emission photometry in ORNL analyses. In addition, three elements (arsenic, selenium, and lead) were also determined by ICP and were reported to detection levels which exceeded the CLP requisite limits, but were significantly below the ICP method detection limits as listed in the DOE protocol. Graphite furnace atomic absorption (GFAA) was used to determine and report the concentrations of seven elements (silver, arsenic, antimony, cadmium, chromium, lead, selenium and thallium) in INEL samples. Mercury was determined by the cold vapor flameless AA (CVFAA) technique.

CLP protocol was used to monitor the precision and accuracy of the individual elemental results. Calibration data were verified during the course of an analytical run. Interference check samples were used to determine the effectiveness of interelement corrections for the ICP metals. The precision of

Table 3.4. Elements Determined by Atomic Emission or Absorption Techniques

| Element | Contract Required Detection Level (ug/L) | DOE Method Detection Limit for ICP (ug/L) | Analytical Method |
|---|---|---|---|
| Aluminum | 200 | 200 | ICP |
| Antimony | 60 | 150 | ICP, GFAA* |
| Arsenic | 10 | 250 | ICP, GFAA* |
| Barium | 200 | 200 | ICP |
| Beryllium | 5 | 5 | ICP, GFAA* |
| Cadmium | 5 | 20 | ICP, GFAA* |
| Calcium | 5000 | 5000 | ICP |
| Chromium | 10 | 10 | ICP, GFAA* |
| Cobalt | 50 | 50 | ICP |
| Copper | 25 | 25 | ICP |
| Iron | 100 | 100 | ICP |
| Lead | 5 | 200 | ICP, GFAA* |
| Magnesium | 5000 | 5000 | ICP |
| Manganese | 15 | 15 | ICP |
| Mercury | 0.2 | --- | CVFAA |
| Nickel | 40 | 40 | ICP |
| Potassium | 5000 | 5000 | FES |
| Selenium | 5 | 400 | ICP, GFAA* |
| Silver | 10 | 30 | ICP, GFAA* |
| Sodium | 5000 | 5000 | ICP |
| Thallium | 10 | 500 | ICP, GFAA* |
| Vanadium | 50 | 50 | ICP |
| Zinc | 20 | 20 | ICP |

ICP = Inductively coupled plasma emission spectrometry.
GFAA = Graphite furnace atomic absorption spectrometry.
FES = Flame emission photometry.
CVFAA = Cold vapor flameless atomic absorption spectrometry.

* Only GFAA results were reported for this element.

the measurements was estimated using sample duplicates. Sample digestion efficiency was assessed by including laboratory control samples with each preparation batch. Matrix spikes, analytical spikes (for GFAA only), and serial dilutions of samples (for ICP only) were made to assess the accuracy and to determine the presence of analytical interferences attributable to the sample matrix or to preparation procedures.

#### 3.2.2.1.1 ICP-Atomic Emission Spectrometry

The basis of this method is the simultaneous multi-element measurement of atomic emission by an optical spectroscopic technique. Samples are nebulized and the aerosol that is produced is transported to a high temperature plasma where excitation occurs. Characteristic atomic-line emission spectra are produced by the radio-frequency inductively coupled plasma and are dispersed by a grating spectrometer. The line intensities, which are a measurement of elemental concentrations, are monitored by photomultiplier tubes. The photocurrents from the photomultiplier tubes are processed and controlled by a computer system.

A background correction technique is required to compensate for variable background contributions to the determination of trace elements. Background is measured adjacent to analyte lines on samples during analysis. The position selected for the background intensity measurement, on either or both sides of the analytical line, is determined by the complexity of the spectrum adjacent to the analyte line. The position used should be free of spectral interference and reflect the same change in background intensity that occurs as the analyte wavelength is measured. Background correction is not required in cases of line broadening where a background correction measurement would actually degrade the analytical result. Additional interferences, i.e., spectral, physical, and/or chemical, are also possible. Appropriate corrections are made when required and are documented in the ICP case narrative.

Acid digestion of water, soil, sediment, and sludge samples is performed according to the 7/87 CLP SOW protocol prior to trace metal analysis by ICP. A 100-mL aliquot of an aqueous sample is digested with a mixture of nitric and hydrochloric acids. The acidified sample is heated below boiling for approximately 2 hr or until the sample volume is reduced to half of its initial volume. The sample is then cooled, filtered, and diluted volumetrically. For solid samples, a representative 1-g (wet weight) sample is digested with nitric acid and hydrogen peroxide. The digestate is refluxed with nitric and hydrochloric acid, then allowed to cool prior to filtration and dilution. Elemental sample concentrations are reported on a dry weight basis.

#### 3.2.2.1.2 Potassium

A direct-reading flame photometer is used for the quantitative analysis of potassium in aqueous and solid samples analyzed at ORNL. In this technique, an aspirating atomizer capillary tube is used to transfer a portion of a digested sample into a high velocity, propane-oxygen burner assembly. Ground state potassium atoms are thermally excited in the high temperature flame. Light emitted from the excited atoms as they return to ground state passes through a sodium light attenuator, then through an optical transmission filter specific for potassium emission. The light emission is detected by a phototube and is directly proportional to potassium concentration in the digested sample. The operating range for the flame photometer is 0.1 to 8 mg/L.

The same digestates prepared for ICP analysis are also used for the analysis of potassium by flame photometry.

#### 3.2.2.1.3 Atomic Absorption, Furnace Technique

Graphite furnace atomic absorption (GFAA) is used to determine the concentration of arsenic, antimony, cadmium, chromium, lead, selenium, silver, and thallium in INEL samples. When using the furnace technique in conjunction

with an atomic absorption spectrophotometer, a representative aliquot of a sample is placed in the graphite tube of the furnace, evaporated to dryness, charred, and atomized. Analyte atoms are vaporized and dissociated for light absorption in the tube. Radiation from a light source, hollow cathode, or electrodeless discharge lamp of the element being determined is passed through the vapor containing ground-state atoms of that element. The intensity of the transmitted radiation decreases in proportion to the amount of the ground state element in the vapor. A grating monochromator isolates the characteristic radiation from the hollow cathode lamp and a photosensitive device measures the attenuated transmitted radiation.

Aqueous samples are prepared by digesting 100-mL aliquots with a mixture of nitric acid and hydrogen peroxide. The acidified sample is then heated below boiling for approximately 2 hr, or until the sample volume is reduced to half of its initial volume. The sample is then cooled, diluted volumetrically, and allowed to settle overnight to remove insoluble material. Representative 1-g solid samples are prepared by digesting them in nitric acid and hydrogen peroxide. The digestate is refluxed with nitric acid, cooled, diluted volumetrically, and allowed to settle overnight.

#### 3.2.2.1.4 Mercury

Mercury is determined by cold vapor flameless atomic absorption (CVFAA). The flameless AA procedure is a physical method based on the absorption of radiation at 253.7 nm by mercury vapor. Organic mercury compounds are converted to inorganic forms by the oxidative digestion of the sample. An aliquot of the diluted digestate is transferred to a 50-mL closed reaction chamber where stannous chloride is used to reduce the mercury to the elemental form. The mercury vapor is then purged from the solution into a 90-cm absorption cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance (peak height) is measured as a function of mercury concentration.

Samples are prepared using a method developed at ORNL. The method is capable of determining two nanograms (ng) of mercury. A perchloric acid/nitric acid wet-ashing procedure is used to convert the organic mercury to an inorganic form. Reagent blanks are very low (<2 ng) for this procedure. To obtain these low blanks, acids are preselected by analytical testing and washed glassware is baked overnight at 450°C. Samples are digested in a 250-mL borosilicate volumetric flask equipped with supplemental air condensers to prevent the loss of mercury. After digestion the sample volume is adjusted to 50 mL. An aliquot of this solution is introduced into the instrument reaction chamber for the subsequent determination of mercury.

#### 3.2.2.1.5 Chromium (VI) in Soils

The method for the determination of chromium (VI) in soils is currently under development at INEL. Extractable hexavalent chromium is displaced from the soil sample with phosphate in a neutral extracting solution and determined colorimetrically with diphenylcarbazide. The extracting conditions were chosen to inhibit undesirable redox reactions of the hexavalent chromium and to limit the extraction of fulvic/humic acid. Although results obtained by the method are reproducible (RSD=15% for n=10), there are indications that the hexavalent chromium value obtained is not total under all circumstances. The extreme instability of the hexavalent oxidation state makes the determination of total chromium (VI) very uncertain and there are currently no certified standards for chromium (VI) in solids to use for verification of extraction efficiency.

### 3.2.2.2 Nontarget List Parameters

#### 3.2.2.2.1 Anions

Ion chromatography is a rapid analytical technique for multi-ion analysis in a single solution scan. The method depends on the separation of a group of anions flowing through an anion exchange column, suppression of the eluant

conductivity on an acid-form cation exchange column, and final conductimetric detection of the separated anions as they pass through the measurement cell. Identification of the ions present is made by characteristic retention times and is supported by sample spikes. The increase in conductivity caused by each electronegative anion is recorded using a peak integrator or strip chart recorder. Results are compared with those of standard solutions to determine anion concentration. Aqueous samples are allowed to come to ambient temperature before analysis. Holding times for sample analysis are limited to between 48 hr to 28 days, depending on the anions to be determined.

#### 3.2.2.2.2 Nitrate-N by Flow Injection Analysis

This method is used for the determination of nitrite-N (nitrogen) or combined nitrate-N and nitrite-N in surface waters, saline waters, and domestic and industrial wastes. A sample is passed through a column containing granulated copper-cadmium to reduce nitrate to nitrite. The total nitrite is determined colorimetrically by diazotizing with sulfanilamide and coupling with N-(1-naphthyl)-ethylenediamine dihydrochloride. Separate determinations of nitrate and nitrite are obtained by carrying out the procedure with and without the copper-cadmium reduction step. The applicable range of this method is 0.05 to 10.0 mg/L nitrate-nitrite nitrogen. The analysis range may be extended by sample dilution.

#### 3.2.2.3 Percent Solids

To determine the percent solids in a sample, a portion of the material is placed on a weighed dish; the difference in weight represents the wet sample weight. The sample is dried at 103$^{o}$ to 105$^{o}$C overnight, cooled, and reweighed. The difference between the dried sample and the dish represents the dry weight. The ratio of dry weight to wet weight is multiplied by 100 to obtain the percent solids contained in a solid sample. Duplicate determinations of percent solids

were performed at a sample frequency of approximately 20% at ORNL; duplicate determinations for each sample were performed by BCD.

### 3.2.2.4 Toxicity Characteristic Leaching Procedure

EPA has proposed to amend the Extraction Procedure Toxicity Characteristic (EPTC) to include 38 additional compounds and a modified leaching procedure, known as the Toxicity Characteristic Leaching Procedure (TCLP). A description of and background information on TCLP is found in "Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Notification Requirements; Reportable Quantity Adjustments: Proposed Rule" (40 CFR Parts 261, 271, and 302) in Volume 51 of the Federal Register. Under the proposed rule, a leaching test is used to determine whether an unacceptably high level of groundwater contamination might result from improper waste management of wastes containing any one of the 52 listed toxicants. Regulatory level concentrations for the individual toxicants are based on chronic toxicity reference levels, combined with a compound-specific dilution/attenuation factor (derived from application of a groundwater transport equation).

The TCLP is intended to be a first order approximation of the leaching of low molecular weight carboxylic acids generated in actively decomposing sanitary landfills. Acetic acid is one of the more dominant carboxylic acids present in municipal waste leachate. As such, it is used as a buffered acid extraction fluid for approximately 100 g of a soil sample. The liquid extract is separated from the solid phase prior to chemical analysis. Waste samples containing less than 0.5% solids are defined as the TCLP extract. Two-phase waste samples are filtered with 0.6 to 0.8 um glass fiber filters; the solid phase is then extracted with the acetic acid extraction fluid. The leachate, if compatible, is then recombined with the liquid phase prior to analysis. If incompatible, the liquids are analyzed separately and the results are mathematically combined to yield a volume weighted average concentration. Analytical results above the proposed regulatory limits for the individual compounds will define the sample as a

hazardous waste. TCLP need not be run on samples if a total analysis of the original sample demonstrates that individual contaminants are not present in the waste, or that they are present, but at such low concentrations that the appropriate regulatory thresholds could not possibly be exceeded. Tables 3.5 and 3.6 list the regulatory levels for semivolatile compounds and metal analytes determined using CLP analysis protocol. For solids, these values must be increased by twentyfold in order to establish whether the waste is hazardous.

#### 3.2.2.5 Radiological

Radiochemical contamination in soil and water is determined by either direct counting or by radiochemical separations and specific counting to ascertain radionuclide activity. Water samples (other than those for tritium analysis) are acidified to pH 2 at collection time. Samples that are not acidified in the field are acidified when they are received and allowed to equilibrate overnight before sample aliquots are removed. Soil samples are dried at 105$^{o}$C to a constant weight, then pulverized and blended well before sample aliquots are removed. All soil samples are analyzed on a dry weight basis.

##### 3.2.2.5.1 Determination of Gross Alpha and Beta Activity in Water and Soil

For water samples, an aliquot of the preserved sample is evaporated to a small volume and transferred quantitatively to a tared 2-in. stainless steel counting planchet. The sample residue is dried to constant weight, then reweighed to determine dry residue weight. The sample is then counted for gross alpha and gross beta activity. For soil samples the sample is first leached with nitric acid and hydrogen peroxide. An aliquot of the leachate is transferred to a counting planchete and counted for gross alpha and beta activity.

Counting is performed on a Tennelec LB-4000 system comprised of 12 gas-flow proportional counters and an IBM-PC controller. Counting efficiencies for both

Table 3.5. TCLP Limits for CLP Semivolatile Compounds

| Semivolatile | CAS Number | Reg. Level (mg/L) |
|---|---|---|
| Bis (2-chloroethyl)ether | 111-44-4 | 0.05 |
| o-Cresol | 95-48-7 | 10.0 |
| m-Cresol | 108-39-4 | 10.0 |
| p-Cresol | 106-44-5 | 10.0 |
| 1,2 - Dichlorobenzene | 95-50-1 | 4.3 |
| 1,4 - Dichlorobenzene | 106-46-7 | 10.8 |
| 2,4 - Dinitrotoluene | 121-14-2 | 0.13 |
| Hexachlorobenzene | 118-74-1 | 0.13 |
| Hexachlorobutadiene | 87-68-3 | 0.72 |
| Hexachloroethane | 67-72-1 | 4.3 |
| Nitrobenzene | 98-95-3 | 0.13 |
| Pentachlorophenol | 87-86-5 | 3.6 |
| Phenol | 108-95-2 | 14.4 |
| 2,4,5 - Trichlorophenol | 95-95-4 | 5.8 |
| 2,4,6 - Trichlorophenol | 88-06-2 | 0.30 |
| 2,3,4,6 - Tetrachlorophenol | 108-88-3 | 14.4 |
| Pyridine | 110-86-1 | 5.0 |

Table 3.6. TCLP Limits for ICP Metals

| Metals | CAS Number | Reg. Level (mg/L) |
|---|---|---|
| Arsenic | 7440-38-2 | 5.0 |
| Barium | 7440-39-3 | 100 |
| Cadmium | 7440-43-9 | 1.0 |
| Chromium | 1330-82-0 | 5.0 |
| Lead | 7439-91-1 | 5.0 |
| Mercury | 7439-97-6 | 0.2 |
| Selenium | 7782-49-2 | 1.0 |
| Silver | 7440-22-4 | 5.0 |

alpha and beta particle activities are determined according to the amount of sample solids from a standard curve of counting efficiency versus sample solids.

#### 3.2.2.5.2 Isotopic Uranium in Water by Alpha Spectrometry

The sample is equilibrated with uranium-232, which is an internal standard. The uranium is then chemically purified by the use of anion exchange resin chromatography and repeated methyl isobutyl ketone (hexone) extractions. The extracted uranium is deposited on a stainless steel disc which is counted on a Nuclear Data MicroVax-based analyzer system using a silicon surface-barrier detector to determine uranium concentration.

Concentrations as low as 4 x $10^{-5}$ picoCuries per mL (pCi/mL) have been reported when 1-L samples were spiked with 10 disintegrations per minute (dpm) of uranium-232 and counted for 1000 min on an alpha pulse height analyzer. The detectors had a 20% efficiency and a 0.005 counts per minute (cpm) background over each energy region of interest. A 60% chemical recovery of the uranium was obtained.

#### 3.2.2.5.3 Isotopic Uranium in Soil by Alpha Spectrometry

A known quantity of uranium-232 tracer, used as an internal standard, is added to a 10-g sample which is then leached with hot nitric acid followed by hot nitric acid-hydrogen peroxide treatment. The leachate is passed through an anion exchange resin to adsorb plutonium and thorium, leaving purified uranium in the effluent solution. The uranium is further purified by repeated extractions with methyl isobutyl ketone (hexone). The final hexone extract is dried on a stainless steel disc which is counted on a Nuclear Data MicroVAX-based analyzer system using a silicon surface-barrier detector to determine the uranium concentration.

Concentrations as low as 0.004 pCi/g have been reported for 10-g soil samples using the counting conditions as described for the determination of isotopic uranium in aqueous samples (see Sect. 3.2.2.5.3).

#### 3.2.2.5.4 Total Radioactive Strontium in Water

Stable strontium carrier is added to an aliquot of water and the strontium precipitated from the sample as the carbonate. Interferences from calcium and some radionuclides are removed by one or more precipitations of the strontium carrier as strontium nitrate. Barium and radium are removed as the chromate; the yttrium-90 daughter of strontium-90 is removed by hydroxide precipitation. The separated strontium is counted immediately for beta particle activity. The counting result represents the total strontium activity (strontium-89 and strontium-90) plus an insignificant fraction of the yttrium-90 that has grown into the separated strontium-90. Counting is performed on a Tennelec Model LB 4000 computer-controlled system. The lowest reported concentration is 0.5 pCi/L for 250-mL samples.

#### 3.2.2.5.5 Total Radioactive Strontium in Soil

Stable strontium carrier is added to a 10-g sample which then is leached by hot nitric acid, followed by a hot nitric acid-hydrogen peroxide treatment. The leachate is reduced in volume and the strontium is precipitated from the solution as the nitrate salt. Interferences from calcium and some radionuclides are removed by one or more precipitations of the strontium carrier as strontium nitrate. Barium and radium are removed as the chromate; the yttrium-90 daughter of strontium-90 is removed by hydroxide precipitation. The separated strontium is counted immediately for beta particle activity. The counting result represents the total strontium activity (strontium-89 and strontium-90) plus an insignificant fraction of yttrium-90 that has grown into the separated strontium-90. Counting is performed on a Tennelec Model LB 4000

computer-controlled system. The lowest reported concentration is 0.2 pCi/g for 10-g samples.

### 3.2.2.5.6 Americium

Americium is determined in potable and industrial waters by the method listed in Appendix D of the Doe Environmental Survey Manual. Americium-243 tracer is equilibrated with the sample activities of americium and coprecipitated with calcium as the fluorides. The isotopes are then extracted into a quaternary amine, stripped with $HNO_3$ and extracted into thenoyltrifluoroacetone-xylene. The final extract is dried on a stainless steel disc and evaluated by alpha spectrometry using the americium-243 tracer as the basis for calibration. When large amounts of iron are present in the sample, the americium is separated from the iron on a Dowex 1- X 4-Cl anion resin column before extracting with TTA-xylene. The lowest reported concentration of americium-241 in water is $3 \times 10^{-3}$ pCi/ml when using a 100-mL aliquot.

### 3.2.2.5.7 Plutonium Isotopes in Water

Plutonium (Pu) in natural and industrial water samples is equilibrated with plutonium-242 tracer, coprecipitated with bismuth phosphate, adsorbed on an anion exchange resin, selectively eluted from the resin, coprecipitated with praseodymium hydroxide, and extracted with thenoyltrifluoroacetone-xylene. The plutonium extract is dried on a stainless steel disc, which is analyzed by alpha pulse-height analysis to determine the plutonium concentration.

The lowest concentration reported is $4 \times 10^{-5}$ pCi/mL when analyzing a 1-L sample, using 10 disintegration per minute (dpm) of plutonium-242 tracer, counting for 1000 min on an alpha pulse-height analyzer with a detector efficiency of 20% and a 0.005-cpm background over each energy region of interest, and realizing an 80% chemical recovery of plutonium.

Interferences from other alpha-emitting nuclides are generally eliminated by alpha pulse-height analysis, except for plutonium-240, which cannot be resolved from plutonium-239 by this means. Mass spectrometric analysis is required if independent measurements of both of these isotopes are desired.

### 3.2.2.5.8 Plutonium in Sediment and Soil

A known quantity of plutonium-242 tracer, which is used as the internal standard, is added to the sample that is leached by hot nitric acid and hot nitric acid-hydrogen peroxide treatment. After leaching, plutonium is adjusted to $Pu^{+4}$, adsorbed on anion exchange resin, reduced to $Pu^{+3}$, and selectively eluted from the resin. Subsequently, plutonium is coprecipitated with praseodymium hydroxide, dissolved, and oxidized to $Pu^{+4}$, which is then extracted with thenoyltrifluoroacetone-xylene. The organic extract is deposited on a stainless steel disc, and the plutonium is determined by alpha pulse-height analysis.

The lowest concentration reported is 0.004 pCi/g when analyzing a 10-g sample using 10 dpm of plutonium-242 tracer, counting for 1000 min on an alpha pulse-height analyzer with a detector having a 20% efficiency and a 0.005-cpm background over each energy region of interest, and realizing an 80% chemical recovery of plutonium.

Because samples that are refractory, such as test-site materials, are not apt to release plutonium in the leaching process, more rigorous treatment is recommended for decomposition of these samples. Plutonium-240 cannot be distinguished from plutonium-239 by alpha pulse-height analysis. However, alpha spectrometry eliminates most other alpha interferences.

### 3.2.2.5.9 Thorium Isotopes in Soil and Water

The available thorium is leached from the sample material with a hot nitric acid and hot nitric acid-hydrogen peroxide treatment. The leaching solution is

equilibrated with thorium-234 tracer (an alpha emitter) and passed through an anion exchange resin to adsorb the thorium, which is then preferentially eluted with strong hydrochloric acid. Water samples do not require leaching. The thorium is coprecipitated with praseodymium, as the hydroxide and then the fluoride. Thorium is then separated from the praseodymium and other rare earths and further purified by extracting with thenoyltrifluoroacetone-xylene (TTA-xylene). The TTA extract is dried on a stainless disc and the chemical recovery is determined by the thorium-234 tracer. The alpha-emitting thorium isotopes are determined by alpha pulse-height analysis.

#### 3.2.2.5.10 Iodine-129 in Water

An iodate carrier is added to the sample followed by reduction of the iodate to iodide. The iodide is separated from solution by adsorption on an ion exchange resin. The iodine-129 activity is determined in the resin with a well-type germanium detector.

#### 3.2.2.5.11 Gamma-Ray Emitting Nuclides in Water and Soil

Nine hundred mL of water sample is transferred to a polyethylene Marinelli beaker, placed on a high purity germanium detector, and counted for gamma activity. Soil samples are weighed into a 3-in. petri dish, placed on a high purity germanium detector, and counted for gamma activity. The nuclides determined by this method include cobalt-60, cesium-137, and iodine-131. The efficiencies of the six detectors used in this determination are between 20% and 35%. The gamma spectra are reduced and reports generated by a Nuclear Data MicroVAX-based analyzer system. The lowest reported concentration for cesium-137 is 3 pCi/L for a 900-mL water sample and 50 pCi/kg for a 75-g soil sample.

### 3.2.2.5.12 Tritium in Water and Soil

Soil samples are pretreated by shaking 50 g of sample and 100 mL of distilled water on a wrist action shaker for 1 hr. The sample is then centrifuged for 5 min and the leachate is reserved for analysis. Water samples require no pretreatment. An aliquot of water or soil leachate is treated with a small amount of sodium hydroxide and potassium permanganate and distilled. The alkaline treatment prevents other radionuclides, such as radioiodine and radiocarbon, from codistilling over with the tritium. Some water supplies will contain trace quantities of organic compounds (especially surface water sources that contain biota.) The permanganate treatment oxidizes trace organics in the sample aliquot, which could distill over and cause quenching interferences. A middle fraction of the distillate is collected for tritium analysis because the early and late fractions are more apt to contain materials that might interfere with the liquid scintillation counting process. The collected distillate fraction is thoroughly mixed and a portion is mixed with a liquid scintillator solution. After dark adapting, the aliquot is counted in a Packard 460C liquid scintillation counter for tritium beta particle activity.

# 4.0 DATA PRESENTATION

## 4.1 Introduction

This section presents the data collected as part of the DOE Environmental Survey of the INEL Site. Findings generated by the Survey Team were divided into units called environmental problems. This chapter presents the environmental problem sampling and analysis data. Section 4.2 describes the format and content of data tables, data qualifiers, and the criteria for reporting values.

> **NOTE:** The lists of acronyms and data flags at the end of the Table of Contents can be removed from their location and referenced as data for each environmental problem are examined.

Data are presented in order by environmental problem. Sample request numbers and the name of the Survey Team member who requested the sample collection and analysis are presented for each problem. The reason for examination of a certain site or sites is given in the Finding and Basis section. The Sampling and Analysis Objectives section defines the Survey's goal for that environmental problem. The Sampling and Analysis Design section describes the sampling design and methods, the analytes of interest for each sample, and changes from the design and methods reported in the INEL Sampling and Analysis Plan (Ref. 1-1). The field and analytical data are then presented in text and tabular form with statements of the level of data quality. Italicized text indicates a summary of information, including a summary of sampling and analytical data and related findings for the environmental problem.

The data tables present samples by analysis type. The analysis type is further divided into specific analytes. Analytes are presented only if a positive determination has been reported for the specific analyte in the specific set of samples.

A complete listing of non-radiological data is available in Appendix D in the form of a QC presentation. A discussion of the QA/QC results can be found in Chapter 5.0.

Other appendices include an updated listing of sampling and analytical requests (Appendix A); background information (Appendix B); results of field, analytical chemistry, documentation, and data management audits (Appendix C); and the radiological QC section (Appendix E).

## 4.2 Data Tables, Data Flags, and Restrictions on Data Reporting

This section presents descriptions of the structure and contents of the three basic types of data tables which may accompany the discussion of each environmental problem. Explanations for the types of data flags that appear in the tables are given. The basis for inclusion/exclusion of entries to tables is discussed.

### 4.2.1 Sampling and Analytical Data Tables

Table 4.1 summarizes field and analytical completion data for sampling and analysis requests for the INEL Site. The summary is organized by request number. For each request number, the status, date collected, location, type of location, media, number of samples planned and actually collected, the type of sample, and the number of samples planned and actually collected for each analysis type are given. In each section presenting an environmental problem, a table with a similar format is provided if samples were requested. Table 4.1 can be used as a guide to the environmental problem-specific Table 4.2 series of tables.

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TABLE 4.1 INEL SITE ENVIRONMENTAL SURVEY S&A REQUESTS
WITH FIELD AND ANALYTICAL COMPLETION DATA

| REQUEST NUMBER | STAT | DATE COLL. DD/MM/YY | LOCATION | TYPE LOCATION | MEDIA | NUMB SAMP ACT COLL | NUMB SAMP PLAN COLL | TYPE | ANIONS ACT ANAL | ANIONS PLAN ANAL | METALS ACT ANAL | METALS PLAN ANAL | SOIL GAS ACT ANAL | SOIL GAS PLAN ANAL | PES/H/PCB ACT ANAL | PES/H/PCB PLAN ANAL | SEMIVOLS ACT ANAL | SEMIVOLS PLAN ANAL | VOLS ACT ANAL | VOLS PLAN ANAL | RADS ACT ANAL | RADS PLAN ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN301 | DELETED | | CFA | DRAINFIELD | SOIL | 0 | 3 | GRAB | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 |
| IN301 | DELETED | | CFA | DRAINFIELD | SUR WATER | 0 | 1 | QC RN | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| IN301 | | 17/06/88 | CFA | DRAINFIELD | SOIL | 1 | 1 | GRAB | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| IN301 | | 21/06/88 | CFA | DRAINFIELD | SOIL | 5 | 5 | GRAB | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 | 0 | 0 |
| IN301 | | 22/06/88 | CFA | DRAINFIELD | SOIL | 3 | 3 | GRAB | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 3 | 0 | 0 |
| IN401 | | 13/07/88 | WELL P&W 2 | WELL | GRN WATER | 2 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN401 | | 15/07/88 | WELL P&W 2 | WELL | GRN WATER | 1 | 1 | PUMP | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN402 | | 15/07/88 | USGS-19 | WELL | GRN WATER | 2 | 2 | BAILR | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN403 | DELETED | | USGS-27 | WELL | GRN WATER | 0 | 1 | PUMP | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN403 | | 20/07/88 | USGS-27 | WELL | GRN WATER | 2 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN404 | | 20/06/88 | ANL M-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN405 | | 28/06/88 | WELL 98 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN406 | | 17/06/88 | WELL ANP-8 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN407 | | 17/06/88 | WELL FET-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN408 | | 17/06/88 | WELL ANP-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN409 | | 22/06/88 | USGS-86 | WELL | GRN WATER | 2 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN410 | | 23/06/88 | USGS-105 | WELL | GRN WATER | 2 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 1 | 2 |
| IN411 | | 23/06/88 | USGS-110 | WELL | GRN WATER | 2 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN412 | | 17/06/88 | FIRE STA. | WELL | GRN WATER | 2 | 2 | TAP | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 2 |
| IN413 | DELETED | | USGS-107 | WELL | GRN WATER | 0 | 1 | PUMP | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN414 | | 16/06/88 | WELL CFA-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN415 | | 16/06/88 | WELL SL-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN416 | DELETED | | USGS-90 | WELL | GRN WATER | 0 | 1 | PUMP | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN416 | | 22/06/88 | USGS-90 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN417 | | 28/06/88 | USGS-113 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN418 | | 14/07/88 | USGS-37 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN419 | | 28/06/88 | WELL 116 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN420 | | 20/07/88 | USGS-82 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN421 | | 21/06/88 | USGS-43 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN422 | | 21/06/88 | USGS-65 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN423 | | 17/06/88 | WELL TRA-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| IN501 | DELETED | | TRA 1952 | WASTE POND | SUR WATER | 0 | 12 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 |
| IN501 | | 20/07/88 | TRA 1952 | WASTE POND | SUR WATER | 1 | 1 | QC FL | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN501 | | 20/07/88 | TRA 1952 | WASTE POND | SUR WATER | 6 | 6 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 | 0 |
| IN501 | | 20/07/88 | TRA 1952 | WASTE POND | SUR WATER | 6 | 6 | S COM | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 6 | 6 |
| IN502 | | 20/07/88 | TRA 1952 | WASTE POND | SEDIMENT | 6 | 6 | GRAB | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 6 | 0 | 0 | 6 | 6 | 6 | 6 |
| IN502 | | 20/07/88 | TRA 1952 | WASTE POND | SUR WATER | 1 | 1 | QC RN | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN503 | | 28/09/88 | TRA 1952 | WASTE POND | SOIL | 2 | 2 | GRAB | 2 | 2 | 2 | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 2 | 2 | 2 |
| IN503 | | 28/09/88 | TRA 1952 | WASTE POND | SUR WATER | 1 | 1 | QC RN | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| IN503 | | 29/09/88 | TRA 1952 | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN504 | DELETED | | TRA NE CLD | WASTE POND | SUR WATER | 0 | 12 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 |
| IN504 | | 22/06/88 | TRA NE CLD | WASTE POND | SUR WATER | 6 | 6 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 | 0 |
| IN504 | | 22/06/88 | TRA NE CLD | WASTE POND | SUR WATER | 6 | 6 | S COM | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 |
| IN505 | | 22/06/88 | TRA NE CLD | WASTE POND | SEDIMENT | 6 | 6 | GRAB | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 6 | 6 |
| IN506 | DELETED | | TRA NE CLD | WASTE POND | SOIL | 0 | 1 | GRAB | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |

TABLE 4.1 INEL SITE ENVIRONMENTAL SURVEY S&A REQUESTS
WITH FIELD AND ANALYTICAL COMPLETION DATA

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| REQUEST NUMBER | STAT | DATE COLL. DD/MM/YY | LOCATION | TYPE LOCATION | MEDIA | NUMB SAMP ACT COLL | NUMB SAMP PLAN COLL | TYPE | ANIONS ACT ANAL | ANIONS PLAN ANAL | METALS ACT ANAL | METALS PLAN ANAL | SOIL GAS ACT ANAL | SOIL GAS PLAN ANAL | PES/H/PCB ACT ANAL | PES/H/PCB PLAN ANAL | SEMIVOLS ACT ANAL | SEMIVOLS PLAN ANAL | VOLS ACT ANAL | VOLS PLAN ANAL | RADS ACT ANAL | RADS PLAN ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN506 | | 22/09/88 | TRA NE CLD | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN506 | | 23/09/88 | TRA NE CLD | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN506 | | 23/09/88 | TRA NE CLD | WASTE POND | SUR WATER | 1 | 1 | QC RN | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN507 | DELETED | | TRA CHEM | WASTE POND | SUR WATER | 0 | 14 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 |
| IN507 | DELETED | | TRA CHEM | WASTE POND | SUR WATER | 0 | 2 | S COM | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| IN507 | | 23/06/88 | TRA CHEM | WASTE POND | SUR WATER | 4 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 |
| IN507 | | 23/06/88 | TRA CHEM | WASTE POND | SUR WATER | 4 | 4 | S COM | 4 | 4 | 4 | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 4 | 4 |
| IN508 | DELETED | | TRA CHEM | WASTE POND | SEDIMENT | 0 | 2 | GRAB | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 2 |
| IN508 | | 23/06/88 | TRA CHEM | WASTE POND | SEDIMENT | 4 | 4 | GRAB | 4 | 4 | 4 | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 | 4 | 4 | 4 |
| IN509 | | 26/09/88 | TRA CHEM | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN509 | | 27/09/88 | TRA CHEM | WASTE POND | SOIL | 2 | 2 | GRAB | 2 | 2 | 2 | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 2 | 2 | 2 |
| IN510 | DELETED | | TAN TSF | WASTE POND | SUR WATER | 0 | 14 | GRAB | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 |
| IN510 | DELETED | | TAN TSF | WASTE POND | SUR WATER | 0 | 2 | OTHER | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| IN510 | | 29/06/88 | TAN TSF | WASTE POND | SUR WATER | 4 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 |
| IN510 | | 29/06/88 | TAN TSF | WASTE POND | SUR WATER | 4 | 4 | OTHER | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 |
| IN510 | | 29/06/88 | TAN TSF | WASTE POND | SUR WATER | 1 | 1 | QC RN | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN511 | DELETED | | TAN TSF | WASTE POND | SEDIMENT | 0 | 2 | GRAB | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| IN511 | | 29/06/88 | TAN TSF | WASTE POND | SEDIMENT | 4 | 4 | GRAB | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 4 | 4 |
| IN512 | DELETED | | TAN TSF | WASTE POND | SOIL | 0 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN512 | | 14/09/88 | TAN TSF | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN512 | | 19/09/88 | TAN TSF | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN513 | DELETED | | TAN LOFT | WASTE POND | SUR WATER | 0 | 14 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 |
| IN513 | DELETED | | TAN LOFT | WASTE POND | SUR WATER | 0 | 2 | OTHER | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| IN513 | | 30/06/88 | TAN LOFT | WASTE POND | SUR WATER | 1 | 1 | QC FL | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN513 | | 30/06/88 | TAN LOFT | WASTE POND | SUR WATER | 4 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 |
| IN513 | | 30/06/88 | TAN LOFT | WASTE POND | SUR WATER | 4 | 4 | OTHER | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 4 |
| IN514 | DELETED | | TAN LOFT | WASTE POND | SEDIMENT | 0 | 2 | GRAB | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 1 | 2 |
| IN514 | | 30/06/88 | TAN LOFT | WASTE POND | SEDIMENT | 4 | 4 | GRAB | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 4 | 4 | 4 |
| IN515 | | 12/09/88 | TAN LOFT | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN515 | | 13/09/88 | TAN LOFT | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN515 | | 14/09/88 | TAN LOFT | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| IN516 | DELETED | | ICPP 2 | WASTE POND | SUR WATER | 0 | 14 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 |
| IN516 | DELETED | | ICPP 2 | WASTE POND | SUR WATER | 0 | 2 | OTHER | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| IN516 | DELETED | | ICPP 2 | WASTE POND | SUR WATER | 0 | 1 | QC RN | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN516 | | 24/06/88 | ICPP 2 | WASTE POND | SUR WATER | 4 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 |
| IN516 | | 24/06/88 | ICPP 2 | WASTE POND | SUR WATER | 4 | 4 | OTHER | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 4 |
| IN517 | DELETED | | ICPP 2 | WASTE POND | SEDIMENT | 0 | 2 | GRAB | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 2 |
| IN517 | DELETED | | ICPP 2 | WASTE POND | SUR WATER | 0 | 1 | QC RN | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN517 | | 24/06/88 | ICPP 2 | WASTE POND | SEDIMENT | 4 | 4 | GRAB | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 4 | 4 | 4 |
| IN518 | DELETED | 09/88 | ICPP 2 | WASTE POND | SOIL | 0 | 1 | GRAB | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN518 | | 21/09/88 | ICPP 2 | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| IN518 | | 22/09/88 | ICPP 2 | WASTE POND | SOIL | 1 | 1 | GRAB | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| IN519 | DELETED | | ANL-W | WASTE POND | SUR WATER | 0 | 12 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 |
| IN519 | | 20/06/88 | ANL-W | WASTE POND | SUR WATER | 6 | 6 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 | 0 |

TABLE 4.1 INEL SITE ENVIRONMENTAL SURVEY S&A REQUESTS WITH FIELD AND ANALYTICAL COMPLETION DATA

DRAFT DO NOT CITE

| REQUEST NUMBER | STAT | DATE COLL. DD/MM/YY | LOCATION | TYPE LOCATION | MEDIA | NUMB SAMP ACT COLL | NUMB SAMP PLAN COLL | TYPE | ANIONS ACT ANAL | ANIONS PLAN ANAL | METALS ACT ANAL | METALS PLAN ANAL | SOIL GAS ACT ANAL | SOIL GAS PLAN ANAL | PES/H/PCB ACT ANAL | PES/H/PCB PLAN ANAL | SEMIVOLS ACT ANAL | SEMIVOLS PLAN ANAL | VOLS ACT ANAL | VOLS PLAN ANAL | RADS ACT ANAL | RADS PLAN ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN519 | | 20/06/88 | ANL-W | WASTE POND | SUR WATER | 6 | 6 | OTHER | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 6 | 6 |
| IN520 | | 20/06/88 | ANL-W | WASTE POND | SEDIMENT | 6 | 6 | GRAB | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 6 | 0 | 0 | 6 | 6 | 6 | 6 |
| IN521 | DELETED | | ANL-W | WASTE POND | SOIL | 0 | 3 | GRAB | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 3 |
| IN522 | | 20/06/88 | ANL-W | DITCH | SOIL | 3 | 3 | GRAB | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 3 | 3 | 3 |
| IN522 | | 21/06/88 | ANL-W | DITCH | SOIL | 3 | 3 | GRAB | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 3 | 3 | 3 |
| IN522 | | 21/06/88 | ANL-W | DITCH | SUR WATER | 1 | 1 | QC RN | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN523 | DELETED | | CFA STP | CFA STP | SUR WATER | 0 | 1 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| IN523 | | 15/06/88 | CFA STP | CFA STP | SUR WATER | 2 | 2 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 |
| IN523 | | 15/06/88 | CFA STP | CFA STP | SUR WATER | 1 | 1 | T COM | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| IN523 | | 16/06/88 | CFA STP | CFA STP | SUR WATER | 3 | 3 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 |
| IN523 | | 16/06/88 | CFA STP | CFA STP | SUR WATER | 1 | 1 | T COM | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| IN523 | | 17/06/88 | CFA STP | CFA STP | SUR WATER | 1 | 1 | QC FL | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN523 | | 17/06/88 | CFA STP | CFA STP | SUR WATER | 3 | 3 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 |
| IN523 | | 17/06/88 | CFA STP | CFA STP | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| IN523 | | 17/06/88 | CFA STP | CFA STP | SUR WATER | 1 | 1 | T COM | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| IN801 | | 18/07/88 | OMRE | LEACH POND | SOIL | 1 | 1 | GRAB | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| IN801 | | 20/07/88 | OMRE | LEACH POND | SOIL | 2 | 2 | GRAB | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 0 | 0 |
| IN802 | DELETED | | OMRE | LEACH POND | SOIL | 0 | 6 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 |
| IN802 | | 17/06/88 | OMRE | LEACH POND | SOIL | 4 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 |
| IN802 | | 18/07/88 | OMRE | LEACH POND | SOIL | 5 | 5 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 |
| IN803 | | 27/06/88 | OMRE | LEACH POND | SOIL | 5 | 5 | S COM | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN803 | | 28/06/88 | OMRE | LEACH POND | AIR | 2 | 2 | QC FL | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN803 | | 28/06/88 | OMRE | LEACH POND | AIR | 5 | 5 | GRAB | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN804 | | 28/06/88 | OMRE | LEACH POND | SOIL | 1 | 1 | GRAB | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN804 | | 29/06/88 | OMRE | LEACH POND | SOIL | 5 | 5 | GRAB | 0 | 0 | 5 | 5 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN805 | | 23/06/88 | OMRE | LEACH POND | SOIL | 6 | 6 | S COM | 0 | 0 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 | 0 |
| IN806 | DELETED | | OMRE | LEACH POND | SOIL | 0 | 8 | GRAB | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 8 |
| IN806 | | 25/07/88 | OMRE | LEACH POND | SOIL | 7 | 7 | GRAB | 0 | 0 | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 | 7 | 7 |
| IN806 | | 25/07/88 | OMRE | LEACH POND | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN806 | | 26/07/88 | OMRE | LEACH POND | SOIL | 5 | 5 | GRAB | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 |
| IN807 | DELETED | | OMRE | LEACH POND | SOIL | 0 | 5 | GRAB | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 |
| IN807 | | 22/07/88 | OMRE | LEACH POND | SOIL | 2 | 2 | GRAB | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 |
| IN807 | | 25/07/88 | OMRE | LEACH POND | SOIL | 2 | 2 | GRAB | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 |
| IN807 | | 25/07/88 | OMRE | LEACH POND | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN808 | | 12/07/88 | OMRE | LEACH POND | SOIL | 5 | 5 | GRAB | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN809 | | 28/06/88 | OMRE | LEACH POND | SOIL | 5 | 5 | GRAB | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 |
| IN810 | | 27/06/88 | OMRE | LEACH POND | SOIL | 2 | 2 | BKGRN | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| IN811 | | 28/06/88 | OMRE | LEACH POND | SOIL | 2 | 2 | GRAB | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| IN812 | DELETED | | ICPP | INJ. WELL | SOIL | 0 | 4 | GRAB | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| IN814 | DELETED | | TAN/WRRTF | BURN PITS | SOIL | 0 | 1 | GRAB | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| IN814 | | 14/07/88 | TAN/WRRTF | BURN PITS | SOIL | 8 | 8 | GRAB | 0 | 0 | 8 | 8 | 0 | 0 | 8 | 8 | 0 | 0 | 8 | 8 | 0 | 0 |
| IN814 | | 14/07/88 | TAN/WRRTF | BURN PITS | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| IN814 | | 15/07/88 | TAN/WRRTF | BURN PITS | SOIL | 3 | 3 | GRAB | 0 | 0 | 3 | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 | 3 | 0 | 0 |
| IN815 | DELETED | | TAN/WRRTF | BURN PITS | SOIL | 0 | 7 | GRAB | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 7 | 0 | 0 |

TABLE 4.1 INEL SITE ENVIRONMENTAL SURVEY S&A REQUESTS
WITH FIELD AND ANALYTICAL COMPLETION DATA

DRAFT DO NOT CITE

| REQUEST NUMBER | STAT | DATE COLL. DD/MM/YY | LOCATION | TYPE LOCATION | MEDIA | NUMB SAMP ACT COLL | NUMB SAMP PLAN COLL | TYPE | ANIONS ACT ANAL | ANIONS PLAN ANAL | METALS ACT ANAL | METALS PLAN ANAL | SOIL GAS ACT ANAL | SOIL GAS PLAN ANAL | PES/H/PCB ACT ANAL | PES/H/PCB PLAN ANAL | SEMIVOLS ACT ANAL | SEMIVOLS PLAN ANAL | VOLS ACT ANAL | VOLS PLAN ANAL | RADS ACT ANAL | RADS PLAN ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN815 | | 18/07/88 | TAN/HRRTF | BURN PITS | SOIL | 2 | 2 | GRAB | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 0 | 0 |
| IN815 | | 19/07/88 | TAN/HRRTF | BURN PITS | SOIL | 11 | 11 | GRAB | 0 | 0 | 11 | 11 | 0 | 0 | 0 | 11 | 0 | 0 | 11 | 11 | 0 | 0 |
| IN815 | | 19/07/88 | TAN/HRRTF | BURN PITS | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| IN816 | DELETED | | TAN/HRRTF | BURN PITS | SOIL | 0 | 3 | GRAB | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 |
| IN816 | | 20/07/88 | TAN/HRRTF | BURN PITS | SOIL | 12 | 12 | GRAB | 0 | 0 | 12 | 12 | 0 | 0 | 0 | 12 | 0 | 0 | 12 | 12 | 0 | 0 |
| IN816 | | 21/07/88 | TAN/HRRTF | BURN PITS | SOIL | 5 | 5 | GRAB | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 5 | 0 | 0 |
| IN816 | | 21/07/88 | TAN/HRRTF | BURN PITS | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| IN817 | DELETED | | TAN/HRRTF | BURN PITS | SOIL | 0 | 11 | GRAB | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 11 | 0 | 0 |
| IN817 | | 21/07/88 | TAN/HRRTF | BURN PITS | SOIL | 5 | 5 | GRAB | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 5 | 0 | 0 |
| IN817 | | 21/07/88 | TAN/HRRTF | BURN PITS | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| IN818 | DELETED | | TAN/HRRTF | BURN PITS | SOIL | 0 | 8 | GRAB | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 8 | 0 | 0 |
| IN818 | | 20/06/88 | TAN/HRRTF | BURN PITS | SOIL | 4 | 4 | GRAB | 0 | 0 | 4 | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 | 4 | 0 | 0 |
| IN819 | DELETED | | TAN/HRRTF | BURN PITS | AIR | 0 | 1 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| IN819 | | 27/06/88 | TAN/HRRTF | BURN PITS | SOIL | 7 | 7 | GRAB | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 |
| IN820 | | 29/06/88 | TAN/TSF | LEACH FLD | SOIL | 2 | 2 | GRAB | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 |
| IN820 | | 30/06/88 | TAN/TSF | LEACH FLD | SOIL | 4 | 4 | GRAB | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 |
| IN821 | DELETED | | TAN/TSF | LEACH FLD | SOIL | 0 | 6 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 6 |
| IN821 | DELETED | | TAN/TSF | LEACH FLD | SUR WATER | 0 | 1 | QC RN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN822 | | 13/07/88 | TAN/TSF | LEACH FLD | SOIL | 9 | 9 | GRAB | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 0 | 0 |
| IN823 | DELETED | | PM-2A TANK | TANK | SOIL | 0 | 6 | GRAB | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| IN823 | | 22/07/88 | PM-2A TANK | TANK | SOIL | 14 | 14 | GRAB | 0 | 0 | 14 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 14 |
| IN824 | DELETED | | PM-2A TANK | TANK | SOIL | 0 | 3 | GRAB | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN824 | | 16/06/88 | PM-2A TANK | TANK | SOIL | 3 | 3 | GRAB | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN825 | DELETED | | PM-2A TANK | TANK | AIR | 0 | 1 | GRAB | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN825 | | 17/06/88 | PM-2A TANK | TANK | AIR | 2 | 2 | GRAB | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN826 | | 20/07/88 | PM-2A TANK | TANK | OTHER | 1 | 1 | QC FL | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN826 | | 20/07/88 | PM-2A TANK | TANK | OTHER | 1 | 1 | GRAB | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN826 | | 20/07/88 | PM-2A TANK | TANK | OTHER | 2 | 2 | S COM | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | | | PM-2A TANK | TANK | SOIL | 1 | 32 | GRAB | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | | 15/07/88 | PM-2A TANK | TANK | SOIL | 11 | 11 | GRAB | 0 | 0 | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | | 15/07/88 | PM-2A TANK | TANK | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | | 18/07/88 | PM-2A TANK | TANK | SOIL | 9 | 9 | GRAB | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | | 19/07/88 | PM-2A TANK | TANK | SOIL | 4 | 4 | GRAB | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | | 20/07/88 | PM-2A TANK | TANK | SOIL | 8 | 8 | GRAB | 0 | 0 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | | 20/07/88 | PM-2A TANK | TANK | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | TOTAL | 391 | 617 | | 133 | 161 | 312 | 440 | 13 | 19 | 37 | 213 | 16 | 20 | 249 | 424 | 170 | 230 |

**NOTE:** When data are formatted into environmental problem-specific tables, the last digit in a three-digit table number refers to a specific environmental problem. For example, Table 4.3.4 is the analytical data summary by sample medium series table that applies specifically to Environmental Problem 4. Problem-specific tables are located in the appropriate environmental problem section of this chapter. The problem-specific data series tables are:

| | |
|---|---|
| 4.2.1-4.2.9 | Sampling and Analysis Data Summary |
| 4.3.1-4.3.9 | Analytical Data Summary by (sample) Medium for Environmental Problem |
| 4.4.2 | Groundwater Sample Locations and Sample Volumes |

The Table 4.2 series of tables displays sampling and analytical activities and the level of activity for each type of analysis for each environmental problem. On a problem-specific basis, the Table 4.2 series presents a concise listing of by medium, location, and sampling and analysis request number. In all cases, the problem-specific 4.2 series tables will include a pair of numbers for each analysis type for which at least one analyte was detected. The numbers represent the number of samples analyzed and the number of samples with at least one analyte detected, respectively. As shown in Table 4.1, each table will also include descriptive sampling and analytical information on a sample-specific basis. More detailed sample-analyte data are presented in the problem-specific Table 4.2 series. Table 4.1 can be used as a guide to the level of activity that appears in Tables 4.2.1 through 4.2.9.

Tables 4.3.1 through 4.3.9 illustrate sample-specific analyte data, using analytical chemistry methods, for each environmental problem. (The data presentation for radiological analysis using gamma spectrometry is discussed separately.) Tables 4.3.1 through 4.3.9 provide a consistent grouping by sampling and analysis request number, location, medium, and type of analysis on a problem-specific basis. Although the basic format is constant, the exact manner in which the data are displayed is determined by first having sampling and analytical personnel

identify the logical groupings of the data and then having data management determine an easily readable form for the data presentation.

The headings on Table 4.3.1 through 4.3.9 include a row designated "SDG Number." Sample delivery group (SDG) is a term that evolved out of EPA CLP terminology. An SDG number is used to uniquely identify an analytical batch of samples within a given type of analysis. This is important because the QA/QC data qualifiers appearing in Tables 4.3.1 through 4.3.9 are specific to an SDG (analytical batch) and not necessarily to a particular environmental problem. QA/QC data presented in Appendix D are grouped by SDG within analysis type. For each analysis type listed in the 4.3 series tables, a directory for sample numbers and SDGs is provided (Table D.n.1). [The directory includes a list of sample numbers grouped by environmental problem, each sample number's corresponding SDG number (QA/QC table), and the table and page number of the QA/QC table in Appendix D on which that sample number's data are located.] The SDG number provides the link between the concentration data in Tables 4.3.1 through 4.3.9 and the applicable QA/QC data in Appendix D. For a given sample, look up the Appendix D table number for the SDG in the directory for QA/QC tables in Volume II.

The 4.4 series of tables provides information on groundwater sample locations and sample volumes for those environmental problems that call for the collection of groundwater samples. The well identification, the sample number, the date the sample was collected, the sampling method used or the type of sample (e.g., bailer, pump), and the purge volume of the sampling apparatus in liters are provided. If stable readings of pH and conductivity were obtained before the required well volume was purged, or if the Sample Team was unable to determine when purging began, the sample was taken before the purging was completed.

### 4.2.2 Data Flags

In many of the data tables, the reported value is accompanied by a flag that represents a qualifying condition for a reported result, e.g., a problem with the analytical instrument or control value was encountered, or a specific method or dilution factor was used to obtain the result. This section offers a detailed explanation of the qualifying data flags listed in the data flag reference guide found at the end of the Table of Contents.

#### 4.2.2.1 Data Flags: Inorganic Analysis

Inorganic analysis data tables have concentrations reported in milligrams per kilogram (mg/kg) for solid samples and micrograms per liter (ug/L) for multiphasic (liquids and solids) or aqueous samples.

For each reported concentration, the types of qualifiers and the designated groups are as follows:

**Concentration Qualifiers:** Relate the data to detection limits and to the detection or lack of detection of analytes.

B — This qualifier indicates that the reported value is less than the Contract Required Detection Limit (CRDL) but greater than the Instrument Detection Limit (IDL).

U — This qualifier indicates the analyte was analyzed for but not detected.

**QA/QC Qualifiers:** Relate to specific QA/QC problems. They are only presented in QC tables in Appendix D.

| | |
|---|---|
| E | Value estimated or not reported because of the presence of interference. |
| M | Duplicate injection precision not met. |
| N | Spiked sample recovery not within control limits. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| * | Duplicate analysis not within control limits. |
| + | Correlation coefficient for the MSA is less than 0.995. |

The use of S and + is mutually exclusive. No combination of these qualifiers can accompany a single reported analyte combination.

**Method Qualifiers:** Analytical method used for determination of analyte concentration.

| | |
|---|---|
| P | ICP |
| A | Flame AA |
| F | Graphite furnace AA |
| CV | Manual cold vapor AA |
| AV | Automated cold vapor AA |

**AS** Semiautomated spectrophotometric

**C** Manual spectrophotometric

**T** Titrimetric

**NR** If analyte is not required to be analyzed.

**AE** Atomic emission - ICP

#### 4.2.2.2 Data Flags: Organic Analysis

In data tables, organic analysis analyte concentrations are reported in ug/L for liquid or multiphasic samples or micrograms per kilogram (ug/kg) for solid samples.

Eight notations are used to qualify the results from organic analysis. The qualifiers are as follows:

**U** Indicates the compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

**J** Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds (TIC) where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria, and the result is less than the sample detection limit [the contract required detection limit (CRDL)], but greater than zero. For example, if the sample quantitation limit is 10 ug/L but a concentration of 3 ug/L is calculated, it is

reported as 3 J. The sample quantitation limit is adjusted for both dilution and percent moisture as discussed for the U flag. If a sample with 24% moisture and a 1:10 dilution factor has a calculated concentration of 300 ug/L and a sample quantitation limit of 430 ug/kg, the concentration is reported as 300 J.

C This flag applies to pesticide results where the identification has been confirmed by GC-MS. Single component pesticides $\geq$ 10 ng/uL in the final extract shall be confirmed by GC-MS.

B This flag is used when the analyte is found in the associated analytical blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC and a positively identified target compound list (TCL) compound.

E This flag identifies compounds whose concentrations exceed the calibration range of the instrument for that specific analysis.

D This flag identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is reanalyzed at a higher dilution factor, as in the E flag above, the DL suffix is appended to the sample number on the Form I for the diluted sample, and <u>all</u> concentration values reported on that Form I are flagged with the D flag.

A This flag indicates that the TIC is a suspected aldol-condensation product.

X,Y,Z Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the Sample Data Summary Package

and the Case Narrative. If more than one is required, use **Y** and **Z**, as needed. If more than five qualifiers are required for a sample result, use the **X** flag to combine several flags, as needed. For instance, the **X** flag might combine the **A**, **B**, and **D** flags for some samples.

The combination of flags **BU** or **UB** is expressly prohibited. Blank contaminants are flagged **B** only when they are also detected in the sample.

### 4.2.3 Restrictions on Data Reporting

The general rule for data appearing in the Tables 4.3.1 through 4.3.9 is that analyte-specific results are presented in the tables for all analytes for which at least one sample's detected concentration was not accompanied by any QC data flag, unless the analyst determines that the data should be included. A consistent, partially subjective method was employed in determining which analytical data would appear in the tables.

Data are not presented in the summary data when an analyte has been conclusively attributed to external contamination. For example, detection of acetone in a laboratory method blank, at levels corresponding to those found in applicable field samples, indicates that the acetone should be attributed to a laboratory contamination problem. As a result, the value would not be reported in the problem-specific summary data table.

The complete data set, with QC data included, is found in Appendix D. The types of contamination which require an analyst to make a determination as to whether or not an analyte can be attributed to external contamination include: travel blank cross contamination, decontamination procedure contamination, method blank contamination, preparation blank contamination, and reagent contamination. Investigation of these possible sources of contamination is an

integral part of the data quality assessment process conducted by the analytical chemist.

Exceptions to the above rule can occur when the analyst determines that additional data should be reported. For example, a specific analyte is detected in a blank (e.g., method blank) and in field samples, yet the relative magnitude of the levels makes it impossible to conclusively attribute the presence of the analyte to contamination. In this case, the appropriately flagged data are included in data summary tables, and an assessment of the impact on data quality is provided in the accompanying text. For example, if acetone is detected in a method blank at 20 ug/L, and in a field sample at 350 ug/L, the value of 350 ug/L flagged with a B to indicate method blank contamination would be provided in the data table. The data quality assessment would provide an explanation of the fact that, despite acetone being detected in the method blank, it is likely that the elevated levels detected in field samples are representative of the actual field samples. These guidelines for reporting data apply to the following types of analysis: organics, inorganics, anions, and cations. Additional restrictions on what data appear in the table for each type of analysis are presented below.

### 4.2.4 Radiological Data Tables

For some environmental problems, radiochemical analysis of samples was performed. Data for radiochemical analysis are presented in problem-specific tables (the 4.3 series). The QC data relevant to each sample are retrievable and appear in Appendix E.

## 4.3 Analytical Data Quality Evaluation

Each problem-specific table is accompanied by a discussion of its contents, significant data points, and the reasons data have been interpreted as such.

An assessment of the quality level for the field and analytical data is given in the discussion of each environmental problem. The assessments are made relative to the three Data Utility Levels developed as part of the DOE Environmental Survey. The three levels are designated as Level I, Level II, and Level III and are in descending order regarding their usefulness in making either quantitative or qualitative (judgmental) decisions regarding an environmental problem. A rating of Quality Level I signifies the highest standard of documentation and reliability of results. Even though the implementation of establishing the degree of contamination may not be ideally realized, a rating of I signifies sufficient information for prioritization. A rating of Quality Level II includes a wide range of quality, but indicates that the information is usable. A rating of Quality Level III implies serious deficiencies requiring further evaluation of the results or the problem as defined. The three levels are discussed in detail in Appendix A of the DOE Environmental Survey Manual (Ref.1-3).

### 4.4 Background Values

INEL background data will be interpreted by DOE, and final Survey findings will be contained in the Environmental Survey Summary Report.

### 4.5 Data Tables for Additional Analysis Types

All analysis types are presented in the Table 4.3 series.

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## 4.6 Environmental Problem 1: CFA Sanitary Drainfield

**Request Number:** 301.

**Requester:** J. Swet.

**Finding and Basis:** The sanitary sewage system treatment plant at the Central Facilities Area (CFA) may have received hazardous inorganic and organic wastes from the Radiological and Environmental Services Laboratory (RESL), thereby potentially releasing hazardous waste into the environment and requiring that an RCRA Part B permit be obtained for the treatment plant. The RESL analytical chemistry laboratories in rooms 120 through 128 lack liquid waste containers to receive a multitude of inorganic and organic wastes. These wastes have been described as inorganic reagent solutions, waste acids and bases, digested samples, and nonflammable reagents. All of the nonflammable liquid wastes are poured into a laboratory drain that connects into the CFA sanitary treatment plant. Because the treatment plant does not appear to have the design capability to remove complex organics or to effect the precipitation of heavy metals, these contaminants were thought to be accumulating in the CFA drainfield.

### 4.6.1 Sampling and Analysis Objectives

**Statement:** Soil samples were collected and analyzed to identify whether or not hazardous materials, i.e., organic or heavy metal wastes, were in the drainfield at concentrations above normal levels for this area and, if so, to determine whether or not the contaminants were migrating toward groundwater.

**Supporting Information:** Based on the information presented in the Finding and Basis section, it was believed that organic and inorganic waste constituents had been discharged to the CFA drainfield from RESL.

### 4.6.2 Sampling and Analytical Design

#### 4.6.2.1 Sampling Design

**Request 301: CFA Sanitary Drainfield (Soil) (Fig. 4.1).** A total of 12 grab spatial composite soil samples were to be collected from four locations at three depths from the CFA sanitary drainfield (Sampling Method: Reference E5.2.3). The area under consideration was 500 to 2500 $m^2$ and was thought to be reasonably homogeneous with respect to effluent application, vegetation, and surface soil composition. The heaviest concentration of contaminant was thought to be in the first quarter of the drainfield. The area was to be divided into a 100-segment grid and 4 segments randomly selected for sampling. Soil samples were to be collected by straight augering at depths of 0 to 5 ft, 5 to 10 ft, and 10 to 15 ft. Analysis for metals was to be done only on 0 to 5 ft samples because migration of metals in soils is usually limited to 1 to 3 ft.

The Sampling Team arrived at the Central Facilities Area Sanitary Drainfield at 1300 on 17JUN88 under sunny skies. The temperature was warm and winds were from the southwest. Sample IN301012 (grid 28) was collected at 1300 from the 3.5 to 5.0 ft depth. This sample was the only one collected on 17JUN88 because the drilling rig needed repair.

The team returned to the site on 21JUN88. Under sunny skies, the temperature was hot and there was hardly any wind. Sample IN301023 (grid 28) was collected at 1000 from the 8.5 to 10.0 ft depth. Sample IN301034 (grid 28) was collected at 1320 from the 10.0 to 15.0 ft depth. After collecting the three samples from grid 28, the team moved the drilling rig to grid 98. At 5 ft the rig drilled through 2 ft of gravel and then hit sand. Split-spoon sample IN301045 (grid 98) was collected at 1425 from 3.5 to 5.0 ft, sample IN301056 was collected at 1520 from 8.5 to 10.0 ft, and sample IN301067, which was almost entirely clay, was collected at 1630 from 13.5 to 15.0 ft.

On 22JUN88, the Sampling Team arrived on-site at 0915. The sky was cloudy, the temperature was warm, and there was no wind. After taking a closer look at the approximate area of the drain field, the team decided to remeasure the length of the field, which was found to be 1000 ft rather than 540 ft. As a result, grids 28 and 54 were based on a grid size of 54 ft EW and 10 ft NS; grids 75 and 98 were based on a grid size of 100 ft EW and 10 ft NS. The first 4 ft of the first hole at grid 75 consisted of 1/2 to 2-in. gravel. At approximately 4 ft, one of the cement drain pipes under the drainfield was struck. A piece of the pipe, which looked like 1/2-in. thick cement pipe, worked up to the cuttings at the top of the hole. The team moved 15 ft west and 12 ft north of the first sample location for grid 75. The ICP metals and AA-CLP metals aliquots for sample IN301078 (grid 75) were collected from the cuttings at 3.5 ft because there was insufficient sample in the split spoon to fill four sample bottles. Sample IN301089 (grid 75) was collected at 1420 from the 8.5 to 10.0 ft depth. Sample IN301090 (grid 75) was collected at 1520 from the 13.5 to 15.0 ft depth.

Because the switch on the drilling machine needed repair, samples IN301103, IN301114, IN301125, and QC rinsate IN301136 were not collected from grid 54.

#### 4.6.2.2 Analytical Design

**Request 301:** No field measurements were requested. Parameters analyzed included volatiles, semivolatiles, and CLP metals.

### 4.6.3 Field and Analytical Data

**Field Data:**

**Request 301:** *No field measurements were requested.*

Field Data Evaluation:

Request 301: Not applicable.

Analytical Data:

Request 301:

*Metals. Analytical data for metals in soil are presented in Table 4.3.1. Of the 23 metals detected, the following 4 toxic metals of interest to the Survey were below the CRDL in all three samples: antimony, selenium, silver, and thallium. Of the remaining metals of interest detected, arsenic ranged from 4.5 to 4.7 mg/kg; barium, 147 to 243 mg/kg; beryllium, 1.1 to 1.5 mg/kg; cadmium, 1.1 to 1.3 mg/kg; chromium, 25 to 29 mg/kg; copper, 19 to 20 mg/kg; lead, 3.4 to 12 mg/kg; mercury, 0.05 to 0.1 mg/kg; nickel, 23 to 32 mg/kg; and zinc, 57 to 99 mg/kg.*

*Extractable organics. Analytical results for extractable organic compounds are presented in Table 4.3.1. From three to nine compounds were identified in particular samples of the nine samples taken for this request. There were five phthalates identified in one or more of these samples, all in concentrations too small to measure; many were also present in the method blank. Phenol was detected in several samples and also in the method blank. It was below the quantitation limit in all samples in which it was detected. Several TICs were detected, but always in concentrations estimated to be less than 1000 ppb.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.1. Acetone and methylene chloride were identified in all nine of these soil samples. Acetone was also identified in the blank in all nine samples, and methylene chloride was listed as in the blank in five samples. In addition, a compound tentatively identified as 1,1,2-trichloro-1,2,2-trifluoroethane was present in two samples and also in the associated blank. The highest*

*concentration of acetone was 49 ppb. The highest measured or estimated concentration of methylene chloride was 11 ppb. The highest estimated concentration of a TIC was 14 ppb.*

**Analytical Data Evaluation:**

**Request 301:**

Metals. Six metals of interest--arsenic, barium, cadmium, chromium, lead, and mercury--were detected above either the CRDL or the IDL for Request 301.

Extractable organics. Phenol was detected below the quantitation limit in several samples and was also in the method blank. All TICs had concentrations estimated to be less than 1000 ppb.

Volatile organics. Methylene chloride was detected, but only in concentrations of 11 ppb or less. No volatile organic compound detected was measured or estimated in concentrations as high as 50 ppb.

### 4.6.4 Limitations and Qualifications

**Data Quality Level:**

**Request 301:** The sampling design and field sampling were rated Quality Level II. The overall analytical rating is Quality Level II.

**Field Data:**

**Request 301:** The rating of II for the sampling design was based on the unclear sampling design description and Fig. 3.1b of the INEL Sampling and Analysis Plan. Fig. 3.1b in the plan showed that the samples were to be taken in the first quadrant of the drainfield; however, this was not stated in the plan's

sampling design, which outlined gridding the drainfield and selecting from four random segments. The sampling team gridded the entire drainfield without regard to the quadrant of interest specified in the INEL Sampling and Analysis Plan figure.

The sampling team collected 9 of the 12 samples requested. Samples from grid 54 was not collected because the drilling machine needed repair. Because analyses for metals were requested only for the samples from the 0-5 ft zone, a hand auger could have been used to collect the surface samples and analyses performed.

**Analytical Data:**

**Request 301:**

Metals. Analytical results for ICP metals were Quality Level I except for zinc at Quality Level III. Analytical results for AA metals were Quality Level I. For zinc, positive values were obtained for the calibration verification blank which were greater than the CRDL, indicative of severe analytical deficiencies. The data are unusable.

Extractable organics. These data are Quality Level II except for bis(2-ethylhexyl)phthalate and di-n-butylphthalate. These two extractable organics, which were below quantitation limits and were also present in the method blank, are, therefore, assigned Quality Level III. These data may be biased low due to holding times being exceeded by 4 to 8 days. Specifically identified organics have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Volatile organics. The overall data are Quality Level I. The 1,1,2-trichloro-1,2,2-trifluoroethane was assigned a data Quality Level III, rather than II,

because of its presence in the blank. Specifically identified organics have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Environmental Problem: 1
Request Number: 301

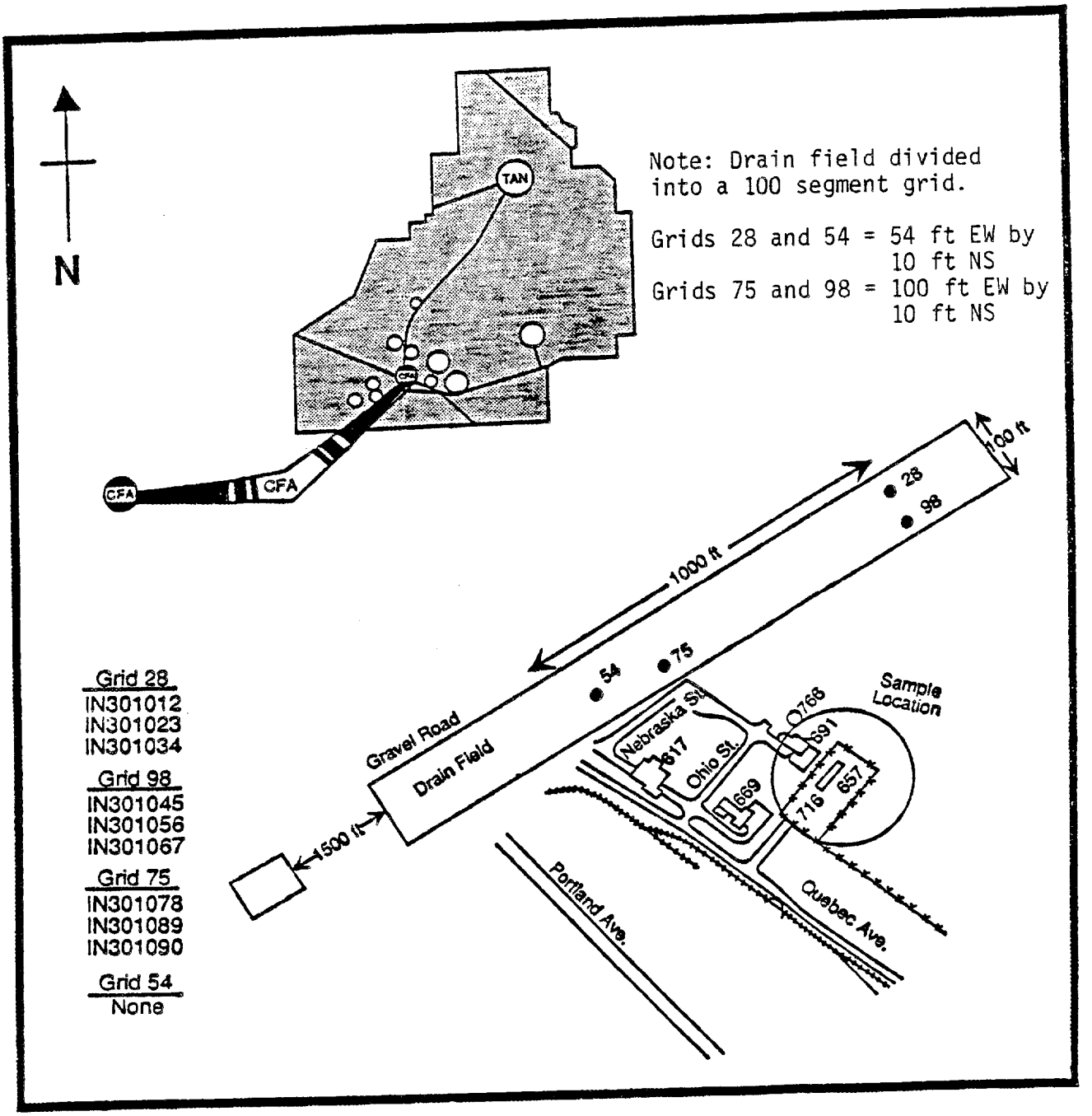


Figure 4.1. CFA Sanitary Drainfield (Request 301)

TABLE 4.2.1 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 1

DRAFT DO NOT CITE

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN301 | CFA | DRAINFIELD | SOIL | 12 | 9 | GRAB | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 9 | 9 | 9 | 9 | 0 | 0 |
| | | MED TOTAL | | 12 | 9 | | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 9 | 9 | 9 | 9 | 0 | 0 |
| IN301 | CFA | DRAINFIELD | SUR WATER | 1 | 0 | QC RN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MED TOTAL | | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | EP TOTAL | | 13 | 9 | | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 9 | 9 | 9 | 9 | 0 | 0 |

TABLE 4.3.1 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 1 DRAFT DO NOT CITE
CFA SANITARY DRAINFIELD

S&A REQUEST: 301
LOCATION: CFA SANITARY DRAINFIELD
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: IN301012C<br>SDG NO: IN301012C<br>TYPE: GRAB | IN301012C<br>IN803053A<br>GRAB | IN301012C<br>IN811020A<br>GRAB | IN301012D<br>IN301012D<br>GRAB | IN301012D<br>IN301012K<br>GRAB | IN301045C<br>IN301012C<br>GRAB |
|---|---|---|---|---|---|---|
| ALUMINUM | | 0.38 B | | 6490 | | |
| ANTIMONY | | | 4.6 | | | |
| ARSENIC | | | | 147 N | | |
| BARIUM | | | | 1.1 | | |
| BERYLLIUM | | | 0.28 B | | | |
| CADMIUM | | | | 29400 * | | |
| CALCIUM | | | | 29 | | |
| CHROMIUM | | | | 5.7 B | | |
| COBALT | | | | 20 | | |
| COPPER | | | | 17000 | | |
| IRON | | | 6.7 | | | |
| LEAD | | | | 5880 | | |
| MAGNESIUM | | | | 191 | | 0.1 |
| MANGANESE | 0.06 | | | 23 | | |
| MERCURY | | | | | 1400 | |
| NICKEL | | | | | | |
| POTASSIUM | | | 0.43 B | | | |
| SELENIUM | | | 0.07 B | | | |
| SILVER | | | | 318 B | | |
| SODIUM | | | 0.21 U | | | |
| THALLIUM | | | | 31 | | |
| VANADIUM | | | | 57 | | |
| ZINC | | | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: IN301045C<br>SDG NO: IN803053A<br>TYPE: GRAB | IN301045C<br>IN811020A<br>GRAB | IN301045D<br>IN301012K<br>GRAB | IN301045D<br>IN301045D<br>GRAB | IN301078C<br>IN301012C<br>GRAB | IN301078C<br>IN803053A<br>GRAB |
|---|---|---|---|---|---|---|
| ALUMINUM | 0.4 B | | | 9750 | | 0.27 B |
| ANTIMONY | | 0.1 U | | | | |
| ARSENIC | | | | 178 | | |
| BARIUM | | | | 1.4 E | | |
| BERYLLIUM | | 1.2 | | | | |
| CADMIUM | | | | 33100 | | |
| CALCIUM | | | | 26 | | |
| CHROMIUM | | | | 6.3 B | | |
| COBALT | | | | 19 | | |
| COPPER | | | | 16400 | | |
| IRON | | 3.4 | | | | |
| LEAD | | | | 7300 E | | |
| MAGNESIUM | | | | | | |

TABLE 4.3.1 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 1 DRAFT DO NOT CITE
CFA SANITARY DRAINFIELD

S&A REQUEST: 301
LOCATION: CFA SANITARY DRAINFIELD
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN301045C IN803053A GRAB | IN301045C IN811020A GRAB | IN301045D IN301012K GRAB | IN301045D IN301045D GRAB | IN301078C IN301012C GRAB | IN301078C IN803053A GRAB |
|---|---|---|---|---|---|---|---|
| MANGANESE | | | | | 342 | | |
| MERCURY | | | | | | 0.05 | |
| NICKEL | | | | | 24 | | |
| POTASSIUM | | | | 2300 | | | |
| SELENIUM | | | 0.13 U | | | | |
| SILVER | | | 0.06 U | | | | |
| SODIUM | | | | | 306 B | | |
| THALLIUM | | | 0.21 U | | | | |
| VANADIUM | | | | | 34 E | | |
| ZINC | | | | | 84 | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN301078C IN811020A GRAB | IN301078D IN301012D GRAB | IN301078D IN301012K GRAB | | | |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | | 11200 | | | | |
| ANTIMONY | | | | | | | |
| ARSENIC | | 4.7 | | | | | |
| BARIUM | | | 243 N | | | | |
| BERYLLIUM | | | 1.5 | | | | |
| CADMIUM | | 1.1 | | | | | |
| CALCIUM | | | 55200 * | | | | |
| CHROMIUM | | | 25 | | | | |
| COBALT | | | 7.4 | | | | |
| COPPER | | | 20 | | | | |
| IRON | | | 17600 | | | | |
| LEAD | | 12 | | | | | |
| MAGNESIUM | | | 13400 | | | | |
| MANGANESE | | | 372 | | | | |
| MERCURY | | | | | | | |
| NICKEL | | | 32 | | | | |
| POTASSIUM | | | | 2000 | | | |
| SELENIUM | | 0.37 B | | | | | |
| SILVER | | 0.14 B | | | | | |
| SODIUM | | | 1290 | | | | |
| THALLIUM | | 0.27 B | | | | | |
| VANADIUM | | | 44 | | | | |
| ZINC | | | 99 | | | | |

TABLE 4.3.1 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 1
CFA SANITARY DRAINFIELD

S&A REQUEST: 301
LOCATION: CFA SANITARY DRAINFIELD
MEDIUM: SOIL

| EXTRACTABLE ORGANICS (UG/KG) | SAMP NO: | IN301012B | IN301023B | IN301034B | IN301045B | IN301067B | IN301078B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012B | IN301012B | IN301012B | IN301012B | IN301012B | IN301012B |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| BIS(2-ETHYLHEXYL)PHTHALATE | | 58 BJ | 100 BJ | 57 BJ | 68 BJ | 210 BJ | 61 BJ |
| BUTYLBENZYLPHTHALATE | | 660 U | 670 U | 800 U | 670 U | 770 U | 660 U |
| DI-N-BUTYLPHTHALATE | | 400 BJ | 220 BJ | 680 BJ | 220 BJ | 240 BJ | 220 BJ |
| DI-N-OCTYLPHTHALATE | | 21 J | 130 J | 28 J | 670 U | 770 U | 660 U |
| DIETHYLPHTHALATE | | 660 U | 670 U | 800 U | 670 U | 770 U | 660 U |
| PHENOL | | 37 BJ | 670 U | 800 U | 670 U | 37 BJ | 42 BJ |
| * C15-ALKANE(24.12) | | 150 J | | | | 59 J | |
| * C26-ALKENE(38.96) | | 310 J | | | 300 J | | |
| * C27-ALKENE(39.86) | | | | | | 130 J | |
| * C28-ALKANE(40.71) | | | | | | | |
| * C28-ALKANE(40.74) | | 340 J | | | | | |
| * C28-ALKENE(40.19) | | 330 J | | | | | |
| * C29-ALKENE(41.17) | | 340 J | | | | | |
| * C30-ALKENE(42.83) | | | | 190 J | | | |
| * C31-ALKANE(44.01) | | | | | 790 J | | |
| * HENITRIACONTANE(43.94) | | | | | | 390 J | |
| * HENITRIACONTANE(43.99) | | | | 190 J | | | |
| * HENITRIACONTANE(44.03) | | | | | | | |
| * PENTADECANE(24.07) | | | 140 J | | | | |
| * PENTADECANE(24.09) | | | 280 J | | | | |
| * PHTHALATE(42.18) | | | 50 J | | 110 J | | |
| * TETRADECANE(21.87) | | | | | | | |
| * UNDECANE(14.40) | | | 76 J | | | 94 J | |
| * UNDECANE(14.42) | | | | | 61 J | | |
| * UNDECANE(14.45) | | | | | 410 J | | |
| * UNKNOWN HYDROCARBON(42.19) | | | | | | | |
| * UNKNOWN HYDROCARBON(48.91) | | | | | | | |
| * 1,2-BENZENEDICARBOXYLIC(41.83) | | | | | | | |
| * 1,2-BENZENEDICARBOXYLIC(42.21) | | | | | | | |

| EXTRACTABLE ORGANICS (UG/KG) | SAMP NO: | IN301089B | IN301090B |
|---|---|---|---|
| | SDG NO: | IN301012B | IN301012B |
| | TYPE: | GRAB | GRAB |
| BIS(2-ETHYLHEXYL)PHTHALATE | | 64 BJ | 650 BJ |
| BUTYLBENZYLPHTHALATE | | 170 J | 770 U |
| DI-N-BUTYLPHTHALATE | | 620 BJ | 470 BJ |
| DI-N-OCTYLPHTHALATE | | 670 U | 580 J |
| DIETHYLPHTHALATE | | 33 J | 770 U |
| PHENOL | | 670 U | 38 BJ |
| * C15-ALKANE(24.12) | | | |

TABLE 4.3.1 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 1 DRAFT DO NOT CITE
CFA SANITARY DRAINFIELD

S&A REQUEST: 301
LOCATION: CFA SANITARY DRAINFIELD
MEDIUM: SOIL

| EXTRACTABLE ORGANICS (UG/KG) | SAMP NO: | IN301089B | IN301090B | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012B | IN301012B | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| * C26-ALKENE(38.96) | | | | | | | |
| * C27-ALKENE(39.86) | | | | | | | |
| * C28-ALKANE(40.71) | | | | | | | |
| * C28-ALKANE(40.74) | | | | | | | |
| * C28-ALKENE(40.19) | | | | | | | |
| * C29-ALKENE(41.17) | | | | | | | |
| * C30-ALKENE(42.83) | | | | | | | |
| * C31-ALKANE(44.01) | | | 660 J | | | | |
| * HENITRIACONTANE(43.94) | | | | | | | |
| * HENITRIACONTANE(43.99) | | | | | | | |
| * HENITRIACONTANE(44.03) | | | | | | | |
| * PENTADECANE(24.07) | | | | | | | |
| * PENTADECANE(24.09) | | | | | | | |
| * PHTHALATE(42.18) | | | | | | | |
| * TETRADECANE(21.87) | | | | | | | |
| * UNDECANE(14.40) | | | | | | | |
| * UNDECANE(14.42) | | | | | | | |
| * UNDECANE(14.45) | | | | | | | |
| * UNKNOWN HYDROCARBON(42.19) | | | | | | | |
| * UNKNOWN HYDROCARBON(48.91) | | | | | | | |
| * 1,2-BENZENEDICARBOXYLIC(41.83) | | | 190 J | | | | |
| * 1,2-BENZENEDICARBOXYLIC(42.21) | | | 930 J | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN301012A | IN301023A | IN301034A | IN301045A | IN301067A | IN301078A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012A | IN301012A | IN301012A | IN301012A | IN301012A | IN301012A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 36 B | 43 B | 18 B | 28 B | 49 B | 22 B |
| METHYLENE CHLORIDE | | 3 J | 2 J | 11 | 3 J | 11 B | 3 BJ |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.29) | | | | | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.30) | | | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN301089A | IN301090A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012A | IN301012A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 25 BJ | 28 B | | | | |
| METHYLENE CHLORIDE | | 3 BJ | 8 B | | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.29) | | | 14 BJ | | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.30) | | 13 BJ | | | | | |

TABLE 4.3.1 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 1
CFA SANITARY DRAINFIELD

S&A REQUEST: 301
LOCATION: SFA SANITARY DRAINFIELD
MEDIUM: SOIL

| EXTRACTABLE ORGANICS (UG/KG) | SAMP NO: IN301056B<br>SDG NO: IN301012B<br>TYPE: GRAB |
|---|---|
| BIS(2-ETHYLHEXYL)PHTHALATE | 100 BJ |
| DI-N-BUTYLPHTHALATE | 150 BJ |
| PHENOL | 57 BJ |
| * UNDECANE(14.44) | 74 J |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: IN301056A<br>SDG NO: IN301012A<br>TYPE: GRAB |
|---|---|
| ACETONE | 18 B |
| METHYLENE CHLORIDE | 3 BJ |

## 4.7 Environmental Problem 2: Groundwater Monitoring

**Request Numbers:** 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, and 423.

**Requester:** F. H. Miller.

**Finding and Basis:** It was thought that inadequate groundwater monitoring for expected contaminants at the INEL may have resulted in undetected degradation of the groundwater. Current groundwater monitoring programs include analysis for radionuclides (with the exception of iodine-129), a limited number of metals, and a limited number of organics. However, past and present waste streams indicate the release of a wider range of semivolatiles, volatiles, inorganics, and anions that also need to be analyzed for to obtain a more accurate idea of the extent of aquifer contamination. In addition, pesticides used at Mud Lake and local farming communities near Howe may have imparted contaminants to regional groundwater under the INEL. Future farming may add to present concentrations on-site but remain immune to control by the INEL. Viable reference data are essential for supporting or refuting sources of contamination and the selection of remedial measures.

### 4.7.1 Sampling and Analysis Objectives

**Statement:** Groundwater samples were collected from 23 wells at the INEL to determine if organics, inorganics, and radionuclides that had been disposed of at various sites had migrated into the Snake River Plain aquifer and were present above reference levels for the area.

**Supporting Information:** Groundwater contamination at the INEL had been identified at a number of locations. This contamination consisted of various radiological and ion contaminant plumes spreading in the aquifer in the southern portion of the INEL. Contaminants included iodine-129, tritium, strontium-90, nitrates, and increases in groundwater conductivity, which could have demonstrated potential contamination.

Volatiles had been introduced into the environment from solvent use. Semivolatiles had been introduced from tank leaks and industrial processes. Metals had been introduced from digestion processes of metal cladding for fuel rods. The nitrates had resulted from the production of uranyl nitrate, and radionuclides had resulted from the many radiological processes continuing at the site. All of these processes produced waste that had been disposed of either in percolation ponds or in injection wells. Metals were to be analyzed by either CLP protocol or ICP method. The CLP protocol was to be used for drinking water or production wells. The ICP method was to be used for monitoring wells.

Waste disposal practices over the history of the INEL had consisted of effluent disposal in injection wells and percolation ponds. The effluent contained organics, inorganics, anions, and radionuclides. Although groundwater monitoring had indicated the presence of many waste plumes in the Snake River Plain aquifer, those studies monitored a limited number of analytical parameters. This request extended the range of monitored parameters and aided in determining the extent of currently unmonitored waste plumes, if any existed.

Twenty-three wells were sampled. The wells included both monitoring wells and production wells. The wells were chosen to obtain a representative and comprehensive groundwater quality assessment of the aquifer beneath the INEL. Because the wells were properly installed and developed, their materials of construction would not contribute significant error to the water quality parameters of interest.

**NOTE:** For the purpose of well sampling at the INEL, two samples (unless otherwise noted) were to be collected from wells that were identified for reference and wells that were at the perimeter and downgradient side of the reservation. In all other requests, the wells were considered a population. This

distinction was not meant to disregard the fact that each particular facility on the site might have contributed differently to the groundwater.

### 4.7.2 Sampling and Analytical Design

#### 4.7.2.1 Sampling Design

**Request 401: Well P+W 2 (Water) (Fig. 4.2a).** Samples from this well were considered representative of the local area before INEL influences. Two grab groundwater samples were to be collected from Well P+W 2, which is equipped with a dedicated pump (Sampling Method: References E4.4.1, E4.4.3, and E4.4.4). Standard RCRA well procedures were used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4). The well was installed in 1957 by the USGS with a steel casing and there was no screened interval.

The Sampling Team arrived on-site at 1020 13JUL88. Skies were clear, the temperature was approximately 75$^{o}$ to 80$^{o}$F, winds were from 0 to 5 mph, and humidity was approximately 10% to 20%. The total depth of Well P+W 2 was 384 ft. The depth to water from the top of the inner casing was 306.2 ft. The well had a 12-in. diameter steel casing. The team hooked up the flow meter and the stainless steel sample post after rinsing them with boiled, distilled water. The case volume of standing water was calculated. ("Bore" and "case" are used interchangeably throughout the field logbook.) The team began pumping the well at 1039 and pumped three case volumes for a total of 1374 gal. (458.05 gal./case volume x 3). The pumping rate was 35 gpm; the time per case volume purge was 13 minutes. The USGS released the purge water onto the ground. The purge water was clear. Samples IN401013 and IN401024 and field blank IN401035 were taken at 1020.

**Request 402: Well USGS-19 (Water) (Fig. 4.2b).** Samples from this well were considered representative of the local area before the INEL influences. Two grab groundwater samples were to be collected from Well USGS-19 (Sampling

Method: References E4.4.3, E4.4.4, and E4.4.4.4). Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4). Per request of DOE Headquarters (K. Knight to the ORNL Field Team Leader), aliquots for pesticides analysis were not to be collected for this request.

The Sampling Team arrived on-site 15JUL88 at 0955. Under clear skies, the temperature was approximately 85$^{o}$F, winds were approximately 10 to 15 mph, and humidity was 10% to 15%. The total depth of the well from the top of the inner casing was 405 ft; depth to water from the top of the inner casing was 270.3 ft; standing water was 134.7 ft. The depth of the screen section (from the top of the inner casing) was from 285 ft to 305 ft. The case volume (26.4 $ft^3$ of water x 7.5 gal./$ft^3$) was 198 gal. The well had a 6-in. diameter casing. After removing the well housing and connecting the level monitor, the team set up a USGS trailer-mounted downhole sampling rig that had a 4-in. submersible pump. The pump rate was approximately 7 gpm. The team purged the well three times for a total of 594 gal. Samples IN402014 and IN402025 were collected at 1205. The purge water was clear. The USGS discharged the purge water onto the ground. A scintillation vial was taken for each parameter. Field measurements were also made. The background beta/gamma scan was 35 cpm above instrument background.

**Request 403: Well USGS-27 (Water) (Fig. 4.2c).** Samples from this well were considered representative of the local area before the INEL influences. Two grab groundwater samples were to be collected at Well USGS-27 with a bailer (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.4). Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4). Because a pump was installed, the team did not use the bailer as requested in the INEL Sampling and Analysis Plan. Per request of DOE Headquarters (K. Knight to the ORNL Field Team Leader), aliquots for pesticides analysis were not to be collected for this request.

The Sampling Team arrived at the well site at 0847 on 20JUL88. Winds were between 5 and 10 mph and the temperature was 62°F. The sky was clear. The depth of the well from the top of the inner casing was 312 ft. The depth to water from the top of the inner casing was 223.8. ft. The depth of the screen section from the top of the inner casing was from 250 ft to 260 ft, and the depth of the steel inner casing was from 298 ft to 308 ft. The well had a 6-in. diameter steel casing. After dismantling the well-housing, the team started pumping the well at 0930 at a pumping rate of 10 gpm. The case volume (18.8 $ft^3$ of water x 7.5 gal./$ft^3$) was 140 gal. More than three bore volumes were evacuated before sampling, the purge volume was actually 500 gal. Sample IN403015 was collected at 1030 and sample IN403026 was collected at 1039. The purge water was clear. Field measurements were also made. The team deleted QC rinsate sample IN403037 per the Assistant Sampling Team Leader because it was not required.

**Request 404: Well ANL W-1 (Water) (Fig. 4.2d).** Although revision 02 of the INEL Sampling and Analysis Plan requested only one sample, the INEL S&A Plan that the Sampling Team took to the field requested that two grab groundwater samples be collected from Well ANL W-1 from the tap nearest the wellhead (per the Assistant Sampling Team Leader on 28FEB89) (Sampling Method: References E4.4.4 and E4.3.2). The well pump was located in Building 754. Because this was a production well, facility operations personnel were to be notified prior to sampling to coordinate well pump operations. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team arrived on location 29JUL88 at 1036. The temperature was 90°F and winds were from 5 to 10 mph. Pumping was started at 1039 with the meter reading on the pump at 803823 x 1000 gal. According to the Sampling Team's escort, nine min. of pumping produced three column volumes. Purging was completed at 1050 with the meter reading at 803840 x 1000 gal. The team started collecting sample IN404016 at 1051 and finished at 1056. Sample

IN404027 was collected by 1102. The purge water was extremely clear. At the end of sampling, the meter reading was 803851 x 1000 gal. Field measurements of pH, conductivity, and temperature were stable throughout the sample collection period.

**Request 405: Well USGS-98 (Water) (Fig. 4.2e).** One grab groundwater sample was to be collected from Well 98 to serve as a sample point for groundwater contaminants prior to influences from the ICPP and TRA (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). Equipped with a dedicated pump, USGS Well 98 was located northwest of the ICPP and north of the TRA. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.5). The depth of the well from the top of the inner casing was 505 ft; the depth to water from the top of the inner casing was 402 ft. The well had a 6-in. steel casing and was sealed with cement grout. The case volume was 151.6 gal. and the purge volume was 454 gal.

The Sampling Team arrived on-site at 1320 on 28JUN88 under clearing skies. The temperature was approximately 85$^{o}$F and winds were from 5 to 10 mph. Only one sample was collected because this was not a reference sample for the INEL. Well purging began at 1328. The team used the USGS portable generator and in-place pump. Purging time was 25 minutes for 454 gal. of water pumped at the rate of 18 gpm. During pumping and sampling, water was allowed to run out onto the ground. (According to USGS personnel, this procedure was standard for USGS.) The purged water was clear. Field measurements were taken from 1358 to 1412. Sample IN405017 was collected from 1406 to 1409.

**Request 406: Well ANP-8 (Water) (Fig. 4.2f).** Although revision 02 of the INEL Sampling and Analysis Plan requested that only one grab groundwater sample be collected from Well ANP-8 from the tap nearest the wellhead, the INEL Sampling and Analysis Plan that the Sampling Team took to the field with them requested two samples (per the Assistant Sampling Team Leader on 28FEB89) (Sampling Method: References E4.5.1, E4.5.2, and E4.5.4). Standard RCRA well procedures

were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4). The pump and tap were located in Building 644 at TAN (TAN-1). Because Well ANP-8 is a production well at WRRTF, facility operations were to be notified prior to sampling to coordinate well pump operations.

The Sampling Team arrived at Well ANP-8 at 1521 on 17JUN88. The temperature was 90°F and winds were between 5 and 10 mph. The depth of the well from the top of the inner casing was 200 ft. Pumping was started at 1522. The purging rate was 500 gpm, and the total volume purged was 4000 gal. Purging was completed at 1530. Sample IN406018 was collected at 1530. Sample IN406029 was collected at 1539. During purging and sampling, the water was very clear. Field measurements were made. pH, temperature, and conductivity readings stabilized very quickly.

**Request 407: Well FET-1 (Water) (Fig. 4.2g).** Although revision 02 of the INEL Sampling and Analysis Plan requested that only one grab groundwater sample be collected from the tap nearest the wellhead of Well FET-1 located in Building TAN 632, the INEL Sampling and Analysis Plan that the Sampling Team took to the field with them requested two samples (per the Assistant Sampling Team Leader on 28FEB89) (Sampling Method: References E4.3.2 and E4.4.4). Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4). Because FET-1 is a production well at LOFT, facility operations personnel were to be notified prior to sampling to coordinate well pump operations.

The Sampling Team arrived on-site at 1400 on 17JUN88. The temperature was 90°F and winds were from the northwest at 5 to 15 mph. The depth of the well from the top of the inner casing was 200 ft. The type of inner casing was unknown. Pumping was started at 1403. The pumping/purging rate was 1000 gpm. Approximately 9000 to 10,000 gal. were purged prior to sampling. Between 1412 and 1429, samples IN407019 and IN407020 were collected. The water was

very clear during purging and sampling. Field measurements were made. pH, conductivity, and temperature readings were stable at the time of sample initiation.

**Request 408: Well ANP-1 (Water) (Fig. 4.2h).** Although revision 02 of the INEL Sampling and Analysis Plan requested that only one grab groundwater sample be collected from Well ANP-1 from the tap nearest the wellhead, the INEL Sampling and Analysis Plan that the Sampling Team carried into the field with them requested two samples (per the Assistant Sampling Team Leader on 28FEB89) (Sampling Method: References E4.3.2 and E4.4.4). Because the pump/tap located in Building 612 was a production well at TSF (TAN-1), facility operations were to be notified prior to sampling to coordinate production well pump operations. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The team members arrived at the site at 1444 on 17JUL88. Winds were out of the southwest at 5 to 15 mph and the temperature was 90$^{o}$F. The depth of the well from the top of the inner casing was 200 ft. The depth to water from the top of the inner casing was unknown. Pumping was started at 1446; the pump rate for purging was 1000 gpm. Purging was completed at 1453 with the volume purged between approximately 7000 and 8000 gal. Sample IN408010 was collected from 1453 to 1458. Sample IN408021 was collected from 1459 to 1507. During purging and sampling, the water was very clear.

**Request 409: Well USGS-86 (Water) (4.2i).** Two grab groundwater samples were to be collected from well USGS-86 (Sampling Method: References E4.4.1, E4.4.3, and E4.4.4). Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4). The well was located near the southwest corner of the INEL, downgradient of the INEL facilities. Well USGS-86, which had a 5-hp dedicated submersible pump, was the last well monitoring the aquifer before the aquifer exited the INEL site.

The Sampling Team arrived on-site at 1330 on 22JUN88. The sky was clear, and the temperature was approximately 92°F. The well finish was an open hole with an 8-in. steel casing in the top 48 ft. The depth of the well from the top of the inner casing was 691 ft; the depth to water from the top of the inner casing was 647.33 ft. Case volume (15.22 $ft^3$ of water x 7.5 gal./$ft^3$) was 114 gal. Purging was begun at 1439 and completed at 1511. The purge rate was 19 gpm and the purge volume was 608 gal. Sample IN409011 was collected from 1512 to 1518. After field measurements were made, sample IN409022 was collected from 1520 to 1524. The water during purging and sampling was very clear. During purging, water was allowed to overflow a 5-gal. bucket onto the ground. According to USGS personnel, this procedure was standard for USGS. A radiation survey of the groundwater indicated only normal groundwater concentration for this area.

**Request 410: Well USGS-105 (Water) (Fig. 4.2j).** Two grab groundwater samples were to be collected from Well USGS-105 located on the southern boundary of the INEL and downgradient of the INEL facilities (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). The well, equipped with a dedicated pump, was the last well in the area before the aquifer exited the INEL property. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team arrived on-site 23JUN88 at 1340. The temperature was approximately 92°F and winds were from the southwest at 10 to 20 mph. The depth of the well from the top of the inner casing was 800 ft, and the depth to water from the top of the inner casing was 667.51 ft. The well had an 8-in. steel inner casing with an open-hole finish and was sealed with cement grout. The case volume (46.2 $ft^3$ of water x 7.5 gal./$ft^3$) was 347 gal., and the purge volume was 1081 gal. Well purging began at 1420. Although according to USGS personnel the purge rate was 19 gpm, the purge rate (calculated at 5 gal. per 13 sec) was actually 23 gpm. The purge water was allowed to run onto the ground.

According to USGS personnel, this procedure was standard operating procedure for this site. Purging was completed at 1507. Sample IN410014 was collected from 1507 to 1511. Sample IN410025 was collected from 1513 to 1517. During purging and sampling, the water was very clear. Field measurements were also made.

**Request 411: Well USGS-110 (Water) (Fig. 4.2k).** Two grab groundwater samples were to be collected from Well USGS-110 on the southern boundary of the INEL and downgradient of the INEL facilities (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). The well was east of the CFA area and west of the ANL-W area. The well, equipped with a dedicated pump, was the last well in the area before the aquifer exited the INEL property. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team arrived on-site 23JUN88 at 0846 under clear skies. The temperature was approximately 87$^{o}$F, and winds were from the south between 5 and 10 mph. The depth of the well from the top of the inner casing was 780 ft, and the depth to water from the top of the inner casing was 566.79 ft. The well had a 6-in. steel casing and was sealed with cement grout. The well case volume (41.8 $ft^3$ of water x 7.5 gal./$ft^3$) was 313 gal. Well purging began at 0857. According to USGS personnel, the purge rate was 5 gpm; however, the purge rate (calculated at 5 gal. in 57 sec) was actually 5.3 gpm. Purging was completed at 1020 with 415 gal. purged. Sample IN411015 was collected from 1021 to 1025. Field measurements were made at 1026. Sample IN411026 was collected from 1027 to 1031. Water during purging and sampling was clear. During purging and sampling, the water was allowed to run onto the ground. According to USGS personnel, this procedure was standard operating procedure for sampling at this well.

**Request 412: Fire Station Well-S (Water) (Fig. 4.2l).** One grab groundwater sample was to be collected from the Fire Station Well from the tap nearest the

wellhead (Sampling Method: References E4.3.2 and E4.4.4). Because this well was a production well, facility operations personnel were to be notified prior to sampling to coordinate production well pump operations. This sample was to monitor for past operations at the Fire Training Site and serve as a reference for the ICPP area. The total depth of the well was unknown; depth to water was 470 ft. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team, escorted by EG&G personnel, arrived on-site 17JUN88 at 1330. Skies were partly cloudy. When the team arrived, the well was being purged by EG&G personnel. The pH was tested until it stabilized. Samples IN412016 and IN412027 were collected at 1340.

**Request 413: Well USGS-107 (Water) (Fig. 4.2m).** One grab groundwater sample was to be collected from Well USGS-107, equipped with a dedicated pump (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). The well was downgradient from PBF, SPERT, and ARA. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team arrived on-site at 1101 on 23JUN88 under clear skies. The temperature was 92$^{o}$F, and winds were from the southwest between 5 and 10 mph. The depth of the well from the top of the inner casing was 690 ft, and the depth to water from the top of the inner casing was 476.90 ft. The well had a 6-in. inner steel casing. The finish was open hole and the seal was cement grout. Purging was begun at 1104 and completed at 1235. According to USGS personnel, the purge rate was 5 gpm. The purge rate was actually calculated at 5 gal. in 59 seconds. Water was allowed to run onto the ground. According to USGS personnel, this was standard operating procedure for sampling at this well. The water was extremely clear. At 1235 the well was pumped dry, and at 1236 the pump was turned off. The well pump was turned on again and the flow rate adjusted to 0.3 gpm, but the pump failed prior to the

final adjustment. At 1300, either the well was still not recharged or the pump was not working. The team returned to USGS-107 at 1400, but the pump was still not working. Therefore, sample IN413017 was not collected.

**Request 414: Well CFA-1 (Water) (Fig. 4.2n).** According to revision 02 of the INEL Sampling and Analysis Plan, one grab groundwater sample was to be collected from Well CFA-1 from the tap nearest the wellhead (Sampling Method: References E4.4.4 and E4.3.2). The field logbook indicates that two samples were collected. Because this well, downgradient from ICPP and CFA landfills, was a production well, facility operations were to be notified prior to sampling to coordinate production well pump operations. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The team arrived on-site 16JUN88 at 1035. According to RCRA requirements, the well was to be purged until three well volumes were removed and pH and conductivity stabilized as reported by the INEL personnel. Samples IN414018 and IN414029 were collected from 1113 to 1150. The liquid in the samples was very clear and had no odor. Because numerous personnel were waiting for completion of the sampling, the team used an INEL pH conductivity meter because they could not locate the team's Horiba meter to make field measurements.

**Request 415: Well SL-1 (Water) (Fig. 4.2o).** According to revision 02 of the INEL Sampling and Analysis Plan, one grab groundwater sample was to be collected from Well SL-1 from the tap nearest the wellhead (Sampling Method: References E4.5.1, E4.5.2, and E4.5.4). The field logbook indicates that two samples were collected. Because the well, located downgradient from ARA, was a production well, facility operations personnel were to be notified prior to sampling to coordinate production well pump operations. Standard RCRA well procedures were used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

EG&G personnel operated the pump system for the team because no operator was available. As the team had no information on well volume, they decided to sample after the pH and conductivity readings stabilized. At 1616, the pH and conductivity stabilized at 7.6 and 0.06, respectively. Samples IN415019 and IN415020 were collected from 1624 to 1639. A gamma screening of the inside of the building showed a gross beta rate of 500 cpm and a gross gamma beta rate of 200 cpm. An overflow from the associated tank was activated during the sampling. The liquid from the well was very clear.

**Request 416: Well USGS-90 (Water) (Fig. 4.2p).** One grab groundwater sample was to be collected from this well. The well was equipped with a dedicated 1.5 hp submersible pump and had 3 ft of stainless steel pipe extending above the ground surface (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The well was downgradient from RWMC. Well USGS-90 was an open-hole well with a steel inner casing. The depth of the well from the top of the inner casing was 626 ft, and the depth to water from the top of the inner casing was 582.1 ft. The well diameter was 6.0 in. The case volume (8.615 $ft^3$ of water x 7.5 gal./$ft^3$) was 64.6 gal. The radiation survey, completed by an EG&G Health Physicist, indicated no radiological contamination.

The Sampling Team arrived on-site 22JUN88 at 0958 under an overcast sky, with intermittent rain, and a temperature of approximately 82$^{o}$F. At 1026, rain was falling, but at 1028 it had stopped. Purging was started at 1023, and at 1027 water had surfaced. At 1028, a 5-gal. bucket was filled in 20 sec and then allowed to overflow, according to standard operating procedure for USGS at this site (per USGS personnel). Although the water was light brown at first, at 1040, the purge water was extremely clear. The purge rate was 4 gpm. The purge

volume was 140 gal. Purging was completed at 1058. Sample IN416010 was collected at 1058.

**Request 417: Well USGS-113 (Water) (Fig. 4.2.q).** One grab groundwater sample was to be collected from this well equipped with a dedicated pump (Sampling Method: References E4.5.1, E4.5.2, and E4.5.4). The well was downgradient (directly south) of the ICPP. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team arrived on-site 28JUN88 at 0940. Skies were cloudy, the temperature was approximately 70-75$^{o}$F, and winds were out of the northwest at 5 mph. The well had a 6-in. steel inner casing and was sealed with cement grout. The depth of the well from the top of the inner casing was 564 ft, and the depth to water from the top of the inner casing was 470 ft. The case volume (18.5 $ft^3$ of water x 7.5 gal./$ft^3$) was 138.4 gal. Purging was begun at 0945; the purge volume was 415 gal. Purging time was to be 16 1/2 min (415 gal with 25 gpm pumps). The water was very clear. The well was pumped with a portable generator by USGS personnel. During purging, the water was allowed to run onto the ground according to standard USGS operating procedure. The sample water was clear. Beginning at 1004, the team took three field measurements to insure stabilization. Sample IN417011 was collected from 0945 to 1016. One field measurement reading was taken after sampling at 1017. The team was accompanied by USGS Water Resource Department personnel.

**Request 418: Well USGS-37 (Water) (Fig. 4.2r).** One grab groundwater sample was to be collected from Well USGS-37 equipped with a dedicated pump (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). The well was downgradient from the ICPP. Standard RCRA well procedures were to be used for purging and sample collection (Field Measurement: References E4.5.1, E4.5.2, and E4.5.4). Per the request of DOE Headquarters (K. Knight to the ORNL Field

Team Leader), aliquots for pesticides analysis were not to be collected for this request.

The Sampling Team arrived at Well USGS-37 on 14JUL88 at 0850. The sky was clear. The temperature was approximately 75$^{o}$F, winds were between 10 and 20 mph, and humidity was approximately 10 to 20%. The total depth of the well from the top of the inner casing was 573 ft; depth to water from the top of the inner casing was 467.9 ft. There was no screened interval. The well had a 12-in. steel inner casing. The team left the site at 0930 to get the USGS generator repaired and returned to the site at 1240. The team began pumping at 1240 and collected sample IN418012 at 1353. USGS personnel pumped the clear purge water onto the ground. The case volume (82.5 ft$^3$ of water x 7.5 gal./ft$^3$) was 618.8 gal. The team pumped three case volumes, which was approximately 1860 gal. purged. The pump rate was 25 gpm. There were 105.1 ft of standing water.

**Request 419: Well USGS-116 (Water) (Fig. 4.2s).** One grab groundwater sample was to be collected from Well USGS-116 equipped with a dedicated pump (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). Well USGS-116 was downgradient from ICPP and was located approximately 1/4 mile southeast of the ICPP. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The team arrived at Well USGS-116 on 28JUN88 at 1034. They were accompanied by USGS Water Resource Division personnel. The sky was cloudy, and there were thunderstorms to the northwest and the southwest. The temperature was approximately 70$^{o}$F and winds were calm. Light rain began at 1054. The wind increased to between 5 and 10 mph from the northwest. The depth of the well from the top of the inner casing was 580 ft. Depth to water from the top of the inner casing was 454 ft. The well had a 6-in. steel inner casing and was sealed with cement grout. The case volume (24.7 ft$^3$ of water x 7.5 gal./ft$^3$) was 185.5 gal. Pumping began at 1040 with a USGS portable generator. Purge time was 27 minutes for 556.5 gal. at 20 gpm. The water, which was clear during

purging, was allowed to run onto the ground. According to USGS personnel, this practice was standard operating procedure for USGS. From 1100 until 1105, three field measurements were taken. Sample IN419013 was collected from 1108 until 1112. A field measurement was made at 1113.

**Request 420: Well USGS-82 (Water) (Fig. 4.2t).** One grab groundwater sample was to be collected from Well USGS-82 located east of ICPP (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.4). Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4). Per the request of DOE Headquarters (K. Knight to the ORNL Field Team Leader), aliquots for pesticides analysis were not to be collected for this request.

The Sampling Team arrived on-site on 20JUL88 at 0810 under a clear sky with a temperature of 95$^{o}$F and a light breeze from 5 to 10 mph. Well USGS-82 was 700 ft deep from the top of the inner casing. The depth to water from the top of the inner casing was 445 ft. The well had an 8-in casing at 445 ft. The depth of the screen section from the top of the inner casing was from 470 ft to 520 ft. From the bottom of the screen section, the well had a 6-in. inner steel casing to 700 ft and from there was open hole. The case volume (54 ft$^3$ of water x 7.5 gal./ft$^3$) was 407 gal. Purging was begun at 0810 at a pumping rate of 7 gpm. The well was purged in approximately 3 hours for a total purge volume of 1221 gal. Water was clear at first purging. Sample IN420016 was collected at 1332 with the well's dedicated pump instead of a bailer.

**Request 421: Well USGS-43 (Water) (Fig. 4.2u).** One grab groundwater sample was to be collected from Well USGS-43 (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). The well, equipped with a 5-hp, submersible, dedicated, impeller-driven pump, was located west of ICPP and east of TRA. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: Reference E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team arrived on-site 21JUN88 at 1350. The temperature was approximately 94°F and winds were out of the northwest from 0 to 5 mph. This well had a 6-in. wrought-iron inner casing to 450.54 ft and then was an open hole; the seal was cement grout. The total depth of the well from the top of the inner casing was 697.80 ft, and the depth to water from the top of the inner casing was 453.30 ft. The case volume (44 $ft^3$ of water x 7.5 gal./$ft^3$) was 330 gal. Purging was begun at 1405 at a rate of 8 gpm. Purged water was pumped onto the ground. Purging was completed at 1549 with a total volume purged 952 gal. Sample IN421017 was collected from 1550 to 1557. During purging and sampling, the water was very clear. The collection tube was galvanized iron, 1-in. wide, and had approximately 2 ft of 3/8 in. stainless steel at the end.

**Request 422: Well USGS-65 (Water) (Fig. 4.2v).** One grab groundwater sample was to be collected from Well USGS-65, which was equipped with a 1.5-hp dedicated pump (Sampling Method: References E4.4.3, E4.4.4, and E4.4.4.1). Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team arrived on-site 21JUN88 at 1025. Winds were from the northeast at 0 to 5 mph. The field pumping unit was parked on the southwest side of the well, which was downgradient from TRA. At 1028, the team measured the depth of the well at 498 ft. The depth to water from the top of the inner casing was 461.68 ft. The well, which had an 8-in., cast-iron inner casing, was cased to 326.5 ft; from there, the well was an open hole. The 1-in. collection tube was galvanized iron and had approximately 2 ft of 3/8-in. stainless steel at the end. The team rinsed the collection tube with deionized water. Purging began at 1041. A 5-gal. bucket was filled in 40 sec. According to USGS personnel, the purge rate was 8 gpm. Purging was completed at 1152 for a purge volume of 624 gal. The case volume (12.67 $ft^3$ of water x 7.5 gal./$ft^3$) was 95.0 gal. Sample IN422018 was collected from 1153 to 1159. Water

during purging and sampling was very clear. At 1056, a GM meter reading read 30 to 50 cpm. The well volume was estimated to be approximately 100 gal.

**Request 423: Well TRA-1 (Water) (Fig. 4.2w).** Two grab groundwater samples were to be collected from the tap nearest the wellhead (Sampling Method: References E4.3.2 and E4.4.4). The well, upgradient of disposal sites at TRA, was a production well; therefore, facility operations were to be notified prior to sampling to coordinate production well pump operations. Standard RCRA well procedures were to be used for purging and sample collection (Field Method: References E4.5.1, E4.5.2, and E4.5.4).

The Sampling Team arrived at Well TRA-1 on 17JUN88 at 1530 and met their EG&G escort. Skies were overcast. The well pumped at approximately 1250 gpm. Because there was no access to the well for exact measurements, estimates were made. The diameter of the well was greater than 12 in. and its depth was greater than 500 ft. Purging had begun approximately 30 min before the Sampling Team had arrived. Samples IN423019 and IN423020 were collected from 1530 to 1535. Only one field measurement was made. A clearance radiation survey by a Health Physicist received before leaving the site showed no readings above instrument background.

#### 4.7.7.2 Analytical Design

**Request 401:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), CLP metals, anions, and iodine-129.

**Request 402:** Field parameters measured included pH, specific conductivity, and temperature. Parameters to be analyzed included volatiles, pesticides (aliquots not collected), CLP metals, anions, and iodine-129.

**Request 403:** Field parameters measured included pH, specific conductivity, and temperature. Parameters to be analyzed included volatiles, pesticides (aliquots not collected), CLP metals, anions, and iodine-129.

**Request 404:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), anions, CLP metals, and iodine-129.

**Request 405:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP metals, AA mercury, anions, and iodine-129.

**Request 406:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), CLP metals, anions, and iodine-129.

**Request 407:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), CLP metals, anions, and iodine-129.

**Request 408:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), CLP metals, anions, and iodine-129.

**Request 409:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP metals, AA mercury, anions, and iodine-129.

**Request 410:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP metals, AA mercury, anions, and iodine-129.

**Request 411:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP-metals, AA mercury, anions, and iodine-129.

**Request 412:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), CLP metals, anions, and iodine-129.

**Request 413:** Field parameters requested included pH, specific conductivity, and temperature. Parameters to have been analyzed included volatiles, pesticides, ICP metals, AA mercury, anions, and iodine-129.

**Request 414:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), CLP metals, anions, and iodine-129.

**Request 415:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), CLP metals, anions, and iodine-129.

**Request 416:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP metals, AA mercury, anions, and iodine-129.

**Request 417:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP metals, AA mercury, anions, and iodine-129.

**Request 418:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots not collected), ICP metals, AA mercury, anions, and iodine-129.

**Request 419:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP metals, AA mercury, anions, and iodine-129.

**Request 420:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots not collected), ICP metals, AA mercury, anions, and iodine-129.

**Request 421:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP metals, AA mercury, anions, and iodine-129.

**Request 422:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), ICP metals, AA mercury, anions, and iodine-129.

**Request 423:** Field parameters measured included pH, specific conductivity, and temperature. Parameters analyzed included volatiles, pesticides (aliquots collected but not analyzed), CLP metals, anions, and iodine-129.

### 4.7.3 Field and Analytical Data

**Field Data:**

**Request 401:** *The field data results are shown in Table 4.3.2. Measurements for the two water samples (IN401013 and IN401024) were identical for pH, conductivity, temperature, and dissolved oxygen (DO). The values were 7.9, 0.29 mS/cm, 12$^{o}$C, and 9.4 ppm respectively. Field blank sample IN401035 had the same readings as the groundwater samples. The field log notes refer the reader to the first sample for the measured values.*

**Request 402:** *The field data results are shown in Table 4.3.2. Measurements for the two water samples (IN402014 and -025) showed 0.4 mS/cm for conductivity, 7.2 ppm for DO, 7.6 for pH, and 17°C for temperature. Actual measurements were made for sample IN402014 and field notes refer the reader to the first sample.*

**Request 403:** *The field data results are shown in Table 4.3.2. Measurements for the two water samples (IN403015 and -026) showed 0.5 mS/cm for conductivity, 5.1 for DO, 7.7 for pH, and 15°C for temperature. In addition, a radiation scan showed 40 cpm. Actual measurement was made only for sample IN403015, and the field notes refer the reader to the first sample.*

**Request 404:** *The field data results are shown in Table 4.3.2. Originally only one sample was requested but the INEL Sampling and Analysis Plan taken into the field requested two grab samples. Measurements for the two samples showed identical pH readings of 7.8. The first sample (IN404016) was slightly cooler (15 vs. 16°C) and had a lower conductivity (0.21 vs. 0.22 ms/cm) than sample IN404027.*

**Request 405:** *The field data results are shown in Table 4.3.2. For USGS Well 98, conductivity was 0.35 mS/cm, pH was 7.5, and the temperature was 12°C. Only one sample was requested for this well which served as a reference for ICPP and TRA.*

**Request 406:** *The field data results are shown in Table 4.3.2. Although the original INEL Sampling and Analysis Plan requested one sample, the plan taken into the field requested two samples. The temperature of the water was the same for both samples (11°C). Sample IN406018 did show a slightly lower conductivity (0.20 vs. 0.21) and higher pH (7.9 vs. 7.8) than sample IN406029.*

**Request 407:** *The field data results are shown in Table 4.3.2. Although the original INEL Sampling and Analysis Plan requested one sample, the plan taken*

*into the field called for two samples. The two samples showed similar readings for conductivity (0.22 and 0.23) and an identical pH of 8, but a temperature difference of 3°C (12 and 15).*

**Request 408:** *The field data results are shown in Table 4.3.2. Although the original INEL Sampling and Analysis Plan requested one sample, the plan taken into the field requested two samples. The two samples showed very similar readings for conductivity (0.22 and 0.23) and pH (7.8 and 7.7), with identical water temperatures (11°C).*

**Request 409:** *The field data results are shown in Table 4.3.2. Measurements of the two water samples were 0.15 and 0.16 mS/cm for conductivity, 7.7 and 8 for pH, and 11°C for the water temperature.*

**Request 410:** *The field data results are shown in Table 4.3.2. The two samples measured 0.23 mS/cm for conductivity, 7.8 and 7.9 for pH, and 16 and 15°C for temperature.*

**Request 411:** *The field data results are shown in Table 4.3.2. Conductivity (0.22 mS/cm), pH (7.9), and water temperatures (15°C) were identical for the two samples. These readings were taken before the first and second samplings.*

**Request 412:** *The field data results are shown in Table 4.3.2. The INEL Sampling and Analysis Plan requested one sample; however, two samples were collected, with the second sample to be analyzed only for metals, thus serving as a duplicate for the first sample. The results of measurement of the two samples are 0.12 mS/cm for conductivity, 7.7 for pH, and 14°C for temperature. Values recorded for the second sample include identical times and measurements, indicating that no separate readings were taken.*

**Request 413:** *The field data results are shown in Table 4.3.2. This sample was not collected and no measurements could be made because the pump failed*

*during or immediately after purging of the well before the sample could be collected.*

**Request 414:** *The field data results are shown in Table 4.3.2. Only one sample was requested in the original INEL Sampling and Analysis Plan but two samples were collected based on the plan taken into the field. The results of the measurements of the two samples are 0.62 mS/cm for conductivity, 7.4 for pH, and 14°C for temperature. The log notes refer the reader to the first sample for readings.*

**Request 415:** *The field data results are shown in Table 4.3.2. Only one sample was requested in the original INEL Sampling and Analysis Plan but two samples were collected based on the plan taken into the field. The results of the measurements of the two samples are 0.06 mS/cm for conductivity, 7.6 for pH, and 16°C for temperature. The readings reported for the second sample were copied from the results of the first sampling.*

**Request 416:** *The field data results are shown in Table 4.3.2. The readings obtained for the sample collected for this request were 0.22 mS/cm for conductivity, 8.1 for pH, and 15°C for temperature.*

**Request 417:** *The field data results are shown in Table 4.3.2. The readings obtained for the sample collected for this request were 0.8 mS/cm for conductivity, 7.5 for pH, and 13°C for temperature. The conductivity reading is the highest observed in the groundwater from the 23 well samples.*

**Request 418:** *The field data results are shown in Table 4.3.2. The readings obtained for the sample collected for this request were 0.61 mS/cm for conductivity, 7.7 for pH, and 18°C for temperature. A reading for dissolved oxygen was made and the value was 7.9 ppm.*

**Request 419:** *The field data results are shown in Table 4.3.2. The readings obtained for the sample collected for this request were 0.46 mS/cm for conductivity, 7.5 for pH, and 11°C for temperature.*

**Request 420:** *The field data results are shown in Table 4.3.2. The readings obtained for the sample collected for this request were 0.27 mS/cm for conductivity, 7.7 for pH, and 13°C for temperature. Readings were also recorded for the radiation scan which showed 40 cpm and for dissolved oxygen which showed 6.4 ppm.*

**Request 421:** *The field data results are shown in Table 4.3.2. The readings obtained for the sample collected for this request were 0.37 mS/cm for conductivity, 8 for pH, and 14°C for temperature.*

**Request 422:** *The field data results are shown in Table 4.3.2. The readings obtained for the sample collected for this request were 0.50 mS/cm for conductivity, 7.9 for pH, and 17°C for temperature.*

**Request 423:** *The field data results are shown in Table 4.3.2. The INEL Sampling and Analysis Plan requested two samples from this well. Because the readings shown in the table were made only once, they are not true replicate readings taken separately. The conductivity was 0.18 mS/cm, the pH was 7.9, and the temperature was 21°C.*

Field Data Evaluation:

**Request 401:** Because the Horiba instrument used to make the measurements was calibrated each morning prior to field use for the requested pH, conductivity, and temperature measurements, values are reliable. The dissolved oxygen probe was calibrated at the laboratory prior to departure to the site; the results, though not optimum, are reliable, especially if readings are compared among the different well water samples. Questions arise on the identical values

for all the readings. Because field log notes refer the reader to the values obtained for IN401013 for the other two samples, the measurements for the second field sample (IN401024) and the field blank sample are unreliable because they were not separately measured in the field.

**Request 402:** Only the measurements for sample IN402014 are reliable because the readings were actually made on the sample with the calibrated instrument. The values for sample IN402025 are unreliable.

**Request 403:** Only the measurements for sample IN403015 are reliable because the readings were actually made on the sample with the calibrated instrument. Values for sample IN403026 are unreliable.

**Request 404:** Measurements were made on each sample collected. Because the instrument was calibrated prior to field use, both readings are reliable.

**Request 405:** Because the instrument was calibrated prior to field use, the readings are reliable.

**Request 406:** Because the instrument was calibrated prior to field use, the readings are reliable for the two samples.

**Request 407:** Because the instrument was calibrated prior to field use, the readings are reliable for the two samples.

**Request 408:** Because the instrument was calibrated prior to field use, the readings are reliable for the two samples.

**Request 409:** Because the instrument was calibrated prior to field use, the readings are reliable for the two samples.

**Request 410:** Because the instrument was calibrated prior to field use, the readings are reliable for the two samples.

**Request 411:** Because the instrument was calibrated prior to field use, the readings are reliable for the two samples.

**Request 412:** Because the instrument was calibrated prior to field use, the readings are reliable. However, the readings were taken prior to the first sampling and not taken prior to the second sampling. The logbook shows that the entry was copied from the log note for the first sample.

**Request 413:** No evaluation can be made because no samples were collected and no measurements were made.

**Request 414:** The instrument which was used for the measurement was supplied by INEL personnel because the ORNL instrument could not be located at the time the measurements were made. Because no record in the log book verified the calibration of the INEL instrument, the reliability of the readings is unknown. Readings for the first sample were actually taken; the second values were copied from the measurements taken for the first sample.

**Request 415:** Because the instrument used for the measurements was calibrated prior to field use, the results are reliable. Because only one set of measurements was made, the second set of values reported was copied from the first sampling.

**Request 416:** Because the instrument used for the measurements was calibrated prior to field use, the results are reliable.

**Request 417:** Because the instrument used for the measurements was calibrated prior to field use, the results are reliable.

**Request 418:** Because the instrument used for the measurements, except the dissolved oxygen, was calibrated prior to field use, the results are reliable. Because the instrument was calibrated for dissolved oxygen at the sampling team's laboratory prior to departure to the INEL, the result is reliable, especially if the values are used to compare results from the other wells.

**Request 419:** Because the instrument was calibrated prior to field use, the results are reliable.

**Request 420:** Because the instrument used for the measurement of conductivity, pH, and temperature was calibrated prior to field use, results are reliable. Because the instrument was calibrated for dissolved oxygen in the sampling team's laboratory prior to departure for the site, results are reliable, especially if the values are compared among the different wells. The radiological instrument used to obtain the radiation scan was calibrated at the sampling team's laboratory prior to departure for the site; therefore, the rugged field instrument readings are considered reliable.

**Request 421:** Because the instrument used for the measurements was calibrated prior to field use, results are reliable.

**Request 422:** Because the instrument used for the measurements was calibrated prior to field use, results are reliable.

**Request 423:** Because the instrument used for the measurements was calibrated prior to field use, results are reliable.

**Analytical Data:**

**Request 401:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. Three anions were measured in the water from Well P+W 2. Both samples showed identical concentrations of chloride at 16000 ug/L and sulfate at 28000 ug/L. The nitrate-N concentrations were 655 and 746 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 19 metals detected, the following 10 metals of interest to the Survey were below the CRDL in all three samples: antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, selenium, and thallium. Of the metals of interest detected, zinc ranged from 108 to 129 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for all samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Acetone concentration was estimated at 6 ppb in one of these surface water (pump) samples, and toluene was estimated at 1 ppb in the other sample.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 402:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. Three inorganic anions were found in quantifiable amounts: chloride at 12000 ug/L, nitrate-N at 1200 and 1290 ug/L, and sulfate at 21000 ug/L.*

*Metals*. *Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 18 metals detected, the following 10 metals of interest to the Survey were below the CRDL in both samples: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, iron, lead, mercury, and selenium. Of the metals of interest detected, zinc ranged from 37 to 50 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for all samples tested.*

*PCBs and other extractables*. *Samples were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics*. *Analytical data for volatile organic compounds are presented in Table 4.3.2. A tentatively identified compound was detected in estimated concentrations of 31 ppb in one of these groundwater samples and 25 ppb in the other.*

*Radiochemistry*. *Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 403:

*Anions and cyanide*. *The analytical data results are given in Table 4.3.2. Four inorganic anions were found in quantifiable amounts: chloride at 66000 and 67000 ug/L, fluoride at 1000 ug/L, nitrate-N at 2000 ug/L, and sulfate at 35000 ug/L. Nitrogen of the nitrate-N was determined using the flow injection technique; the other anions were determined by chromatography.*

*Metals*. *Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 20 metals detected, the following 9 were below the CRDL in both samples: arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, selenium, and thallium. Of the metals of interest detected, mercury ranged from*

*0.21 to 0.22 ug/L and zinc from 38 to 39 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL in both samples.*

*PCBs and other extractables. Samples were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. No volatile organic compounds were reported for this request.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 404:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The inorganic anions found in quantifiable amounts were chloride at 19000 ug/L, fluoride at 1000 ug/L, nitrate-N at 1420 and 1290 ug/L, and sulfate at 13000 and 14000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 13 metals detected, the following 6 metals of interest to the Survey were below the CRDL in both samples: arsenic, barium, beryllium, cadmium, lead, and mercury. Of the metals of interest detected, zinc was 7.1 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the two samples.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Methylene chloride was measured at 5 ppb in one of these two samples and detected at an estimated concentration of 2 ppb in the other.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 405:

*Anions and cyanide. Analytical data results are given in Table 4.3.2. The sample from Well 98 showed chloride at 18000 ug/L, fluoride at 1000 ug/L, nitrate-N at 1790 ug/L, and sulfate at 25000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 11 metals detected, the following 4 metals of interest to the Survey were below the CRDL in the sample collected: barium, beryllium, chromium, and mercury. Of the metals of interest detected, zinc was 134 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the sample tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. No volatile organic compounds were reported for this request.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 406:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. For the two samples, the chloride was 11000 ug/L, the nitrate-N was 4100 and 4600 ug/L, and the sulfate was 28000 and 29000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 16 metals detected, the following 9 metals of interest to the Survey were below the CRDL in both samples: arsenic, barium, beryllium, cadmium, chromium, lead, mercury, selenium, and zinc. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. There were four volatile organic compounds detected in each of these samples, always in measured or estimated concentrations of 6 ppb or less. Methylene chloride was detected in both samples and also in the blank. Tetrachloroethene and trichloroethene were both detected in estimated concentrations of 4 ppb or less in both samples.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 407:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. For the two samples, chloride was 16000 and 17000 ug/L, fluoride was 1000 ug/L, nitrate-N was 791 and 3160 ug/L, and sulfate was 34000 and 36000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 16 metals detected, the following 8 metals of interest to the Survey were below the CRDL in both samples: arsenic, barium, beryllium, cadmium, chromium, lead, mercury, and selenium. Of the metals of interest detected, zinc was 76 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Acetone was detected in one sample (estimated concentration of 3 ppb) and methylene chloride was present in both of these samples and also in the blank. Concentrations of methylene chloride were below the quantitation limit and were estimated at 4 ppb in both samples.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 408:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. Three anions were identified in measurable quantities: chloride at 14000 and 16000 ug/L, nitrate-N at 1200 and 1290 ug/L, and sulfate at 33000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 13 metals detected, the following 7 metals of interest to the Survey were below the CRDL in both samples: arsenic, barium, beryllium, cadmium, chromium, mercury, and selenium. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Methylene chloride was estimated at 3 ppb in both of these tap water samples and was also present in the blank. Tetrachloroethene was detected in one sample and trichloroethene was detected in both samples, but these compounds were always below quantitation limits.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 409:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The anions present above detection levels were: chloride at 25000 and 28000 ug/L, nitrate-N at 1990 and 2120 ug/L, and sulfate at 24000 and 25000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 13 metals detected, the following 3 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, and mercury. Of the metals of interest detected, chromium was 18 ug/L and zinc ranged from 247 to 276 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Toluene was estimated at 1 ppb in one of these (pump) samples.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 410:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The identified anions of the two samples include chloride at 13000 ug/L, nitrate-N at 610 and 655 ug/L, and sulfate at 24000 and 26000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 12 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, iron, and mercury. Of the metals of interest detected, zinc ranged from 87 to 95 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Methylene chloride was detected in one sample in an estimated concentration of 1 ppb. Acetone was detected in one sample and toluene in both samples, in estimated concentrations of 4 ppb or less.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 411:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. Four anions were present in the two samples. They include: chloride at 20000 ug/L, fluoride at 1000 ug/L, nitrate-N at 1150 and 1240 ug/L, and sulfate at 18000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 12 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, and mercury. Of the metals of interest detected, zinc ranged from 171 to 181 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Acetone was detected in one sample (estimated concentration of 4 ppb) and toluene was detected in the other sample (estimated concentration of 1 ppb).*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 412:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The one sample analyzed for anions shows chloride at 14000 ug/L, nitrate-N at 1200 ug/L, and sulfate at 21000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 12 metals detected, the following 6 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, cadmium, chromium, mercury, and zinc. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Methylene chloride was estimated at 1 ppb and 1,1,1-trichloroethane was estimated at 2 ppb in this sample.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 413:** *No samples were collected and no analyses were made for anions, metals (ICP metals and AA mercury), pesticides, volatiles, and iodine-129.*

**Request 414:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The two samples contained chloride at 77000 and 80000 ug/L, nitrate-N at 4750 and 5880 ug/L, and sulfate at 30000 and 32000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 15 metals detected, the following 8 metals of interest to the Survey were below the CRDL in both samples: arsenic, barium, beryllium, cadmium, lead, silver, selenium, and thallium. Of the metals of interest detected, chromium was 16 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Methylene chloride was detected in measured or estimated concentrations of 9 ppb or less in both samples. Chloroform was estimated at 2 ppb in both samples. Toluene was estimated at 1 ppb in one sample. Acetone and trichloroethene were detected in one sample in concentrations of 12 ppb (measured) and 1 ppb (estimated), respectively.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 415:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. Four anions were quantified in the two samples: chloride at 18000 and 21000 ug/L, fluoride at 1000 ug/L, nitrate-N at 1220 and 1400 ug/L, and sulfate at 18000 and 19000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 15 metals detected, the following 9 metals of interest to the Survey were below the CRDL in both samples: arsenic, barium, beryllium, cadmium, chromium, lead, mercury, selenium, and zinc. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Methylene chloride was detected in both of these samples and also in the blank. Measured or estimated concentrations were 6 and 4 ppb, respectively. An estimated 9 ppb of acetone was also detected in one sample.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 416:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. For the sample for this request, the chloride concentration was 14000 ug/L, the nitrate-N was 791 ug/L, and the sulfate was 27000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 14 metals detected, the following 5 metals of interest to the Survey*

*were below the CRDL in the samples collected: barium, beryllium, cadmium, copper, and mercury. Of the metals of interest detected, chromium was 19 ug/L and zinc was 304 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Only an estimated 1 ppb of toluene was detected in this sample.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 417:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. Four anions were quantified in the one sample: chloride at 160000 ug/L, fluoride at 1000 ug/L, nitrate-N at 6330 ug/L, and sulfate at 40000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 11 metals detected, only one metal of interest to the Survey, vanadium, was below the CRDL. Of the metals of interest detected, barium was 210 ug/L; chromium, 12 ug/L; mercury, 0.24 ug/L; and zinc, 123 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. A sample was analyzed, but no volatile organic compounds were reported.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 418:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. For the sample for this request, the chloride concentration was 87000 ug/L, nitrate-N was 4970 ug/L, and sulfate was 29000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 12 metals detected, the following 3 metals of interest to the Survey were below the CRDL in the samples collected: barium, beryllium, and mercury. Of the metals of interest detected, chromium was 11 ug/L and zinc was 265 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Samples were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. No volatile organic compounds were reported for this request.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Request 419:**

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The analysis for the sample for this request shows chloride at 72000 ug/L, nitrate-N at 3620 ug/L, and sulfate at 35000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 13 metals detected, the following 3 metals of interest to the Survey were below the CRDL in the sample collected: barium, beryllium, and mercury. Of the metals of interest detected, chromium was 12 ug/L and zinc 195 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. No volatile organic compounds were reported for this request.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 420:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The results of analysis for the sample show the chloride concentration at 21000 ug/L, the nitrate-N at 710 ug/L, and sulfate at 21000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 12 metals detected, the following 3 metals of interest to the Survey were below the CRDL in the sample collected: barium, beryllium, and mercury. Of the metals of interest detected, chromium was 10 ug/L and zinc was 184 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Samples were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. No volatile organic compounds were reported for this request.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 421:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The results of analysis for the sample show the chloride concentration at 24000 ug/L, nitrate-N at 3840 ug/L, and sulfate at 25000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 14 metals detected, the following 5 metals of interest to the Survey were below the CRDL in the sample collected: barium, beryllium, cadmium, chromium, and mercury. Of the metals of interest detected, zinc was 178 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Acetone and methylene chloride were detected below quantitation limits in this sample in estimated concentrations of 9 and 1 ppb, respectively.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 422:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The results of analysis for the sample show the chloride concentration at 19000 ug/L, nitrate-N at 1670 ug/L, and sulfate at 12000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 11 metals detected, the following 4 metals of interest to the Survey were below the CRDL in the sample collected: barium, beryllium, cadmium and mercury. Of the metals of interest detected, chromium was 252 ug/L and zinc was 488 ug/L. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the sample tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Methylene chloride was detected in an estimated concentration of 1 ppb in this sample.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

Request 423:

*Anions and cyanide. The analytical data results are given in Table 4.3.2. The results for the two samples show the chloride concentration at 11000 ug/L, nitrate-N at 1200 and 1270 ug/L, and sulfate at 20000 ug/L.*

*Metals. Analytical data for metals in groundwater are presented in Table 4.3.2. Of the 12 metals detected, the following 7 metals of interest to the Survey were below the CRDL in both samples: arsenic, barium, beryllium, cadmium, chromium, mercury, and selenium. Toxic metals of interest not listed in Table 4.3.2 were below the IDL for the samples tested.*

*PCBs and other extractables. Sample aliquots were collected but not analyzed per DOE Headquarters directive.*

*Volatile organics. Analytical data for volatile organic compounds are presented in Table 4.3.2. Methylene chloride was detected in estimated concentrations of 1 ppb in both samples and was also detected in the blank.*

*Radiochemistry. Well water samples were analyzed for iodine-129 which was found to be below detection limits.*

**Analytical Data Evaluation:**

**Request 401:**

Anions and cyanide. All blank results were less than the MDL of less than 1000 ug/L for the inorganic anions; however, because the calibration verification of the nitrate-N was 112%, the results may be biased high. The spike recovery of IN401013 was 124%; thus, the result for this sample may be biased high. The chloride and sulfate results are reliable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest, zinc, was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Toluene was estimated at 1 ppb in one sample.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 402:**

Anions and cyanide. All blank results were less than the MDL of less than 1000 ug/L for the inorganic anions; however, the average calibration verification for nitrate-N for the two samples was 121%, which may bias the results high. The spike recovery of sample IN402014 was 82% which may result in a low value. The chloride and sulfate results are reliable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest, zinc, was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. The highest estimated concentration of any tentatively identified compound was 31 ppb in sample IN402014. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. No volatile organic compounds were positively identified.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample

results were within 10% of their true value, radiological data are considered reliable.

**Request 403:**

Anions and cyanide. All blank results were less than the MDL of less than 1000 ug/L for the inorganic anions (except nitrate-N determined by flow injection). The sulfate calibration verification was 88% which would bias the result low. Considering the high bias for nitrate-N by ion chromatography, the average of 11000 ug/L for this anion using the values from the two methods is reasonable. The result in Table 4.3.2 is the value from the flow injection technique which was obtained within the holding time for nitrate-N. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. Two metals of interest--mercury and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. No volatile organic compounds were reported.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 404:

Anions and cyanide. All blank results were less than the MDL of less than 1000 ug/L for the inorganic anions; however, the calibration verification for sulfate showed an average of 86%, which may bias the result low for this anion. In addition, the nitrate-N duplicate analysis was not within the control limit of ± 10% RPD, and for this SDG the variation was 20%. The chloride and fluoride results are reliable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest--zinc--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Methylene chloride was measured at less than 10 ppb in one of these two samples.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 405:

Anions and cyanide. Instrument calibration verification was 111% for fluoride and an average of 117% nitrate-N; these would bias the results high. Furthermore, the spike recovery of nitrate-N was 130%, which adds to the high bias. The duplicate variation was 15% for nitrate-N and 12% for chloride. With these quality control results, only the sulfate result is reliable, with chloride being relatively reliable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest--zinc--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were reported for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 406:

Anions and cyanide. Instrument calibration verification was 115% for nitrate-N, which would bias the results high. In addition, the duplicate variation for nitrate-N was 16% in SDG IN406018. The sulfate recovery was low (58%) which would bias the result low. The chloride result is reliable without qualification. The anions were determined using chromatography; for selected samples for

Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. No metals of interest were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Methylene chloride was detected in concentrations measured or estimated at less than 10 ppb in both samples and also in the blank.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 407:

Anions and cyanide. Instrument calibration verification was 115% for nitrate-N which would bias the results high; in addition the duplicate analysis for both samples were out of the control limit of $\pm$10%. The sulfate spike recovery was not in conformance with the 85 to 115% recovery; however, for the SDG associated with these samples, it was 58% recovery. One of the fluoride samples was also below the detection limit of 1000 ug/L. Overall, the chloride values are reliable but the other values are usable with less confidence. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was

used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest--zinc--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Methylene chloride was present in both of these samples in estimated concentrations of less than 10 ppb and also in the blank.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 408:

Anions and cyanide. The nitrate-N duplicate analysis was not in compliance, for this SDG the RPD was 16%. The spike recovery for sulfate was also not within compliance; for this SDG the recovery was 58%. The chloride analysis is reliable. The sulfate value is biased low. Although the duplicates were out of compliance, the results for nitrate-N are usable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. No metals of interest were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Methylene chloride was estimated at 3 ppb in both of these samples and was also present in the blank.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 409:**

Anions and cyanide. The chloride analysis was out of compliance. Because the recovery was 115%, the result may be too high. The sulfate was out of compliance in calibration verification; for the SDG associated with this sample, the recovery was 83%, thus, the results may be low. Nitrate-N met all quality assurance standards and the results are reliable; the chloride and sulfate results are usable. Anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Toluene was estimated at 1 ppb in one of these samples.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 410:**

Anions and cyanide. The spike sample recovery was out of compliance for sulfate; for this SDG it was 84.4%. In addition, the calibration verification averaged 87% recovery. In both cases, the results for sulfate are biased low. Chloride analysis met quality assurance standards except for laboratory control samples which were not analyzed. Nitrate-N spike was out of compliance; the recovery was 116%. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest--zinc--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds

detected in the samples for this environmental problem were in concentrations below quantitation limits. Methylene chloride and toluene were detected, always in estimated concentrations of 4 ppb or less.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 411:**

Anions and cyanide. The spike sample recovery was out of compliance for sulfate; the recovery average 84.4% for this SDG. In addition, the calibration verification was 87% for the SDG associated with these two samples. Spike recovery was 116% for nitrate-N. Analyses of chloride and fluoride were in compliance with quality assurance standards. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest--zinc--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Toluene was detected in one sample in an estimated concentration of 1 ppb.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 412:**

Anions and cyanide. The nitrate-N duplicate was out of compliance in regard to duplicate analysis for this SDG; the RFD was 20% as compared to the acceptable 10%. The chloride and sulfate analyses met all quality assurance standards and the results are reliable except laboratory control samples which were not analyzed. The nitrate-N result is usable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. No metals of interest were detected above the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Methylene chloride and 1,1,1-trichloroethane were estimated at 2 ppb or less.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 413:**

Anions and cyanide. NA.

Metals. NA.

PCBs and other extractables. NA.

Volatile organics. NA.

Radiochemistry. NA.

**Request 414:**

Anions and cyanide. The nitrate-N analysis was out of compliance in the calibration verification; the recovery was 112%. The chloride and sulfate analysis met all applicable quality assurance standards except that laboratory control samples were not run. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest--chromium--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. The highest measured or estimated concentration of any positively identified compound among all

samples for this request was 12 ppb of acetone in sample IN414029. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Methylene chloride was detected in measured or estimated concentrations of less than 10 ppb in both samples. Chloroform was estimated at 2 ppb in both samples. Toluene was estimated at 1 ppb in one sample.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 415:**

Anions and cyanide. The spike recovery for fluoride was 134%, which would bias the results high. The calibration verification was 112% for nitrate-N. Chloride and sulfate met all applicable quality assurance standards except that laboratory control samples were not analyzed; their results are reliable. The nitrate-N results exceeded the calibration verification by a small amount (2%) and the results are usable. The fluoride analysis showed high spike recovery and the results are questionable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. No metals of interest were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits. Methylene chloride was detected in both samples and also in the blank. Measured or estimated concentrations were less than 10 ppb.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 416:

Anions and cyanide. The calibration verification for sulfate was 83%, which would bias the result low. The spike recovery for chloride was 115%, which would bias the result high. The nitrate-N result is reliable. The sulfate and chloride results are usable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Five or less volatile organic compounds were detected in each of the 23 requests for this environmental problem. Only an estimated 1 ppb of toluene was detected in this sample.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 417:**

Anions and cyanide. The nitrate-N averaged 113% and sulfate averaged 85% in calibration verification. The spike recovery was 124% for nitrate-N and 81% for sulfate. The sulfate results would be biased low and the nitrate-N results would be biased high. The chloride and fluoride analysis met quality assurance standards, except laboratory controls which were not run, and the results are reliable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. Four metals of interest--barium, chromium, mercury, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were reported for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 418:**

Anions and cyanide. The nitrate-N was out of compliance with respect to calibration verification (112%) and spike recovery (124%) for this SDG. The chloride and sulfate analysis met applicable quality assurance standards except for laboratory controls which were not run; the results are reliable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were reported for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 419:**

Anions and cyanide. The nitrate-N was out of compliance in calibration verification (113%) and spike recovery (124%) for this SDG. The sulfate was out of compliance in calibration verification (85%) and spike recovery (81%). The nitrate-N result is biased high and the sulfate result is biased low. The chloride result is reliable without reservation. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The latter technique was used to determine nitrogen

in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were reported for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 420:**

Anions and cyanide. These noncompliances were experienced with samples analyzed by chromatographic technique. However, the results in Table 4.3.2 are reliable for nitrate-N because they were obtained by flow injection within holding time. The sulfate was out of compliance in calibration verification (88%). The sulfate is biased low by the chromatographic method. The chloride analysis met all quality assurance standards except laboratory controls which were not run, thus, the result is reliable. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were reported for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 421:

Anions and cyanide. The chloride analysis was out of compliance in spike recovery (115%) for this SDG and the sulfate analysis was out of compliance in calibration verification (83%). The nitrate-N results are reliable. The chloride result may be biased high and the sulfate result is biased low. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. One metal of interest--zinc--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride was detected below the quantitation limits.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 422:**

Anions and cyanide. The chloride result is out of compliance in spike recovery (115%) and the sulfate result is out of compliance in calibration verification (83%) for the associated SDG. The nitrate-N result is reliable. The sulfate result is biased low and the chloride result is high. The anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride was detected in an estimated concentration of 1 ppb.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 423:**

Anions and cyanide. The nitrate-N results are out of compliance in duplicate analysis (20%) and the sulfate results are out of compliance in calibration verification (86%). The sulfate results are, therefore, biased low. The chloride analysis met all quality assurance standards except laboratory controls which were not run; the results are reliable. The nitrate-N results are usable. The

anions were determined using chromatography; for selected samples for Environmental Problem 2, $NO_3$-N were analyzed by flow injection. The flow injection technique was used to determine nitrogen in low concentrations and when holding time might be exceeded if chromatography was used.

Metals. No metals of interest were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride was detected in estimated concentrations of 1 ppb in both samples; it was also detected in the blank.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

### 4.7.4 Limitations and Qualifications

**Data Quality Level:**

**Request 401:** The sampling design is rated Quality Level II and the field sampling is rated Quality Level II. The overall analytical Quality Level is II.

**Request 402:** The sampling design is rated Quality Level II and the field sampling is rated Quality Level II. The overall analytical Quality Level rating is II.

**Request 403:** The sampling design is rated Quality Level II and the field sampling is rated Quality Level II. The overall analytical Quality Level rating is II.

**Request 404:** The sampling design is rated Quality Level I although the revised sampling design was not available for evaluation. The field sampling is rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 405:** Both the sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level rating is II.

**Request 406:** Both the sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 407:** Both the sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level rating is II.

**Request 408:** Both the sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 409:** Both the sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 410:** Both the sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 411:** Both the sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 412:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level rating is I.

**Request 413:** The sampling design is rated Quality Level I. The team followed the plan but the pump failed; the Quality Level rating is III. The overall analytical Quality Level cannot be assigned because no samples were collected.

**Request 414:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level rating is I.

**Request 415:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level rating is I.

**Request 416:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is I.

**Request 417:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is I.

**Request 418:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is I.

**Request 419:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is II.

**Request 420:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is I.

**Request 421:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is I.

**Request 422:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is I.

**Request 423:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level is I.

**Field Data:** Discussions are included only when the sampling design or the field sampling quality rating is less than II.

**Request 401:** The sampling design is rated Quality Level II because it did not specify that the field measurements were to be taken at the time of each sampling. Two separate measurements would provide information on the representativeness of the water. The field sampling is rated Quality Level II because the field measurements were taken only with the first sample; the second sample was taken without remeasuring the requested parameters. In addition, the careless logging of field notes which intimated that the field blank readings were actually taken is inexcusable.

**Request 402:** Because the sampling design should have specified that the field measurements were to be taken at the time of each sampling, the Quality Level rating is II. The field sampling team should have taken separate measurements because two separate samples were requested to serve as duplicates.

**Request 403:** The sampling design should have specified that the field measurements were to be taken at the time of each sampling, thus the rating of Quality Level II. The field sampling team copied the field measurements obtained during purging of the first sampling even though approximately 10 min had passed since taking the first sample. Remeasurement of the field parameters would have established the degree of stability of the water quality.

**Request 404:** Both the design and the field sampling were rated Quality Level I.

**Request 405:** Both the design and the field sampling were rated Quality Level I.

**Request 406:** Both the design and the field sampling were rated Quality Level I.

**Request 407:** Both the design and the field sampling were rated Quality Level I.

**Request 408:** Both the design and the field sampling were rated Quality Level I.

**Request 409:** Both the design and the field sampling were rated Quality Level I.

**Request 410:** Both the design and the field sampling were rated Quality Level I.

**Request 411:** Both the design and the field sampling were rated Quality Level I.

**Request 412:** The field sampling is rated Quality Level II because the log sheet for the second sampling is a copy of the first sampling log sheet. In other requests requiring two samples, the time and separately measured parameters for the second sampling are provided to document the collection.

**Request 413:** The rating of Quality Level II for the field sampling is assigned because there was no explanation as to whether the pump could have been fixed and the sample taken at a later date.

**Request 414:** The field sampling is rated Quality Level II because the log sheet for the second sampling refers to the first sampling sheet for the field parameters. In other requests requiring two samples, the time and separately measured parameters for the second sampling are provided to document the collection.

**Request 415:** Because the log sheet of the second sampling is a copy of the measured parameters in the first sampling, a Quality Level of II is assigned.

**Request 416:** Both the sampling design and the field sampling are rated Quality Level I.

**Request 417:** Both the sampling design and the field sampling are rated Quality Level I.

**Request 418:** Both the sampling design and the field sampling are rated Quality Level I.

**Request 419:** Both the sampling design and the field sampling are rated Quality Level I.

**Request 420:** Both the sampling design and the field sampling are rated Quality Level I.

**Request 421:** Both the sampling design and the field sampling are rated Quality Level I.

**Request 422:** Both the sampling design and the field sampling are rated Quality Level I.

**Request 423:** The field sampling is rated Quality Level II because the log sheet refers the reader to the first sampling log sheet. A separate reading of the field parameters was not done to provide data on the stability of the water quality.

**Analytical Data:**

**Request 401:**

Anions and cyanide. The data are Quality Level II due to the high recovery of the nitrate-N.

Metals. Analytical results for ICP metals were Quality Level I. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

Request 402:

Anions and cyanide. The data are Quality Level II due to the noncompliance of the calibration verification and low spike recovery for nitrate-N.

Metals. Analytical results for ICP metals were Quality Level I except for zinc at Quality Level III. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL and the sample result was less than 10 times the blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

Request 403:

Anions and cyanide. The data are Quality Level II due to noncompliance of calibration verification for sulfate. The nitrate-N values were suspect because

holding times were exceeded using chromatograhic techniques. This was eliminated by using the flow injection method.

Metals. Analytical results for ICP metals were Quality Level I except for zinc at Quality Level III. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL and the sample result was less than 10 times the blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

Request 404:

Anions and cyanide. The data are of Quality Level II due to noncompliance of calibration verification of sulfate and out of control limit for nitrate-N.

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level II. For arsenic, the percent recovery for spikes was within the 30 to 74% range and the reported sample result is less than the IDL, indicating the possibility of false negatives. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 405:**

Anions and cyanide. The data are Quality Level III due to the relatively poor quality-control parameters.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 406:**

Anions and cyanide. The data are Quality Level II due to the relatively low recovery of sulfate.

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level III. For arsenic, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicating

severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 407:**

Anions and cyanide. The data are Quality Level II mainly due to the noncompliance of the results relative to quality assurance. Noncompliant results include those associated with calibration verification, duplicate sample analysis, and spike recovery.

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level III. For arsenic, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 408:**

Anions and cyanide. The data are Quality Level II mainly due to the noncompliance of the spike recovery of sulfate and noncompliance of the duplicate analysis of nitrate-N.

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level III. For arsenic, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 409:**

Anions and cyanide. The data are Quality Level II mainly due to the noncompliance of the spike recovery of sulfate and the duplicate analysis of chloride.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 410:**

Anions and cyanide. The data are Quality Level I even though the sulfate analysis was Quality Level II because the results do show the definite presence of sulfate and not a questionable occurrence.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 411:**

Anions and cyanide. The data are Quality Level I even though the sulfate analysis was Quality Level II; the results are biased low and show a definite presence of sulfate.

Metals. Analytical results for ICP metals were Quality Level I. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 412:**

Anions and cyanide. The data are Quality Level I; the duplicate analysis were out of compliance but the results are usable.

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level III. For arsenic, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 413:** Because no samples were collected and analyzed, no data quality level can be assigned.

**Request 414:**

Anions and cyanide. The data are Quality Level I; the calibration verification for nitrate-N was exceeded by only a small amount (2%).

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level III. For arsenic, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 415:**

Anions and cyanide. The data are Quality Level II mainly because the fluoride results are questionable; the spike recoveries were high and the concentrations were at or below detection levels.

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level III. For arsenic, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicating

severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

Request 416:

Anions and cyanide. The data are Quality Level II mainly because the sulfate and chloride analysis were out of compliance for calibration verification and spike recovery, respectively.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 417:**

Anions and cyanide. The data are Quality Level II mainly because the sulfate and nitrate-N analysis were out of compliance, both in calibration verification and spike recoveries.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 418:**

Anions and cyanide. The data are Quality Level I. The nitrate-N analysis was out of compliance both in calibration and spike recovery, but the results are usable considering the high concentration of this element.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 419:**

Anions and cyanide. The data are Quality Level II mainly because the nitrate-N and sulfite analyses were out of compliance both in calibration and spike recovery.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 420:**

Anions and cyanide. The data are Quality Level I. Although nitrate-N exceeded holding time when analyzed by chromatographic technique, the value used was obtained by flow injection and was analyzed within the holding time.

Metals. Analytical results for ICP metals were Quality Level I except for zinc at Quality Level III. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL and the sample result was less than 10 times the blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 421:**

Anions and cyanide. The data are Quality Level II mainly because the chloride and sulfate analyses were out of compliance in spike recovery and calibration, respectively.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 422:**

Anions and cyanide. The data are Quality Level II mainly because the chloride and sulfate results were out of compliance in spike recovery and calibration, respectively.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

**Request 423:**

Anions and cyanide. The data are Quality Level II mainly because the nitrate-N was out of compliance in duplicate analysis and because the sulfate results were out of compliance in calibration verification.

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level III. For arsenic, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The data are Quality Level I except for specifically identified TICs which are Quality Level II and unknowns which are of Quality Level III. Many compounds detected in the samples for this environmental problem were in concentrations below quantitation limits.

Radiochemistry. Radiochemical data are Quality Level I.

Environmental Problem: 2
Request Number: 401

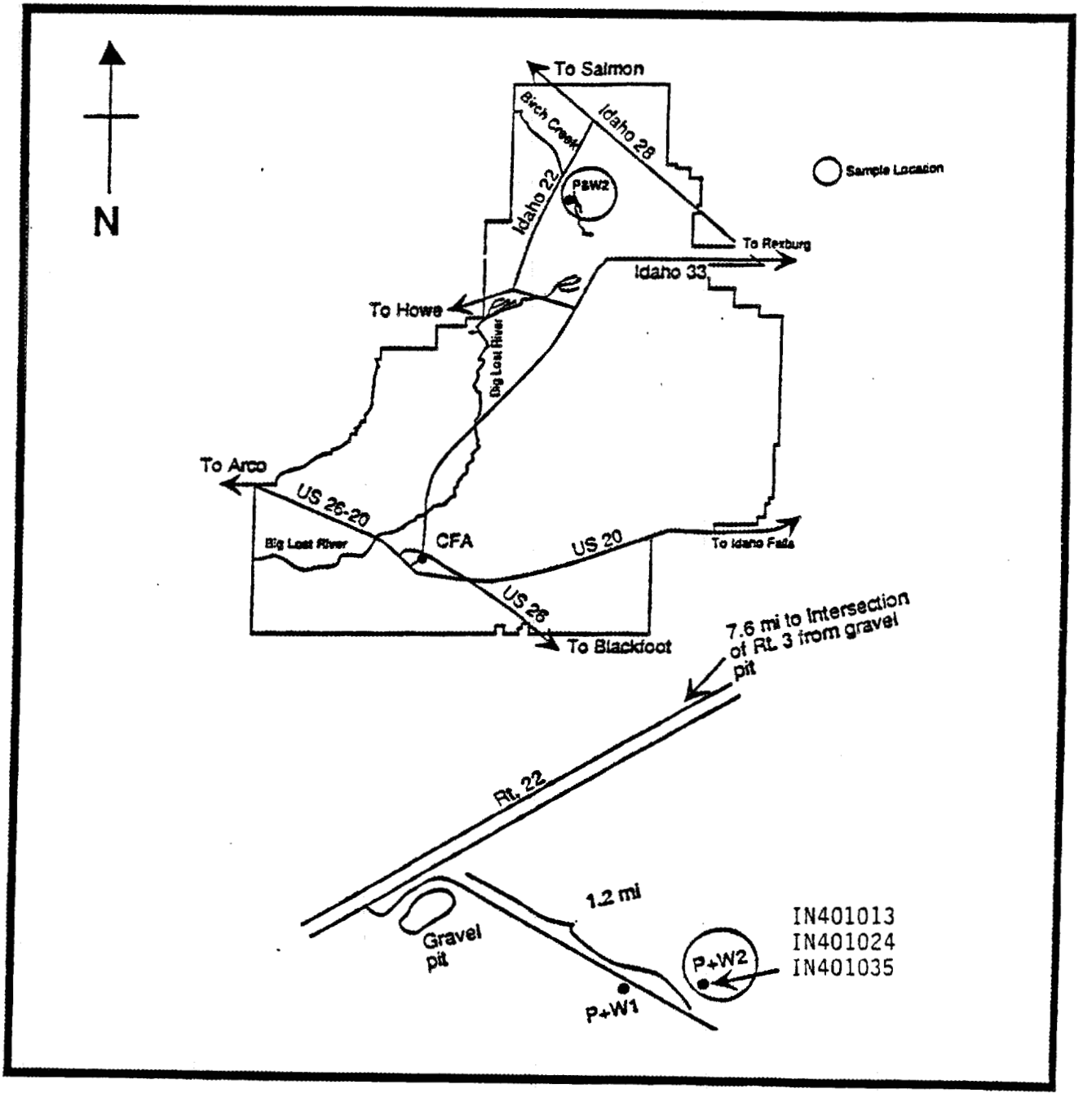


Figure 4.2a. Well P+W 2 (Request 401)

Environmental Problem: 2
Request Number: 402

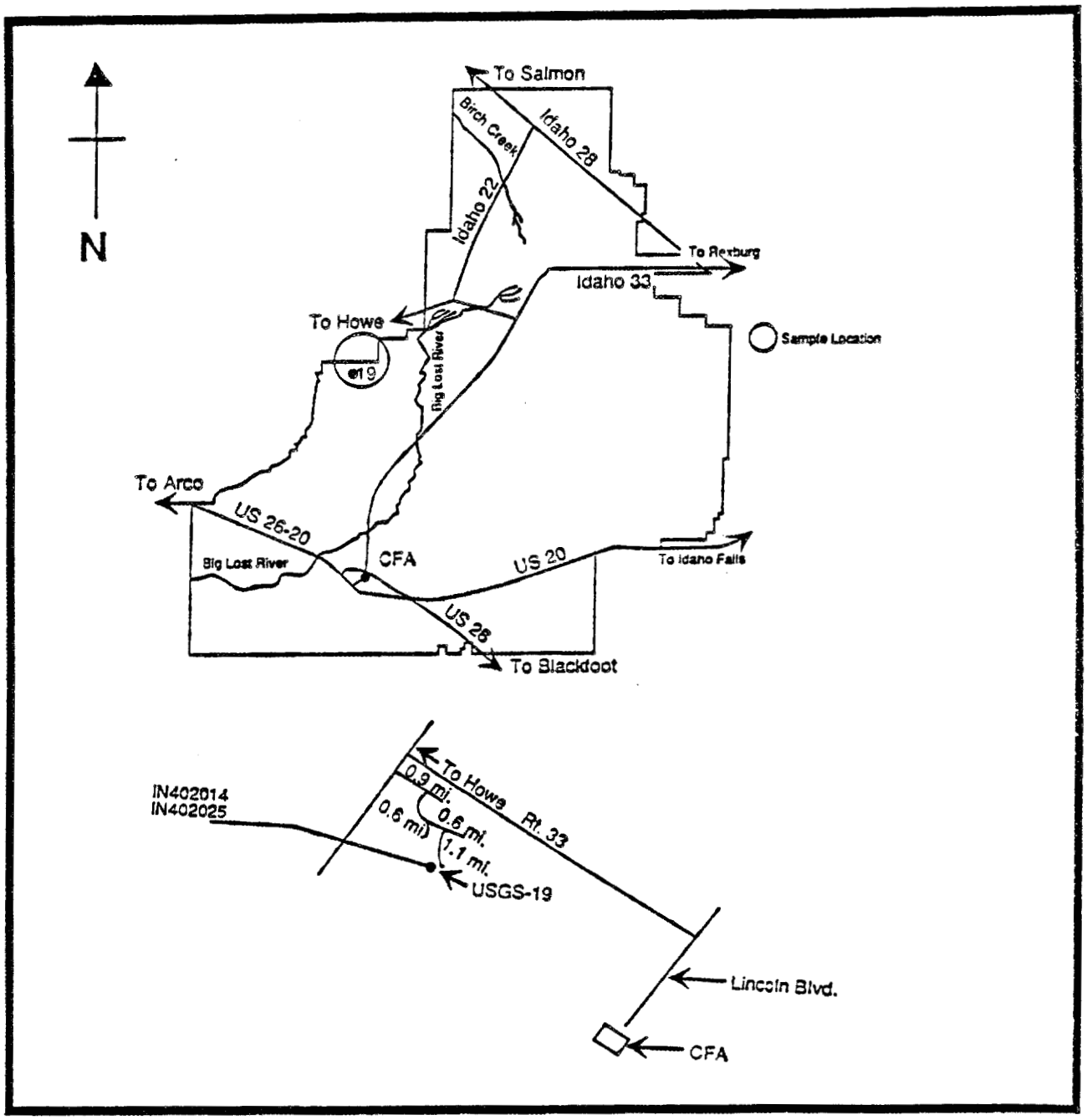


Figure 4.2b. Well USGS-19 (Request 402)

Environmental Problem: 2
Request Number: 403

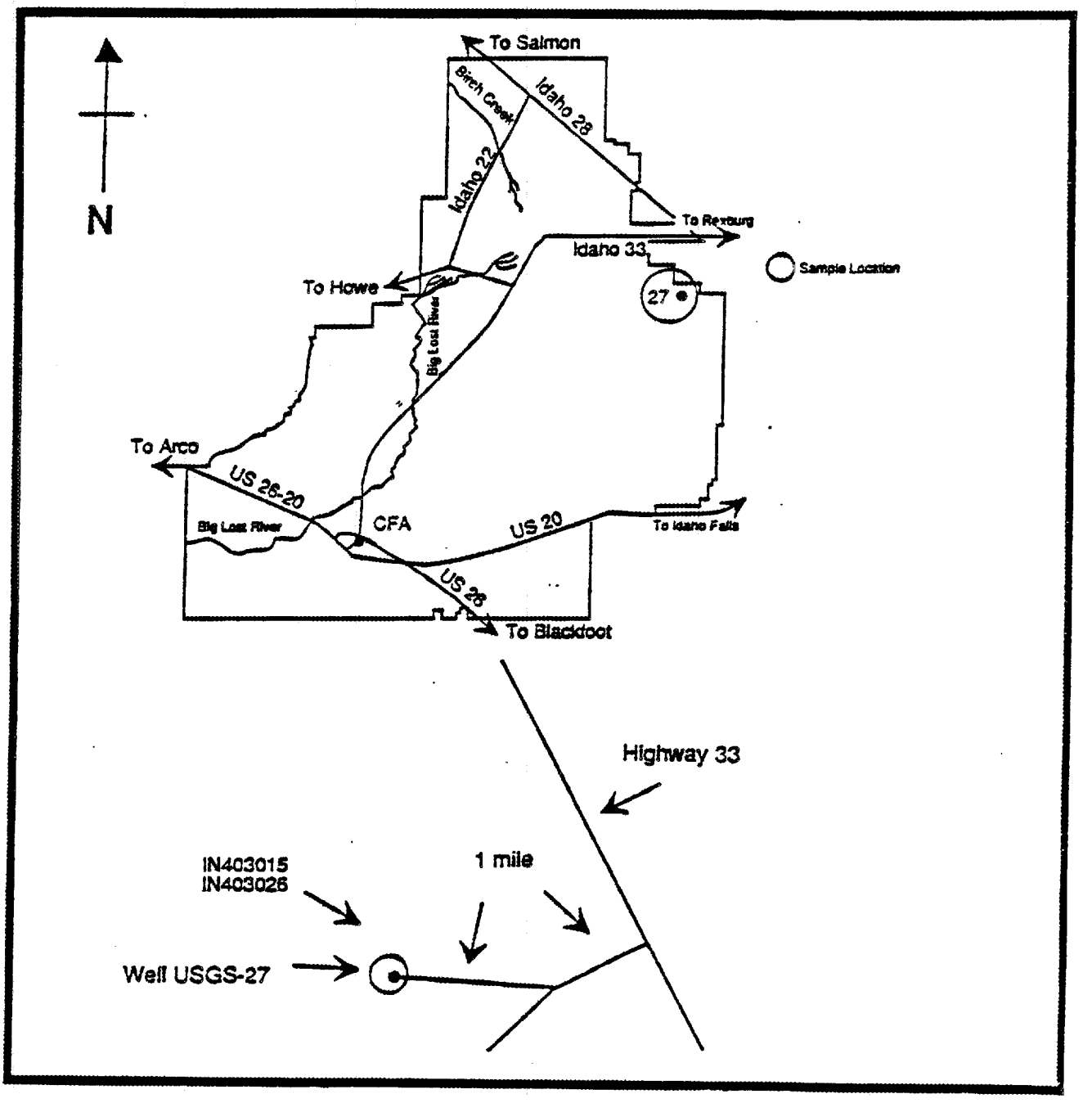


Figure 4.2c. Well USGS-27 (Request 403)

Environmental Problem: 2
Request Number: 404

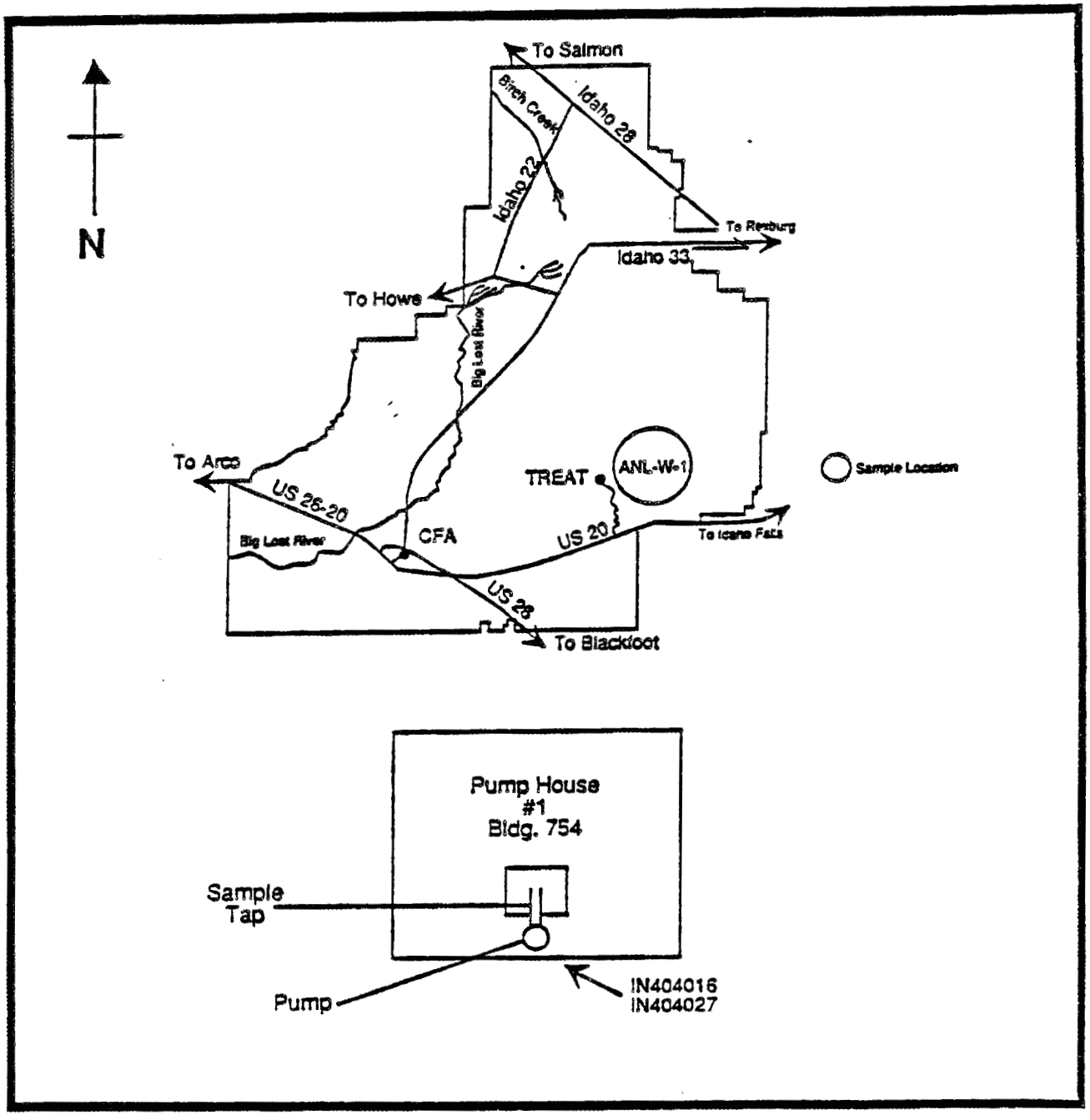


Figure 4.2d. ANL W-1 (Request 404)

Environmental Problem: 2
Request Number: 405

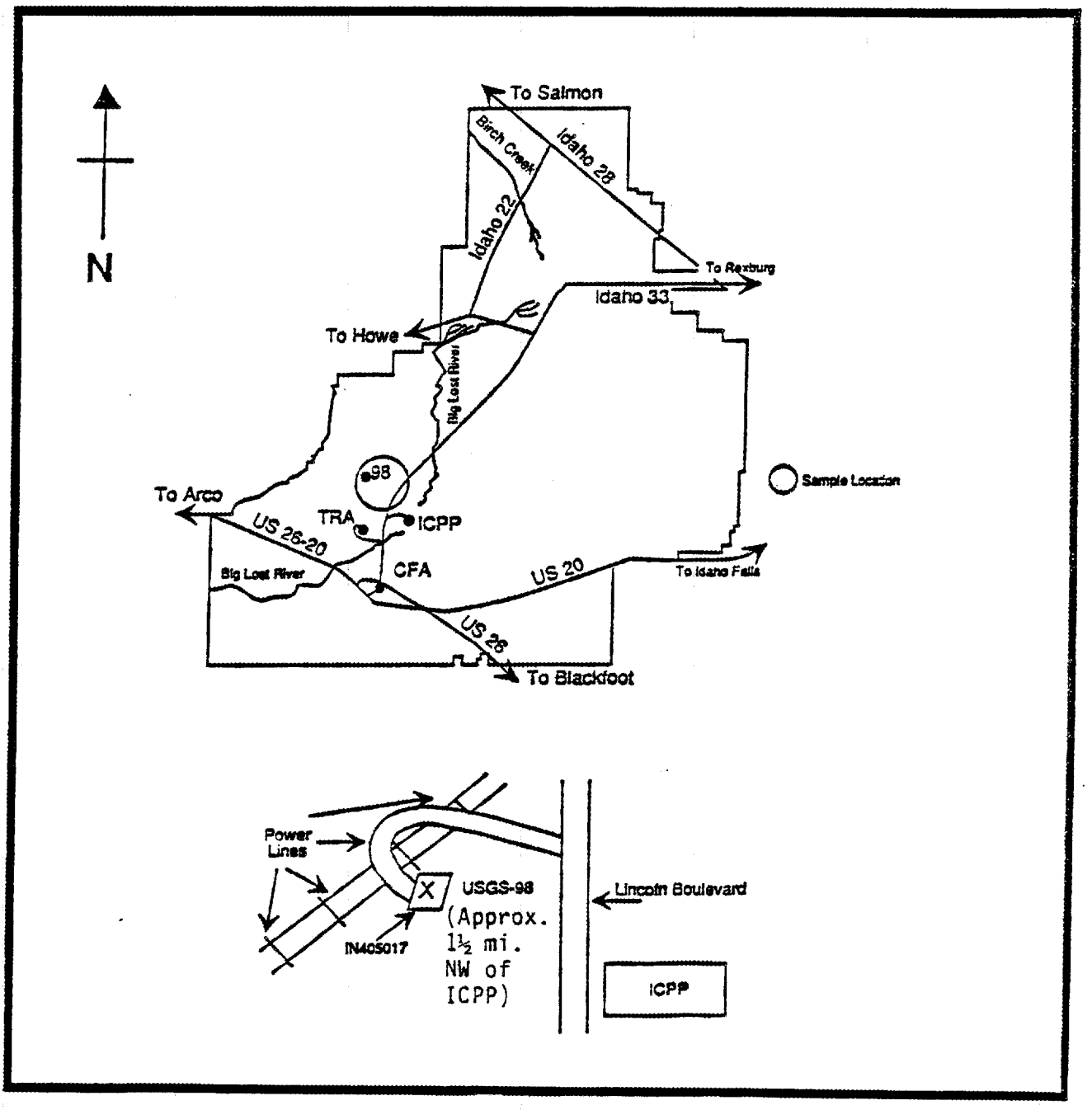


Figure 4.2e. Well USGS-98 (Request 405)

Environmental Problem: 2
Request Number: 406

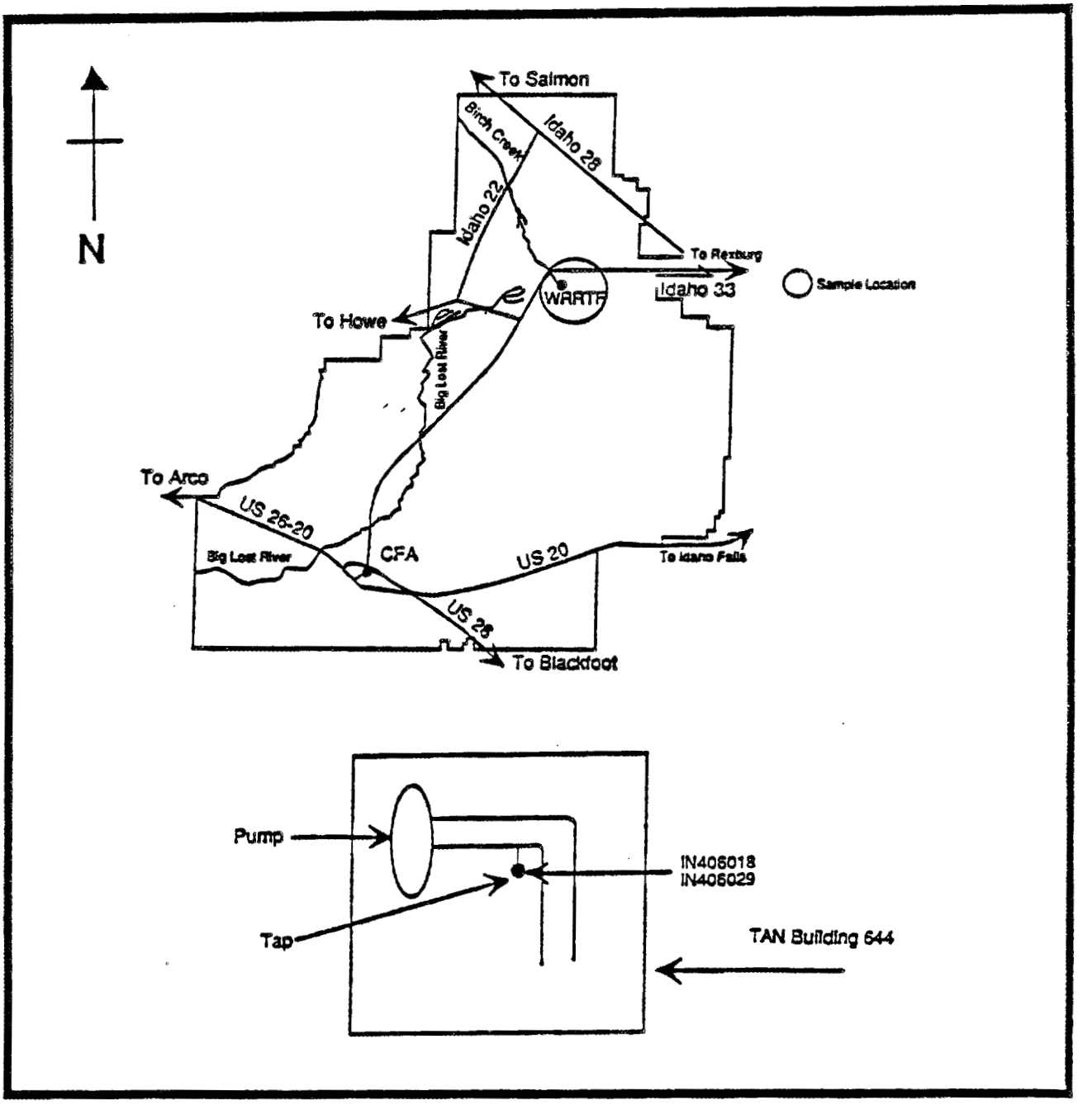


Figure 4.2f. Well ANP-8 (Request 406)

Environmental Problem: 2
Request Number: 407

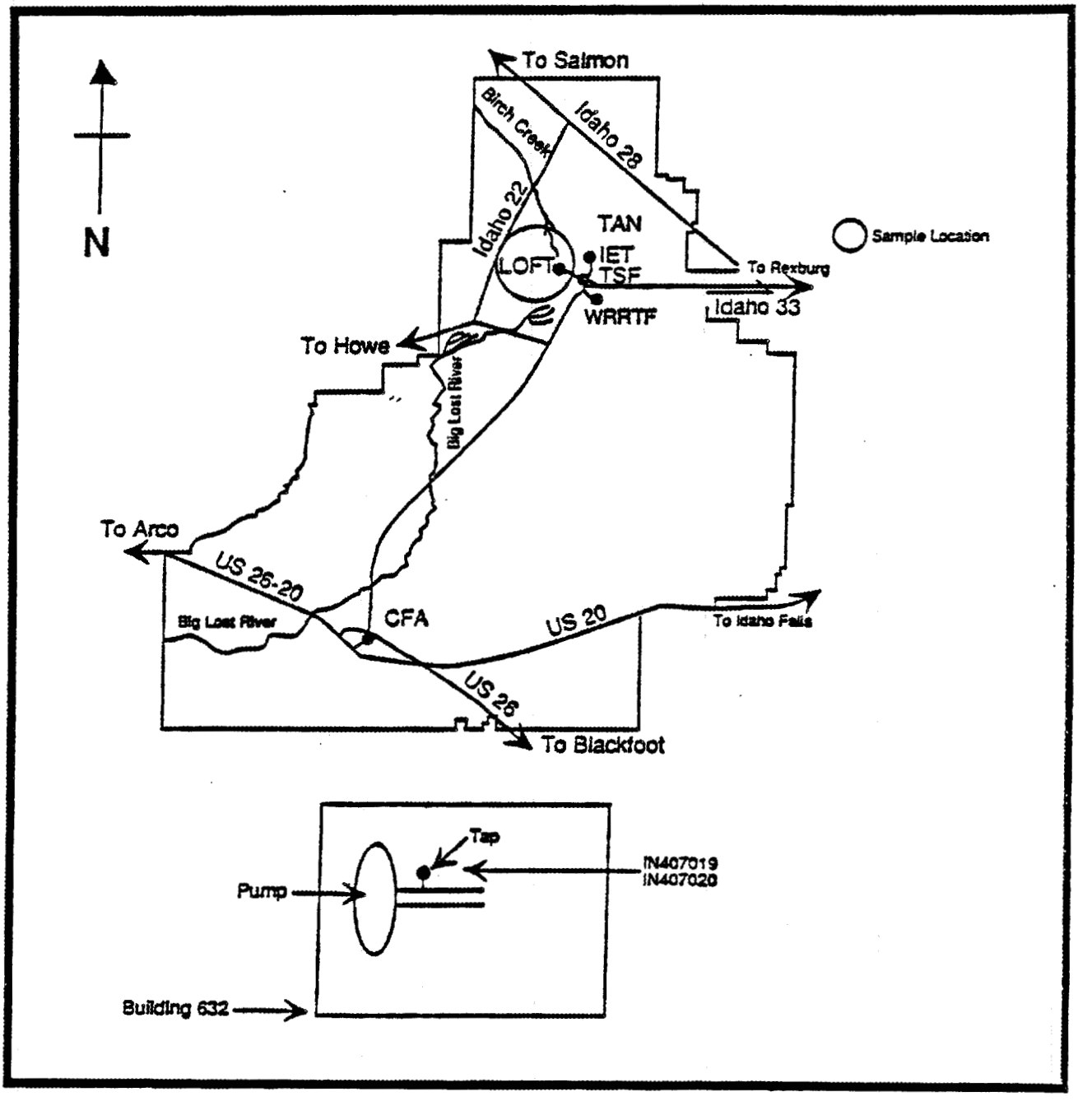


Figure 4.2g. Well FET-1 (Request 407)

Environmental Problem: 2
Request Number: 408

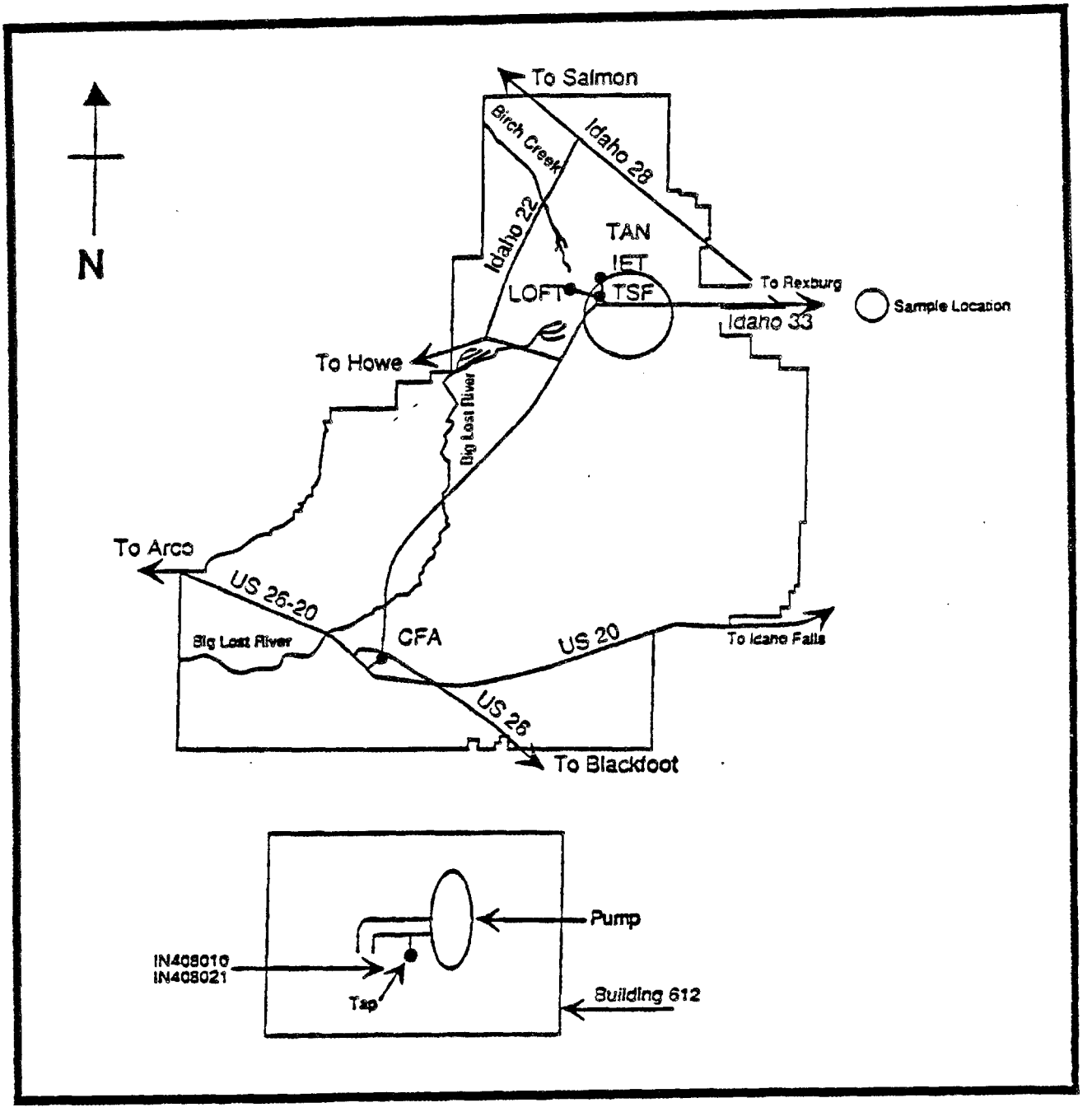


Figure 4.2h. Well ANP-1 (Request 408)

Environmental Problem: 2
Request Number: 409

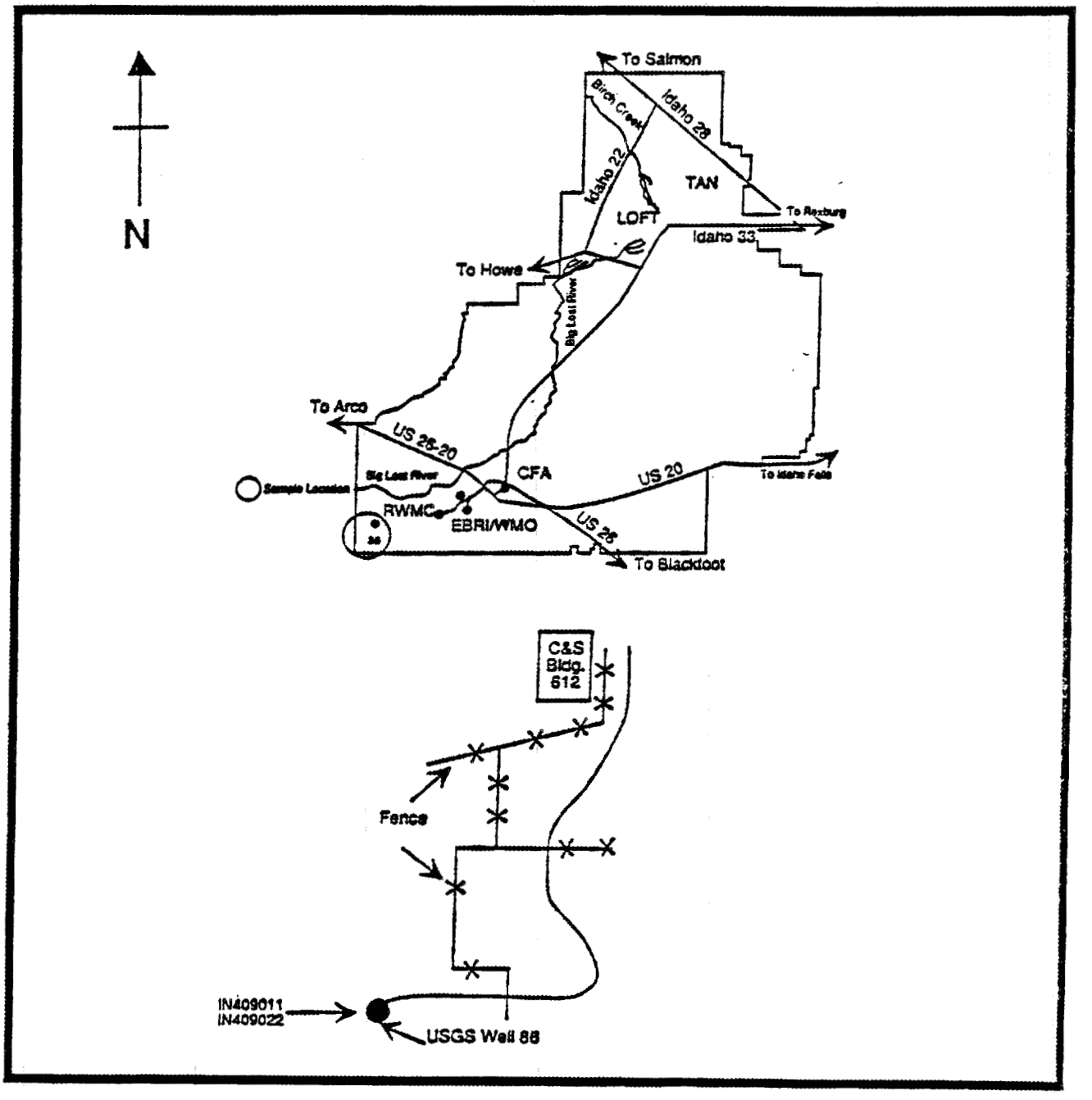


Figure 4.2i. Well USGS-86 (Request 409)

Environmental Problem: 2
Request Number: 410

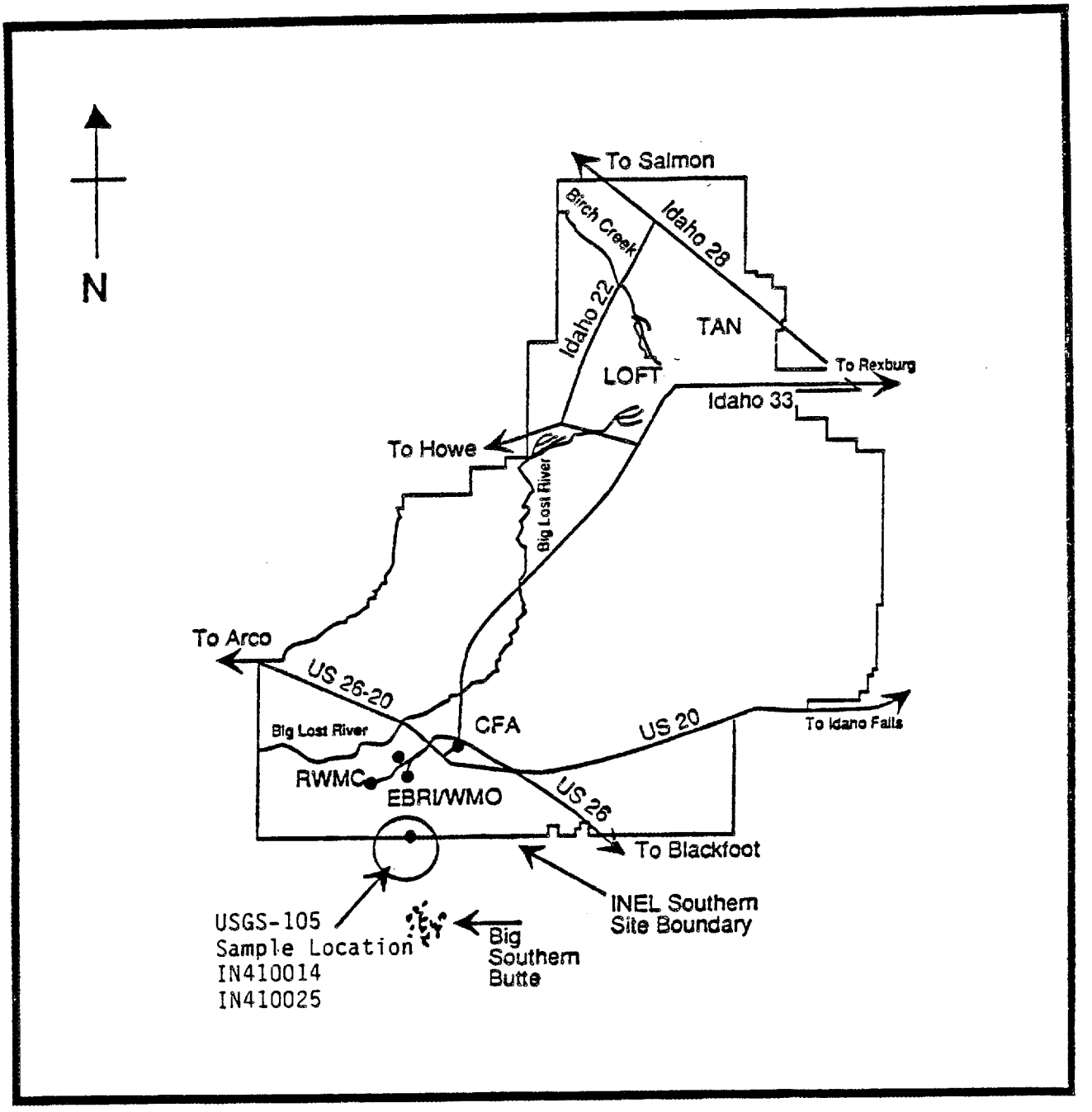


Figure 4.2j. Well USGS-105 (Request 410)

Environmental Problem: 2
Request Number: 411

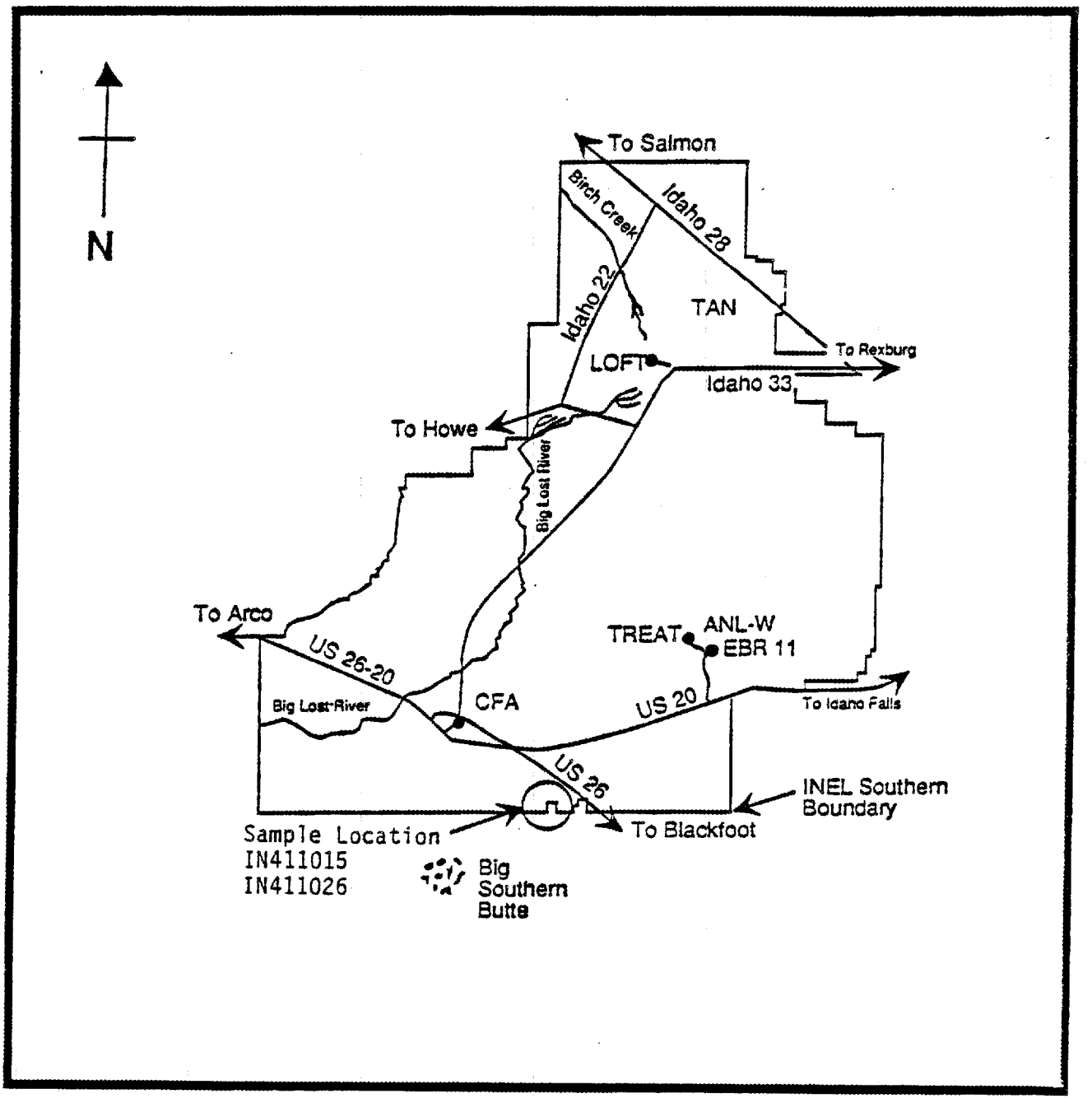


Figure 4.2k. Well USGS-110 (Request 411)

Environmental Problem: 2
Request Number: 412

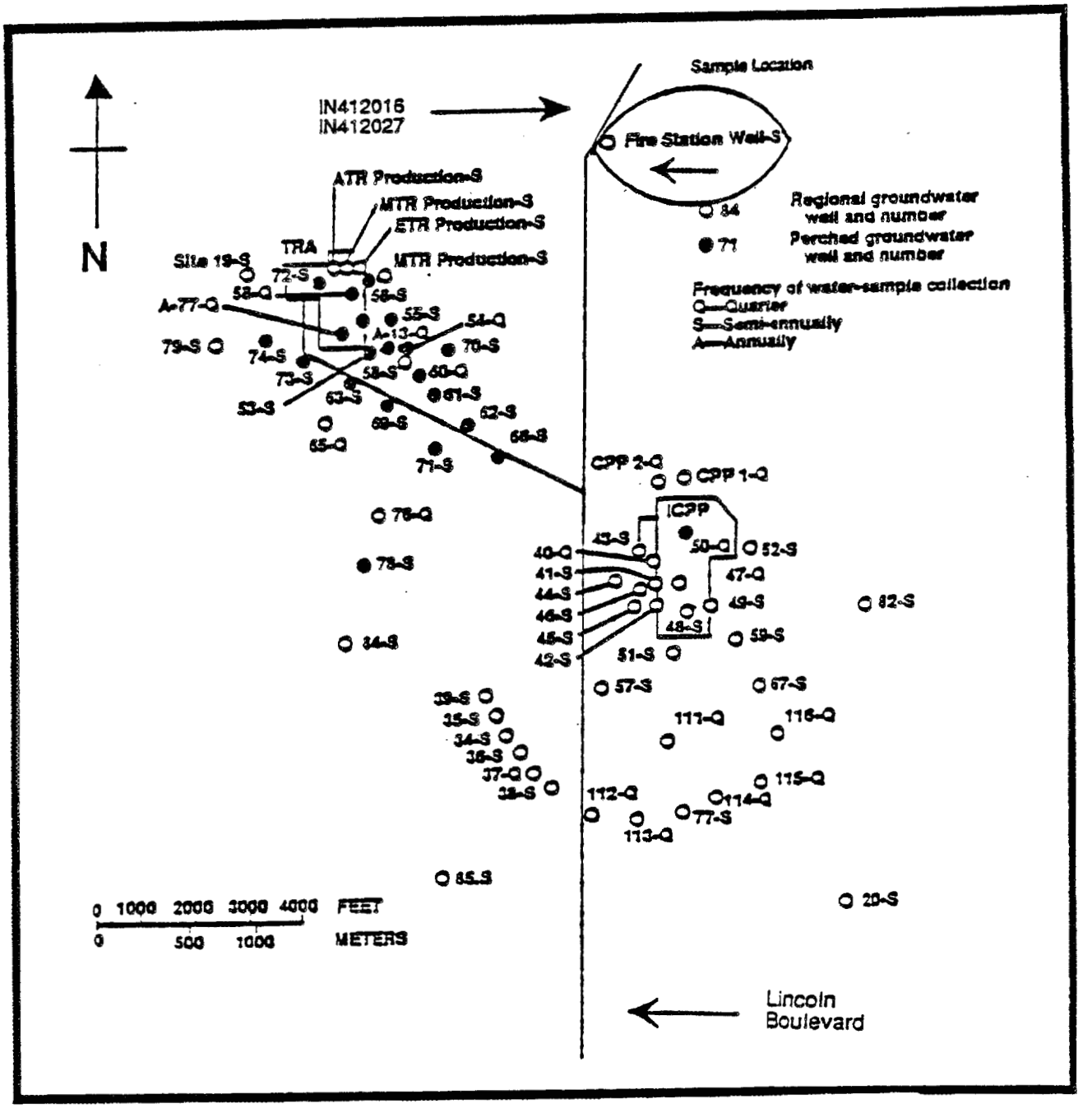


Figure 4.2l. Fire Station Well-S (Request 412)

Environmental Problem: 2
Request Number: 413

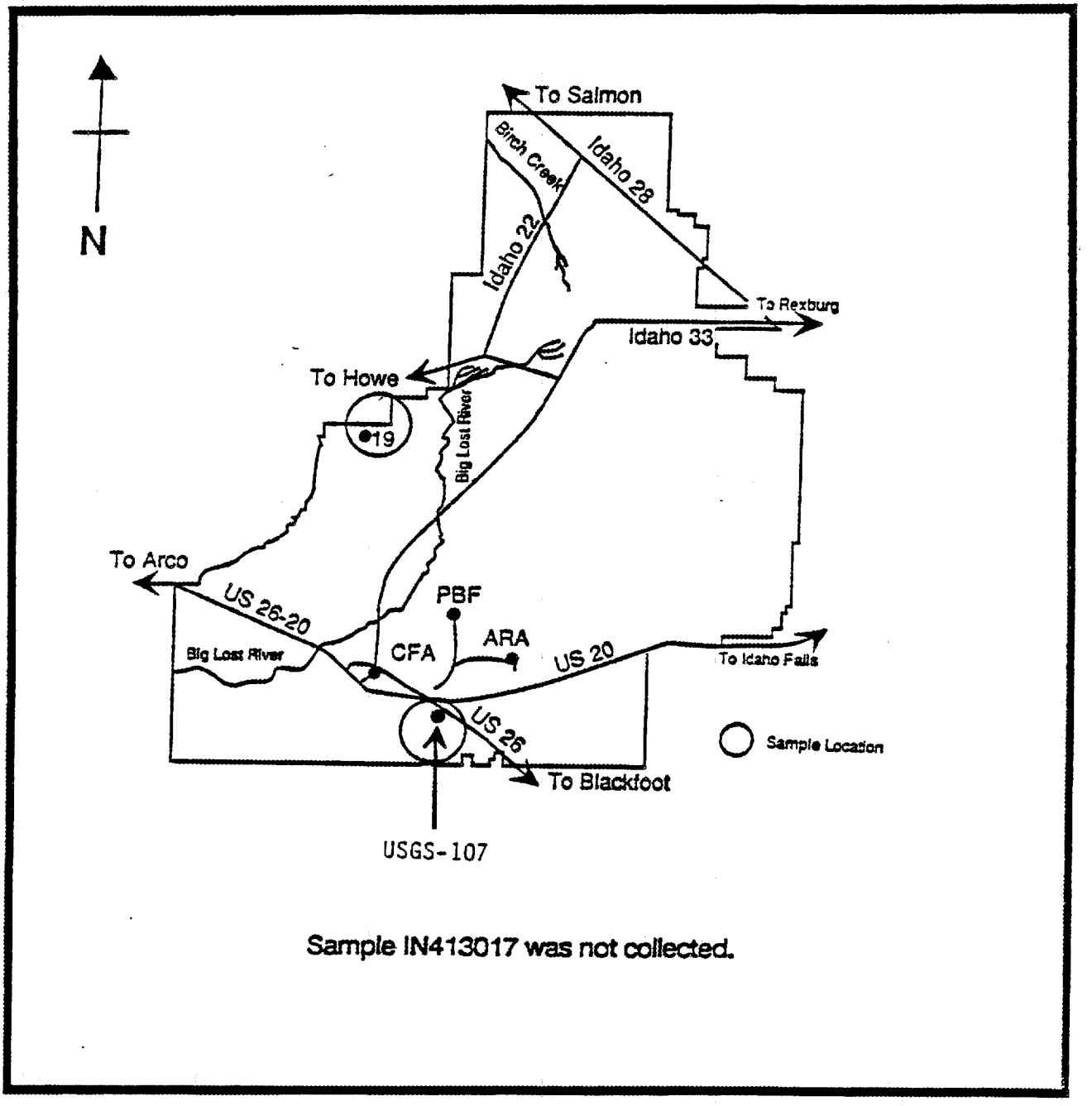


Figure 4.2m. Well USGS-107 (Request 413)

Environmental Problem: 2
Request Number: 414

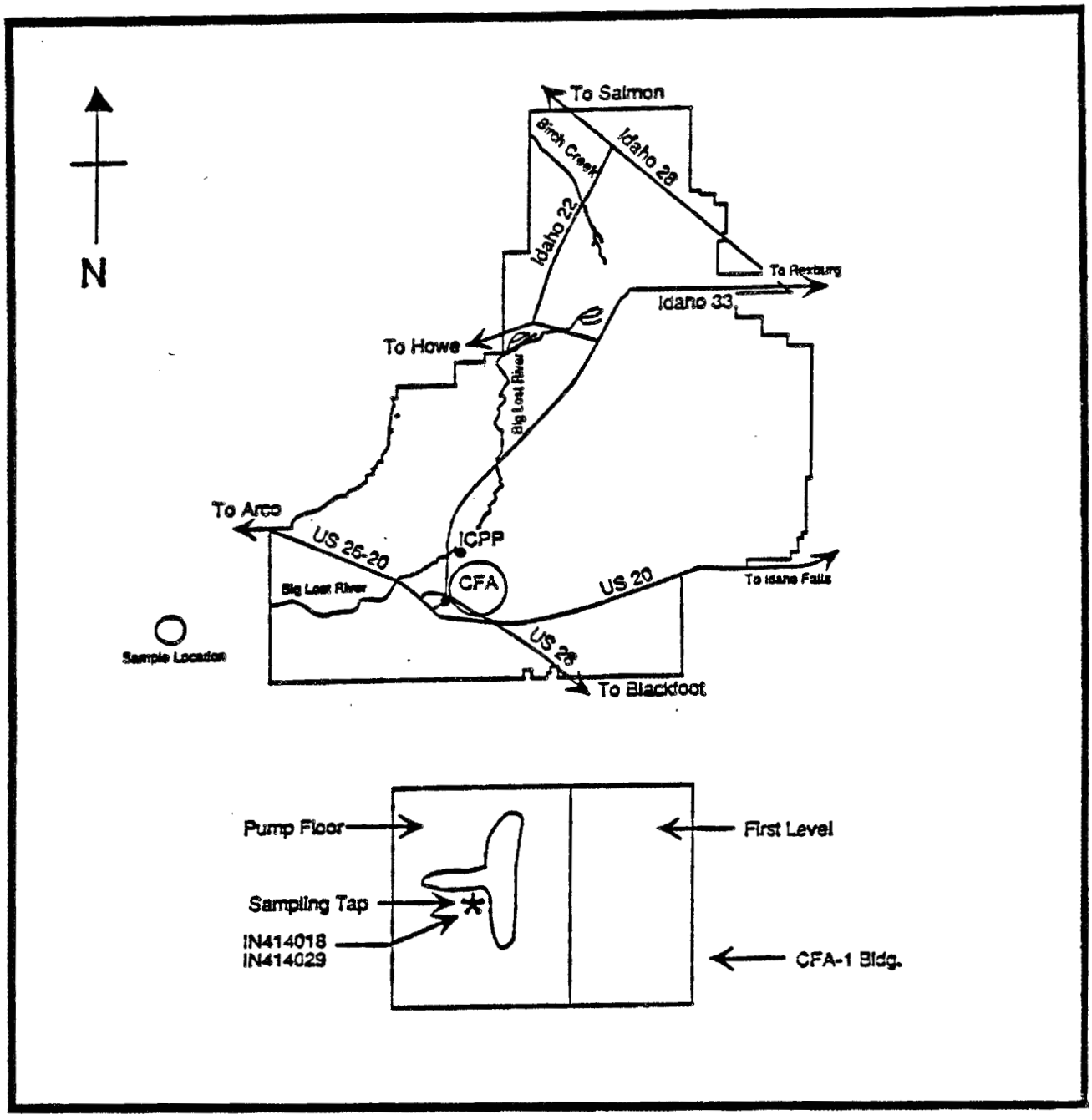


Figure 4.2n. Well CFA-1 (Request 414)

Environmental Problem: 2
Request Number: 415

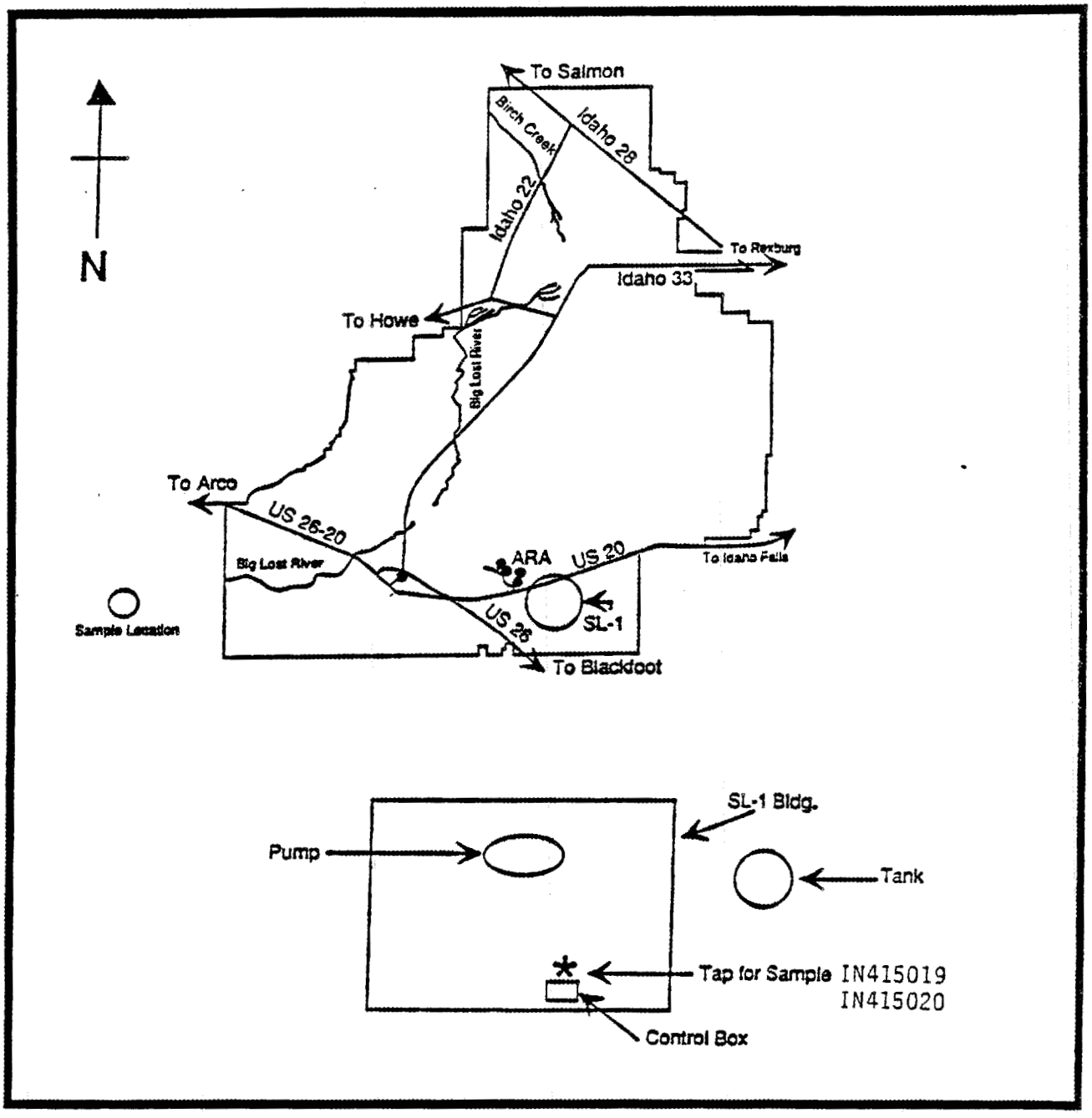


Figure 4.2o. Well SL-1 (Request 415)

Environmental Problem: 2
Request Number: 416

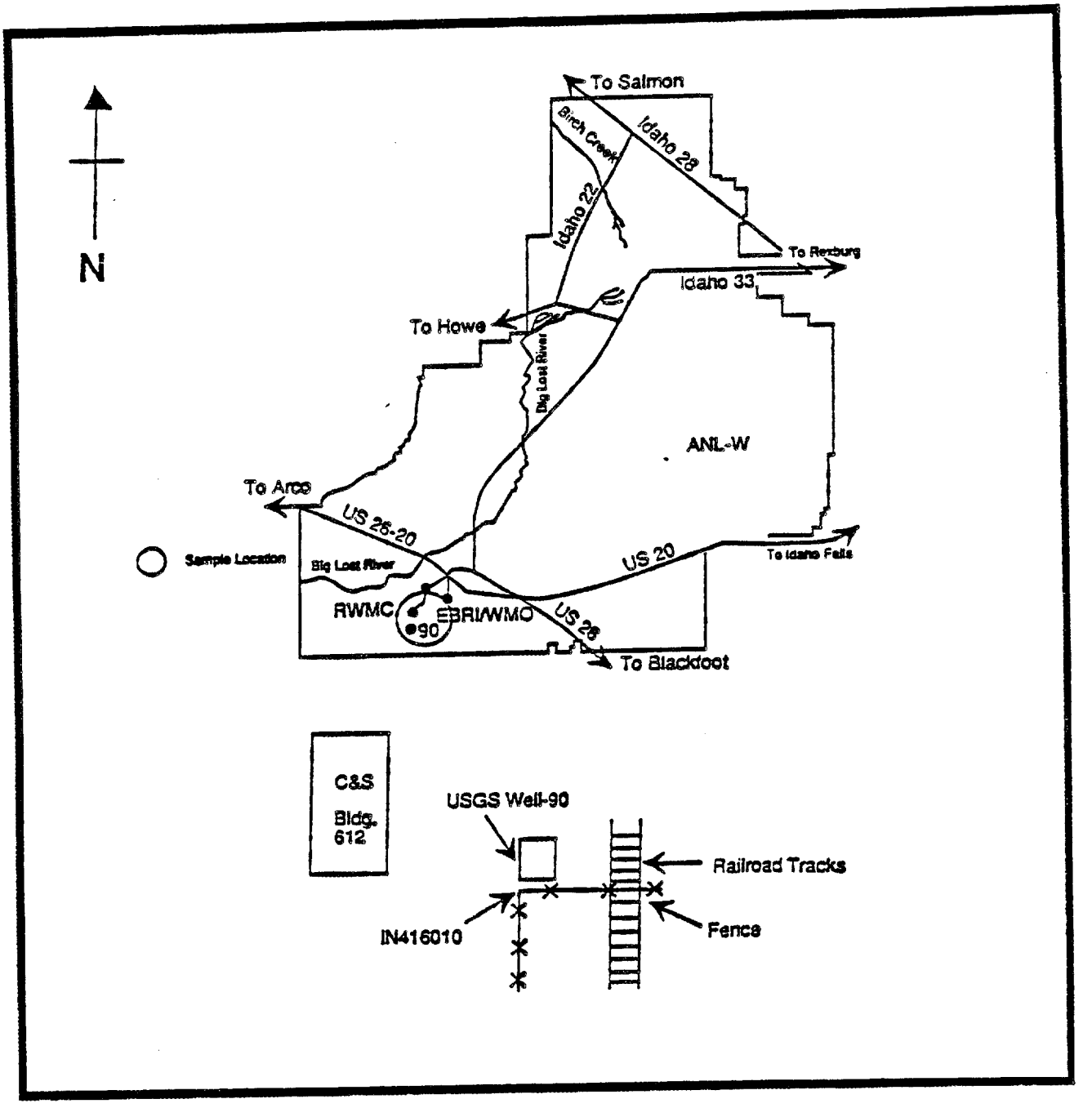


Figure 4.2p. Well USGS-90 (Request 416)

Environmental Problem: 2
Request Number: 417

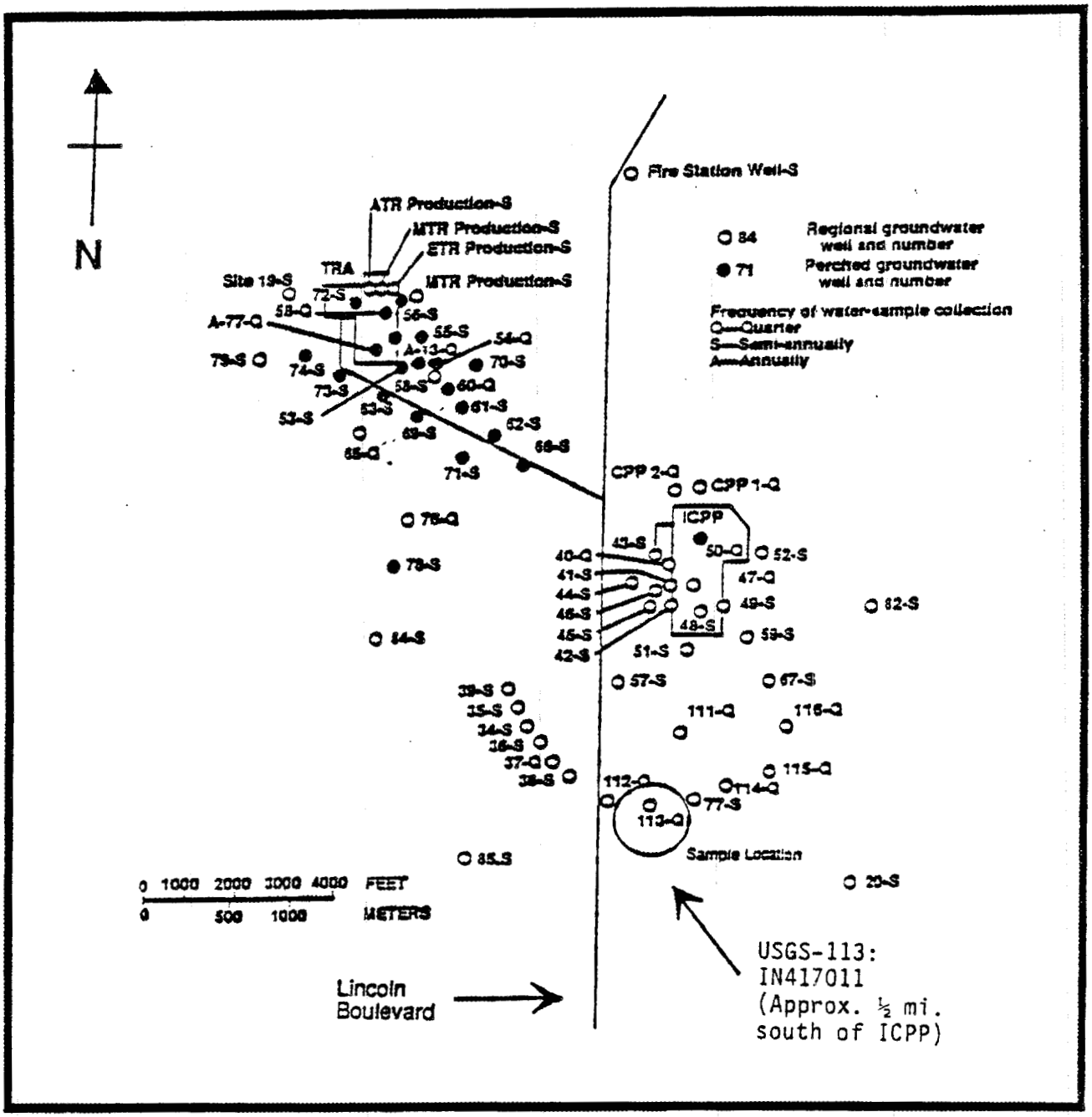


Figure 4.2q. Well USGS-113 (Request 417)

Environmental Problem: 2
Request Number: 418

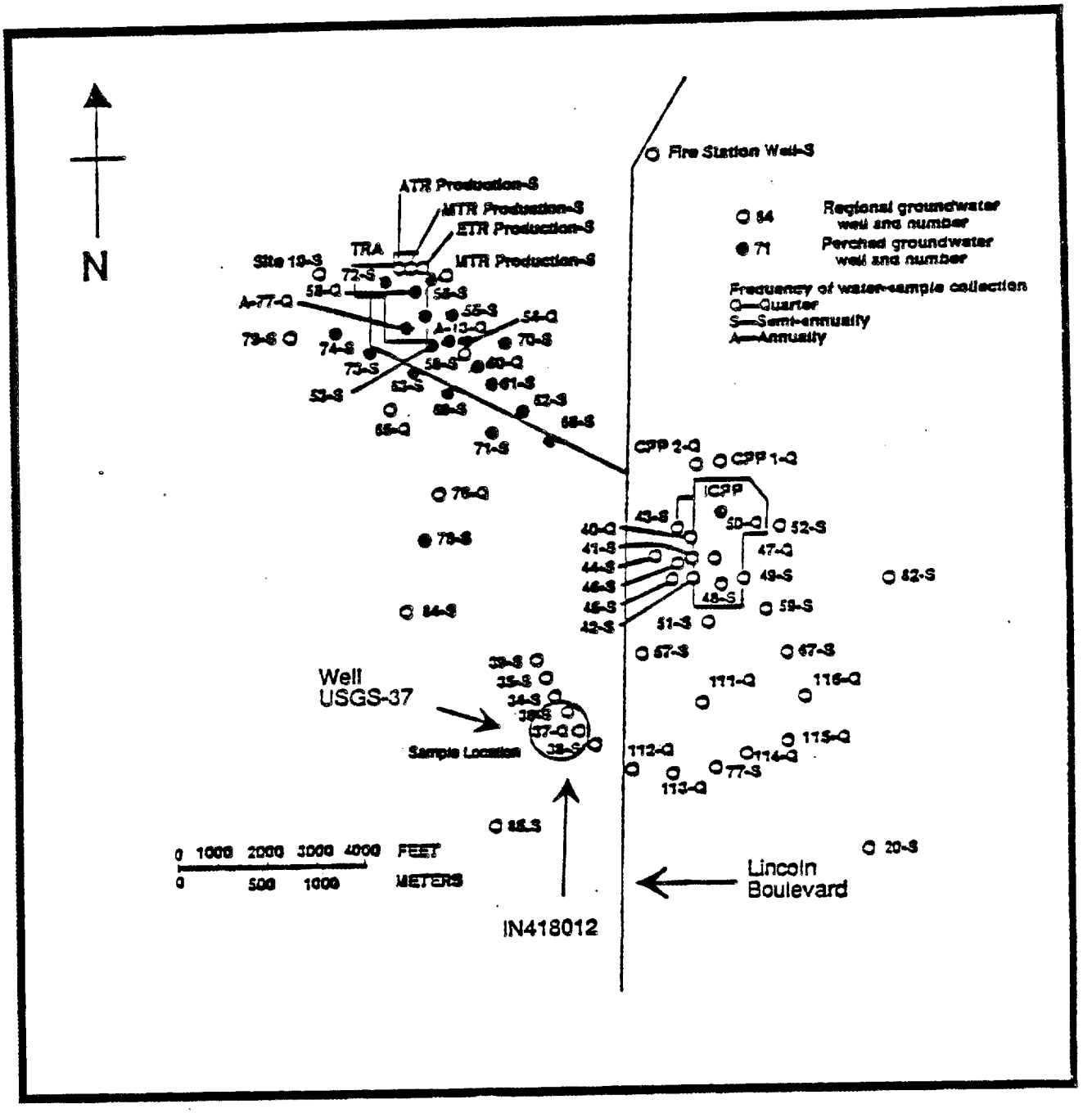


Figure 4.2r. Well USGS-37 (Request 418)

Environmental Problem: 2
Request Number: 419

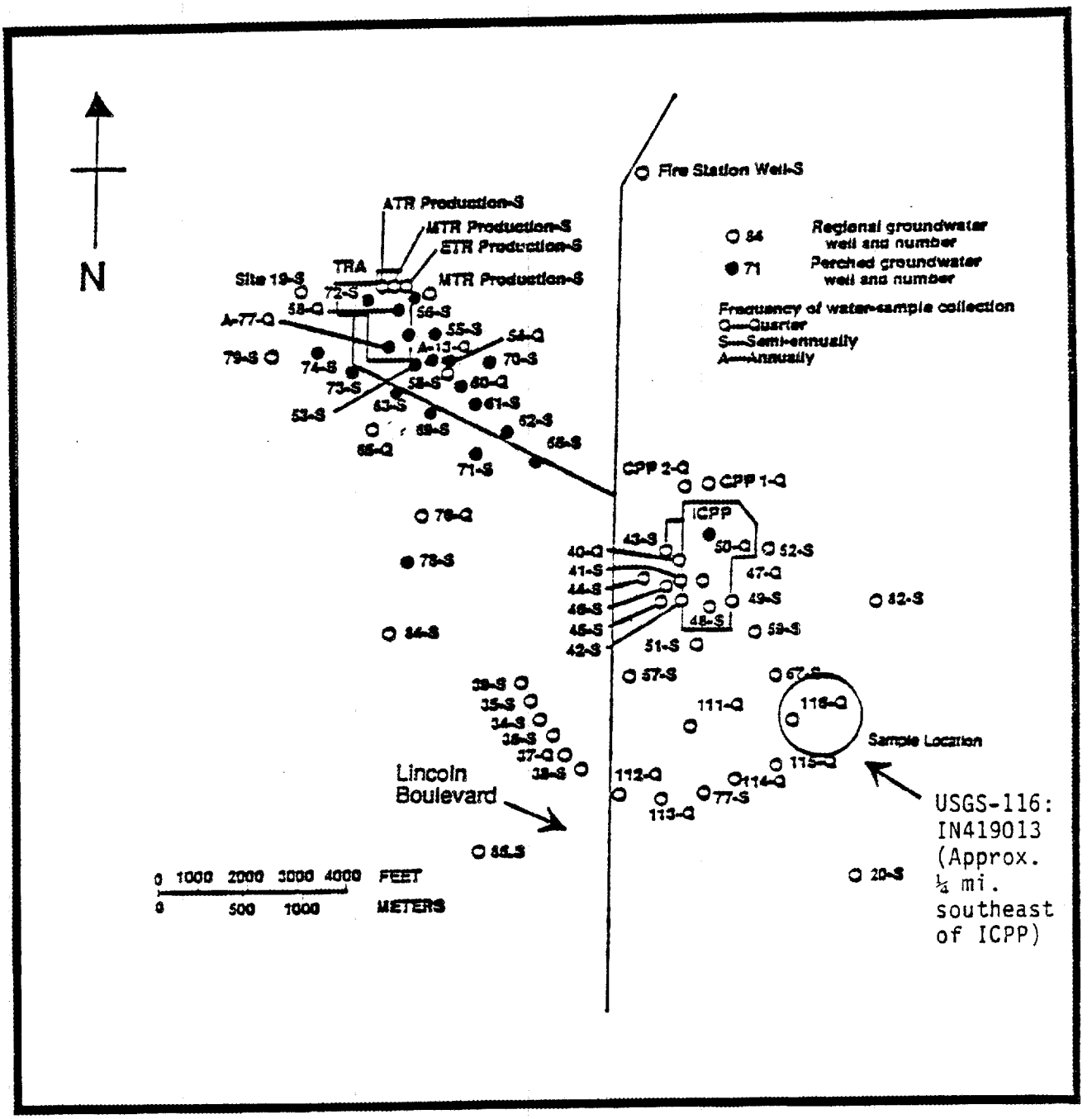


Figure 4.2s. Well USGS-116 (Request 419)

Environmental Problem: 2
Request Number: 420

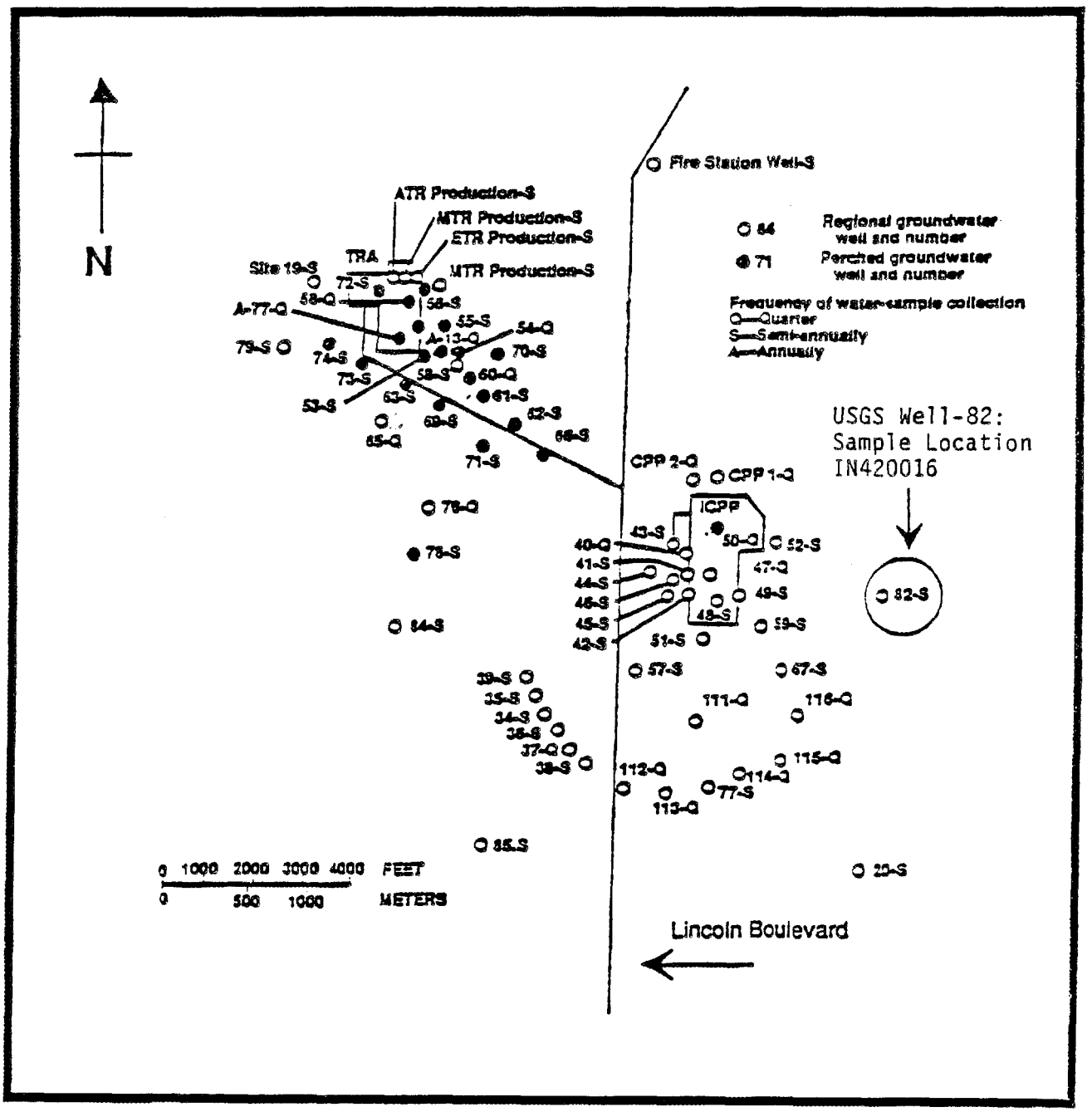


Figure 4.2t. Well USGS-82 (Request 420)

Environmental Problem: 2
Request Number: 421

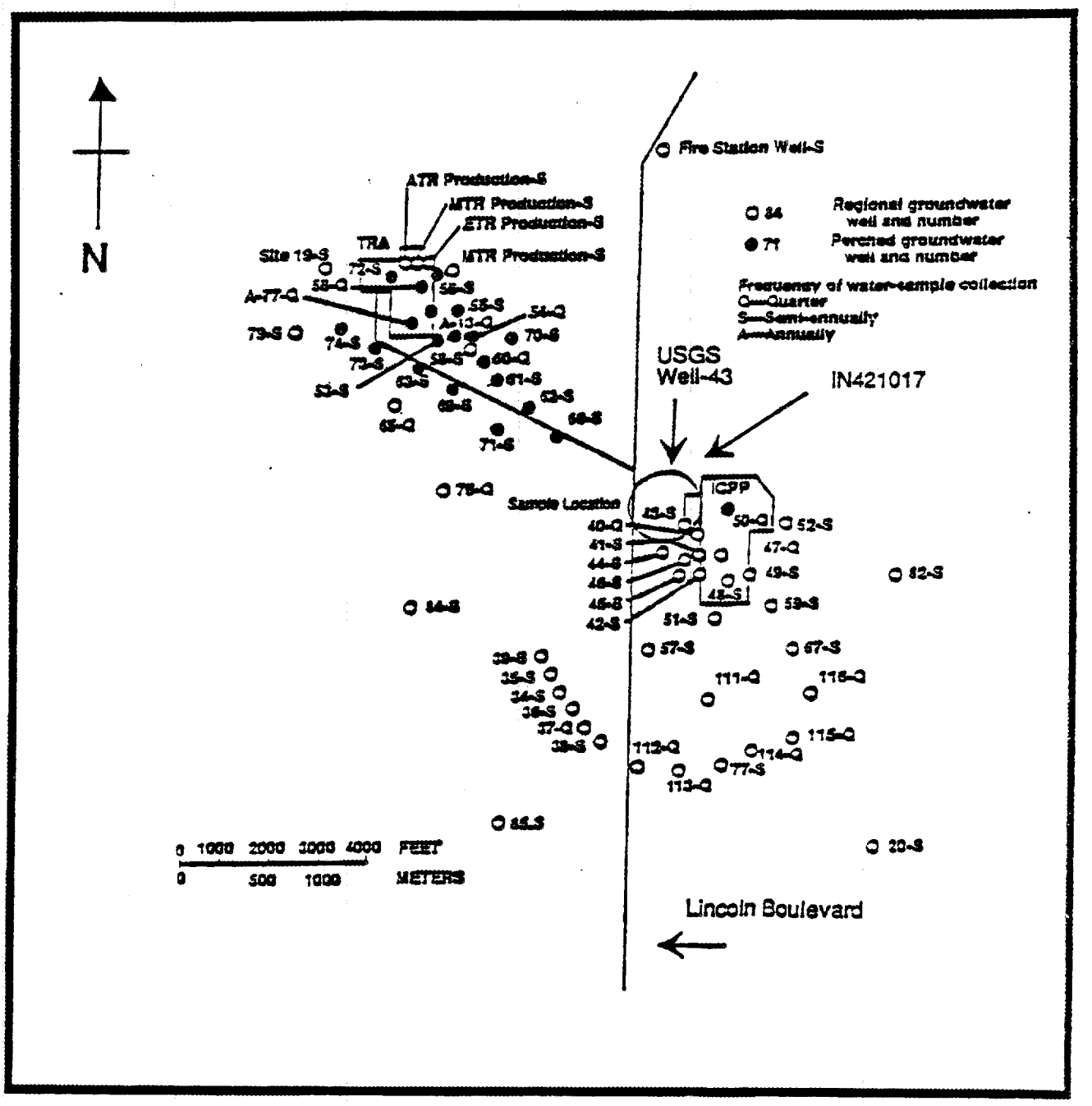


Figure 4.2u. Well USGS-43 (Request 421)

Environmental Problem: 2
Request Number: 422

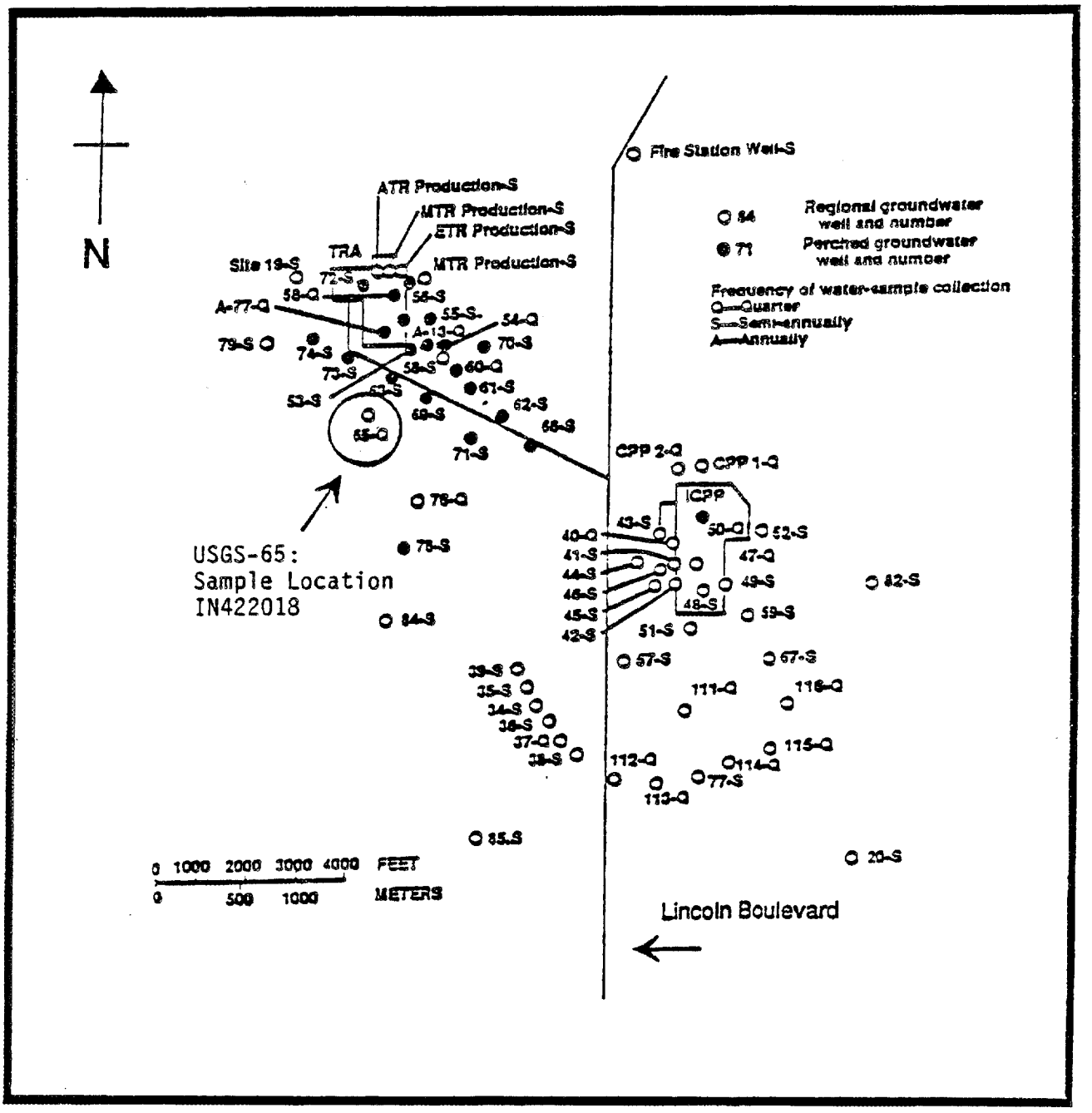


Figure 4.2v. Well USGS-65 (Request 422)

Environmental Problem: 2
Request Number: 423

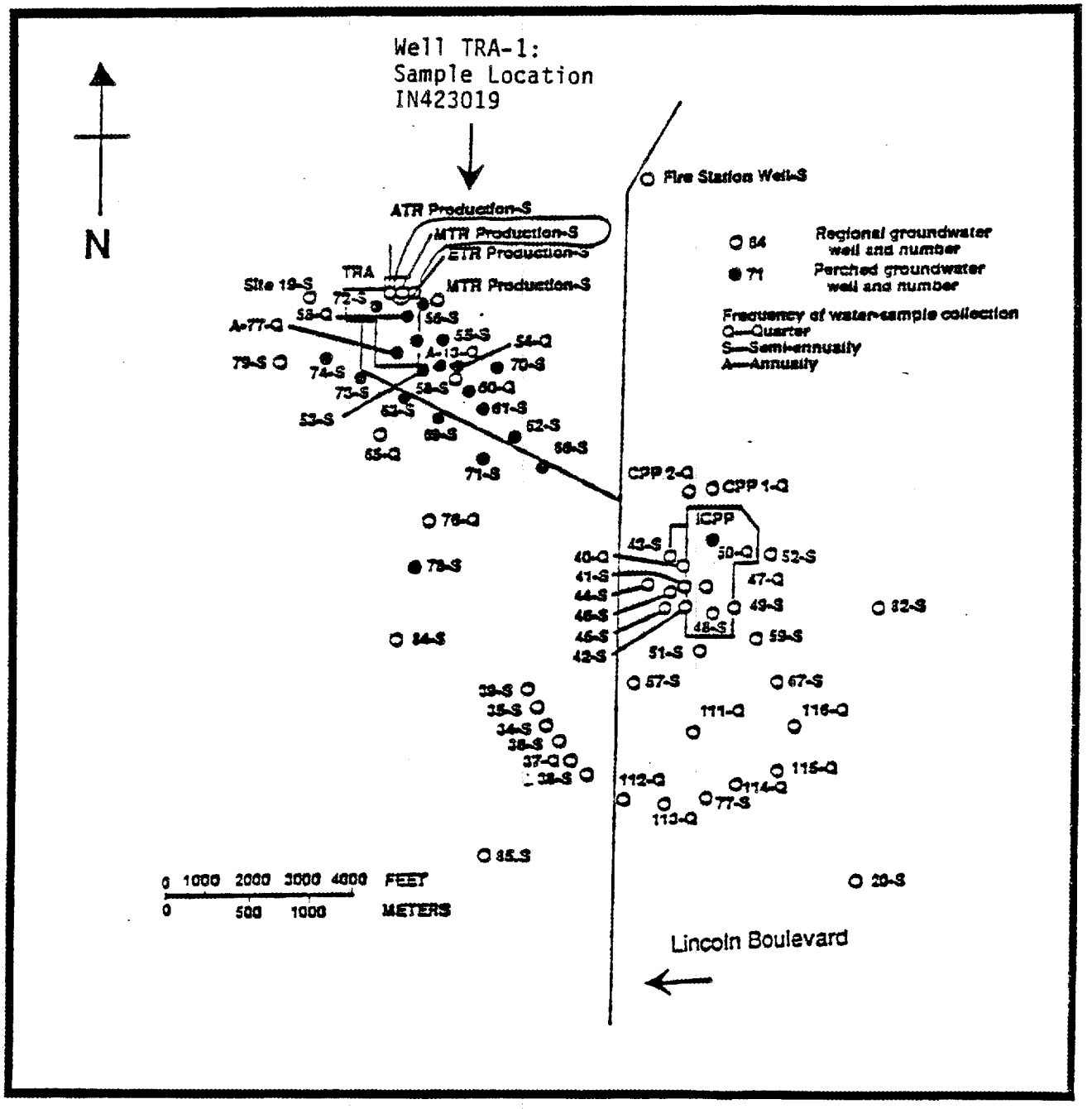


Figure 4.2w. Well TRA-1 (Request 423)

TABLE 4.2.2 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 2

DRAFT DO NOT CITE

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN401 | WELL P&M 2 | WELL | GRN WATER | 3 | 3 | PUMP | 2 | 2 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN402 | USGS-19 | WELL | GRN WATER | 2 | 2 | BAILR | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN403 | USGS-27 | WELL | GRN WATER | 3 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| IN404 | ANL W-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN405 | WELL 98 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN406 | WELL ANP-8 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN407 | WELL FET-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN408 | WELL ANP-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN409 | USGS-86 | WELL | GRN WATER | 2 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 2 |
| IN410 | USGS-105 | WELL | GRN WATER | 2 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 |
| IN411 | USGS-110 | WELL | GRN WATER | 2 | 2 | PUMP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN412 | FIRE STA. | WELL | GRN WATER | 2 | 2 | TAP | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| IN413 | USGS-107 | WELL | GRN WATER | 1 | 0 | PUMP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN414 | WELL CFA-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN415 | WELL SL-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| IN416 | USGS-90 | WELL | GRN WATER | 2 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| IN417 | USGS-113 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN418 | USGS-37 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN419 | WELL 116 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN420 | USGS-82 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| IN421 | USGS-43 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| IN422 | USGS-65 | WELL | GRN WATER | 1 | 1 | PUMP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| IN423 | WELL TRA-1 | WELL | GRN WATER | 2 | 2 | TAP | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 |
| | | | MED TOTAL | 40 | 37 | | 35 | 35 | 37 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 35 | 0 | 34 |
| | | | EP TOTAL | 40 | 37 | | 35 | 35 | 37 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 35 | 0 | 34 |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 401
LOCATION: P&W 2
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN401013 | IN401024 | IN401035 | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.29 | 0.29 | 0.29 | | | |
| DO (PPM) | | 9.4 | 9.4 | 9.4 | | | |
| PH (UNITS) | | 7.9 | 7.9 | 7.9 | | | |
| TEMPERATURE (DEG C) | | 12 | 12 | 12 | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN401013J | IN401024J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013J | IN401013J | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| CHLORIDE | | 16000 | 16000 | | | | |
| NITRATE-N | | 655 N | 746 N | | | | |
| SULFATE | | 28000 | 28000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN401013H | IN401013H | IN401013H | IN401013I | IN401013I | IN401024H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013H | IN401035A | IN415020H | IN401013I | IN401013K | IN401013H |
| | TYPE: | PUMP | PUMP | PUMP | PUMP | PUMP | PUMP |
| ALUMINUM | | | | | 252 | | |
| ANTIMONY | | | 1 B | | | | |
| ARSENIC | | | | 1.2 B | | | |
| BARIUM | | | | | 51 B | | |
| BERYLLIUM | | | | | 2.4 B | | |
| CADMIUM | | | | 0.09 B | | | |
| CALCIUM | | | | | 50000 | | |
| CHROMIUM | | | | | 5.5 B | | |
| IRON | | | | | 979 | | |
| LEAD | | | | 2.4 B | | | |
| MAGNESIUM | | | | | 18800 | | |
| MANGANESE | | | | | 6.3 B | | |
| MERCURY | | 0.05 B | | | | | 0.03 B |
| POTASSIUM | | | | | | 1300 B | |
| SELENIUM | | | | 1.6 B | | | |
| SODIUM | | | | | 7850 | | |
| THALLIUM | | | | 1.2 U | | | |
| VANADIUM | | | | | 12 B | | |
| ZINC | | | | | 129 | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 401
LOCATION: P&W 2
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: SDG NO: TYPE: | IN401024H IN401035A PUMP | IN401024H IN415020H PUMP | IN401024I IN401013I PUMP | IN401024I IN401013K PUMP | IN401035A IN401013H PUMP | IN401035A IN401035A PUMP |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | | | 208 | | | |
| ANTIMONY | | 0.88 U | | | | | 0.88 U |
| ARSENIC | | | 1.1 U | | | | |
| BARIUM | | | | 45 B | | | |
| BERYLLIUM | | | | 2.4 B | | | |
| CADMIUM | | | 0.08 U | | | | |
| CALCIUM | | | | 44800 | | | |
| CHROMIUM | | | | 5.6 B | | | |
| IRON | | | | 221 | | | |
| LEAD | | | 2.2 B | | | | |
| MAGNESIUM | | | | 16600 | | | |
| MANGANESE | | | | 8 B | | | |
| MERCURY | | | | | | 0.03 B | |
| POTASSIUM | | | | | 1200 B | | |
| SELENIUM | | | 1.4 B | | | | |
| SODIUM | | | | 6900 | | | |
| THALLIUM | | | 1.2 U | | | | |
| VANADIUM | | | | 12 B | | | |
| ZINC | | | | 108 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: SDG NO: TYPE: | IN401035A IN415020H PUMP | IN401035B IN401013I PUMP | IN401035B IN401013K PUMP | | | |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | | 50 U | | | | |
| ANTIMONY | | 1.1 U | | | | | |
| ARSENIC | | | 1 U | | | | |
| BARIUM | | | 0.3 U | | | | |
| BERYLLIUM | | 0.08 U | | | | | |
| CADMIUM | | | 150 U | | | | |
| CALCIUM | | | 5 U | | | | |
| CHROMIUM | | | 20 U | | | | |
| IRON | | 0.4 U | | | | | |
| LEAD | | | 10 U | | | | |
| MAGNESIUM | | | 5 U | | | | |
| MANGANESE | | | | | | | |
| MERCURY | | | | 100 U | | | |
| POTASSIUM | | 1.2 U | | | | | |
| SELENIUM | | | 170 U | | | | |
| SODIUM | | 1.3 B | | | | | |
| THALLIUM | | | | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 401
LOCATION: P&W 2
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN401035A | IN401035B | IN401035B | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN415020H | IN401013I | IN401013K | | | |
| | TYPE: | PUMP | PUMP | PUMP | | | |
| VANADIUM | | | 4 U | | | | |
| ZINC | | | 19 B | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN401013A | IN401024B | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013A | IN401024B | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| ACETONE | | 6 J | 10 U | | | | |
| TOLUENE | | 5 U | 1 J | | | | |

S&A REQUEST: 402
LOCATION: USGS-19
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN402014 | IN402025 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.4 | 0.4 | | | | |
| DO (PPM) | | 7.1 | 7.1 | | | | |
| PH (UNITS) | | 7.6 | 7.6 | | | | |
| TEMPERATURE (DEG C) | | 17 | 17 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN402014J | IN402025J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN402014J | IN402014J | | | | |
| | TYPE: | BAILER | BAILER | | | | |
| CHLORIDE | | 12000 | 12000 | | | | |
| NITRATE-N | | 1200 N | 1290 N | | | | |
| SULFATE | | 21000 | 21000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN402014H | IN402014H | IN402014H | IN402014I | IN402014I | IN402025H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401035A | IN402014H | IN415020H | IN402014I | IN402014K | IN401035A |
| | TYPE: | BAILER | BAILER | BAILER | BAILER | BAILER | BAILER |
| ALUMINUM | | | | | 209 | | |
| ANTIMONY | | 1 B | | | | | 0.88 U |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 402
LOCATION: USGS-19
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN402014H | IN402014H | IN402014H | IN402014I | IN402014I | IN402025H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401035A | IN402014H | IN415020H | IN402014I | IN402014K | IN401035A |
| | TYPE: | BAILER | BAILER | BAILER | BAILER | BAILER | BAILER |
| ARSENIC | | | | 2.3 B | | | |
| BARIUM | | | | | 75 B | | |
| BERYLLIUM | | | | | 2.7 B | | |
| CADMIUM | | | | 0.13 B | | | |
| CALCIUM | | | | | 45600 | | |
| CHROMIUM | | | | | 7.9 B | | |
| COBALT | | | | | 2.3 B | | |
| IRON | | | | | 80 B | | |
| LEAD | | | | 0.4 B | | | |
| MAGNESIUM | | | | | 17600 | | |
| MERCURY | | | 0.04 B | | | | |
| POTASSIUM | | | | | | 1500 B | |
| SELENIUM | | | | 1.4 B | | | |
| SODIUM | | | | | 14500 | | |
| VANADIUM | | | | | 13 B | | |
| ZINC | | | | | 50 | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN402025H | IN402025H | IN402025I | IN402025I |
|---|---|---|---|---|---|
| | SDG NO: | IN402014H | IN415020H | IN402014I | IN402014K |
| | TYPE: | BAILER | BAILER | BAILER | BAILER |
| ALUMINUM | | | | 191 B | |
| ANTIMONY | | | 2.3 B | | |
| ARSENIC | | | | 76 B | |
| BARIUM | | | | 2.6 B | |
| BERYLLIUM | | | 0.09 B | | |
| CADMIUM | | | | 46100 | |
| CALCIUM | | | | 7.7 B | |
| CHROMIUM | | | | 2 U | |
| COBALT | | | | 84 B | |
| IRON | | | 0.6 B | | |
| LEAD | | | | 17800 | |
| MAGNESIUM | | 0.03 B | | | |
| MERCURY | | | | | 1600 B |
| POTASSIUM | | | 1.2 U | | |
| SELENIUM | | | | 14800 | |
| SODIUM | | | | 13 B | |
| VANADIUM | | | | 37 | |
| ZINC | | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 402
LOCATION: USGS-19
MEDIUM: GROUND WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN402014A | IN402025A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401024B | IN401024B | | | | |
| | TYPE: | BAILER | BAILER | | | | |
| * 1,1,2-TRICHLORD-1,2,2-T(11.76) | | | 25 J | | | | |
| * 1,1,2-TRICHLORD-1,2,2-T(11.77) | | 31 J | | | | | |

S&A REQUEST: 403
LOCATION: LA 434851;LG 1123218
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN403015 | IN403026 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.51 | 0.51 | | | | |
| DO (PPM) | | 5.1 | 5.1 | | | | |
| PH (UNITS) | | 7.7 | 7.7 | | | | |
| RADS (CPM) | | 40 | 40 | | | | |
| TEMPERATURE (DEG C) | | 15 | 15 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN403015J | IN403026J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN403015J | IN403015J | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| CHLORIDE | | 67000 | 66000 | | | | |
| FLUORIDE | | 1000 | 1000 | | | | |
| NITRATE-N | | 2010 | 2020 | | | | |
| SULFATE | | 35000 | 35000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN403015H | IN403015H | IN403015I | IN403015I | IN403026H | IN403026H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN402014H | IN415020H | IN402014I | IN402014K | IN402014H | IN415020H |
| | TYPE: | PUMP | PUMP | PUMP | PUMP | PUMP | PUMP |
| ALUMINUM | | | | 224 | | | |
| ARSENIC | | | 2.7 B | | | | 2.8 B |
| BARIUM | | | | .76 B | | | |
| BERYLLIUM | | | | 2.8 B | | | |
| CADMIUM | | | 0.1 B | | | | 0.08 U |
| CALCIUM | | | | 52600 | | | |
| CHROMIUM | | | | 9.2 B | | | |
| COBALT | | | | 2 B | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 403
LOCATION: LA 434851;LG 1123218
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN403015H | IN403015H | IN403015I | IN403015I | IN403026H | IN403026H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN402014H | IN415020H | IN402014I | IN402014K | IN402014H | IN415020H |
| | TYPE: | PUMP | PUMP | PUMP | PUMP | PUMP | PUMP |
| COPPER | | | | 24 B | | | |
| IRON | | | | 185 | | | 1.2 B |
| LEAD | | | 1.1 B | | | | |
| MAGNESIUM | | | | 19300 | | | |
| MANGANESE | | | | 11 B | | | |
| MERCURY | | 0.22 | | | | 0.21 | |
| POTASSIUM | | | | | 6400 | | |
| SELENIUM | | | 1.9 B | | | | 1.4 B |
| SODIUM | | | | 31500 | | | |
| THALLIUM | | | 1.2 U | | | | 1.4 B |
| VANADIUM | | | | 16 B | | | |
| ZINC | | | | 39 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN403026I | IN403026I |
|---|---|---|---|
| | SDG NO: | IN402014I | IN402014K |
| | TYPE: | PUMP | PUMP |
| ALUMINUM | | 208 | |
| ARSENIC | | | |
| BARIUM | | 73 B | |
| BERYLLIUM | | 2.8 B | |
| CADMIUM | | | |
| CALCIUM | | 50600 | |
| CHROMIUM | | 8.8 B | |
| COBALT | | 2 U | |
| COPPER | | 18 B | |
| IRON | | 178 | |
| LEAD | | | |
| MAGNESIUM | | 18200 | |
| MANGANESE | | 8.8 B | |
| MERCURY | | | |
| POTASSIUM | | | 3400 B |
| SELENIUM | | | |
| SODIUM | | 30300 | |
| THALLIUM | | | |
| VANADIUM | | 16 B | |
| ZINC | | 38 | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 404
LOCATION: ANL W-1
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN404016 | IN404027 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.21 | 0.22 | | | | |
| PH (UNITS) | | 7.8 | 7.8 | | | | |
| TEMPERATURE (DEG C) | | 15 | 16 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN404016J | IN404027J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016J | IN404016J | | | | |
| | TYPE: | TAP | TAP | | | | |
| CHLORIDE | | 19000 | 19000 | | | | |
| FLUORIDE | | 1000 | 1000 | | | | |
| NITRATE-N | | 1420 * | 1290 * | | | | |
| SULFATE | | 14000 | 13000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN404016H | IN404016H | IN404016I | IN404016I | IN404027H | IN404027H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN415020H | IN404016I | IN404016K | IN404016H | IN423020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| ALUMINUM | | | | 204 | | | |
| ARSENIC | | | 2.5 B | | | | 1.5 B |
| BARIUM | | | | 35 B | | | |
| BERYLLIUM | | | | 2.5 B | | | |
| CADMIUM | | | 0.08 B | | | | 0.08 U |
| CALCIUM | | | | 37400 | | | |
| LEAD | | | 0.4 U | | | | 0.5 B |
| MAGNESIUM | | | | 13000 | | | |
| MERCURY | | 0.02 B | | | | 0.04 B | |
| POTASSIUM | | | | | 3300 B | | |
| SODIUM | | | | 17500 | | | |
| VANADIUM | | | | 15 B | | | |
| ZINC | | | | 7 U | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN404027I | IN404027I |
|---|---|---|---|
| | SDG NO: | IN404016I | IN404016K |
| | TYPE: | TAP | TAP |
| ALUMINUM | | 204 | |
| ARSENIC | | | |
| BARIUM | | 35 B | |
| BERYLLIUM | | 2.7 B | |
| CADMIUM | | | |
| CALCIUM | | 37400 | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 404
LOCATION: ANL W-1
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN404027I | IN404027I |
|---|---|---|---|
| | SDG NO: | IN404016I | IN404016K |
| | TYPE: | IAP | IAP |
| LEAD | | 13000 | |
| MAGNESIUM | | | 3400 B |
| MERCURY | | | |
| POTASSIUM | | 17900 | |
| SODIUM | | 14 B | |
| VANADIUM | | 7.1 | |
| ZINC | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN404016B | IN404027A |
|---|---|---|---|
| | SDG NO: | IN404016B | IN404016B |
| | TYPE: | IAP | IAP |
| METHYLENE CHLORIDE | | 5 | 2 J |

S&A REQUEST: 405
LOCATION: LA 433657;L.11256301
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN405017 |
|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.35 |
| PH (UNITS) | | 7.5 |
| TEMPERATURE (DEG C) | | 12 |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN405017J |
|---|---|---|
| | SDG NO: | IN405017J |
| | TYPE: | PUMP |
| CHLORIDE | | 18000 |
| FLUORIDE | | 1000 |
| NITRATE-N | | 1790 N* |
| SULFATE | | 25000 |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 405
LOCATION: LA 433657;L.11256301
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN405017H | IN405017I | IN405017I | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013H | IN401013I | IN401013K | | | |
| | TYPE: | PUMP | PUMP | PUMP | | | |
| ALUMINUM | | | 232 | | | | |
| BARIUM | | | 42 B | | | | |
| BERYLLIUM | | | 2.3 B | | | | |
| CALCIUM | | | 55000 | | | | |
| CHROMIUM | | | 7.6 B | | | | |
| MAGNESIUM | | | 21700 | | | | |
| MERCURY | | 0.06 B | | | | | |
| POTASSIUM | | | | 2500 B | | | |
| SODIUM | | | 13500 | | | | |
| VANADIUM | | | 17 B | | | | |
| ZINC | | | 134 | | | | |

S&A REQUEST: 406
LOCATION: TAP LOCATED TAN B.644
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN406018 | IN406029 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.2 | 0.21 | | | | |
| PH (UNITS) | | 7.9 | 7.8 | | | | |
| TEMPERATURE (DEG C) | | 11 | 11 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN406018J | IN406029J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018J | IN406018J | | | | |
| | TYPE: | TAP | TAP | | | | |
| CHLORIDE | | 11000 | 11000 | | | | |
| NITRATE-N | | 927 * | 1040 * | | | | |
| SULFATE | | 29000 N | 28000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN406018H | IN406018H | IN406018I | IN406018I | IN406029H | IN406029H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN423020H | IN406018I | IN406018K | IN404016H | IN423020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| ALUMINUM | | | | 244 | | | |
| ARSENIC | | | 1.6 B | | | | 2.6 B |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 406
LOCATION: TAP LOCATED TAN B.64
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN406018H | IN406018H | IN406018I | IN406018I | IN406029H | IN406029H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN423020H | IN406018I | IN406018K | IN404016H | IN423020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| BARIUM | | | | 81 B | | | |
| BERYLLIUM | | | | 1.4 B | | | 0.1 B |
| CADMIUM | | | 0.08 U | | | | |
| CALCIUM | | | | 44100 | | | |
| CHROMIUM | | | | 7.1 B | | | |
| IRON | | | | 26 B | | | 0.5 B |
| LEAD | | | 0.4 U | | | | |
| MAGNESIUM | | | | 15200 | | | |
| MERCURY | | 0.02 B | | | | 0.02 B | |
| POTASSIUM | | | | | 3100 B | | |
| SELENIUM | | | 1.5 B | | | | 1.3 B |
| SODIUM | | | | 9880 E | | | |
| VANADIUM | | | | 13 B | | | |
| ZINC | | | | 12 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN406029I | IN406029I |
|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K |
| | TYPE: | TAP | TAP |
| ALUMINUM | | 227 | |
| ARSENIC | | | |
| BARIUM | | 85 B | |
| BERYLLIUM | | 1.5 B | |
| CADMIUM | | | |
| CALCIUM | | 46500 | |
| CHROMIUM | | 6.9 B | |
| IRON | | 20 U | |
| LEAD | | | |
| MAGNESIUM | | 15900 | |
| MERCURY | | | |
| POTASSIUM | | | 3200 B |
| SELENIUM | | | |
| SODIUM | | 10700 E | |
| VANADIUM | | 14 B | |
| ZINC | | 15 B | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 406
LOCATION: TAP LOCATED TAN B.64
MEDIUM: GROUND WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN406018A | IN406029A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A | | | | |
| | TYPE: | TAP | TAP | | | | |
| ACETONE | | 6 J | 5 J | | | | |
| METHYLENE CHLORIDE | | 5 DB | 6 DB | | | | |
| TETRACHLOROETHENE | | 2 J | 3 J | | | | |
| TRICHLOROETHENE | | 4 J | 4 J | | | | |

S&A REQUEST: 407
LOCATION: BUILDING 632
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN407019 | IN407020 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.22 | 0.23 | | | | |
| PH (UNITS) | | 8 | 8 | | | | |
| TEMPERATURE (DEG C) | | 12 | 15 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN407019J | IN407020J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018J | IN406018J | | | | |
| | TYPE: | TAP | TAP | | | | |
| CHLORIDE | | 16000 | 17000 | | | | |
| FLUORIDE | | 1000 U | 1000 | | | | |
| NITRATE-N | | 791 * | 3160 * | | | | |
| SULFATE | | 36000 N | 34000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN407019H | IN407019H | IN407019I | IN407019I | IN407020H | IN407020H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN423020H | IN406018I | IN406018K | IN404016H | IN423020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| ALUMINUM | | | | 240 | | | |
| ARSENIC | | | 1.8 B | | | | 2.6 B |
| BARIUM | | | | 76 B | | | |
| BERYLLIUM | | | | 1.5 B | | | |
| CADMIUM | | | 0.09 B | | | | 0.16 B |
| CALCIUM | | | | 49800 | | | |
| CHROMIUM | | | | 6.3 B | | | |
| IRON | | | | 20 U | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 407
LOCATION: BUILDING 632
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN407019H | IN407019H | IN407019I | IN407019I | IN407020H | IN407020H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN423020H | IN406018I | IN406018K | IN404016H | IN423020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| LEAD | | | 0.6 B | | | | 0.8 B |
| MAGNESIUM | | | | 14900 | | | |
| MERCURY | | 0.02 B | | | | 0.02 B | |
| POTASSIUM | | | | | 2600 B | | |
| SELENIUM | | | 1.3 B | | | | 1.2 U |
| SODIUM | | | | 9900 E | | | |
| VANADIUM | | | | 12 B | | | |
| ZINC | | | | 8 U | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN407020I | IN407020I |
|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K |
| | TYPE: | TAP | TAP |
| ALUMINUM | | 325 | |
| ARSENIC | | 78 B | |
| BARIUM | | 1.1 B | |
| BERYLLIUM | | | |
| CADMIUM | | 50000 | |
| CALCIUM | | 7.2 B | |
| CHROMIUM | | 101 | |
| IRON | | | |
| LEAD | | 15000 | |
| MAGNESIUM | | | |
| MERCURY | | | 2500 B |
| POTASSIUM | | | |
| SELENIUM | | 9900 E | |
| SODIUM | | 13 B | |
| VANADIUM | | 76 | |
| ZINC | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN407019A | IN407020A |
|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A |
| | TYPE: | TAP | TAP |
| ACETONE | | 10 U | 3 J |
| METHYLENE CHLORIDE | | 4 JDB | 4 JDB |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 WELLS

DRAFT DO NOT CITE

S&A REQUEST: 408
LOCATION: BUILDING 612
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN408010 | IN408021 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.22 | 0.23 | | | | |
| PH (UNITS) | | 7.8 | 7.7 | | | | |
| TEMPERATURE (DEG C) | | 11 | 11 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN408010J | IN408021J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018J | IN406018J | | | | |
| | TYPE: | TAP | TAP | | | | |
| CHLORIDE | | 14000 | 16000 | | | | |
| NITRATE-N | | 1200 * | 1290 * | | | | |
| SULFATE | | 33000 N | 33000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN408010H | IN408010H | IN408010I | IN408010I | IN408021H | IN408021H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN423020H | IN406018I | IN406018K | IN404016H | IN423020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| ALUMINUM | | | | 257 | | | |
| ARSENIC | | | 2.3 B | | | | 2.2 B |
| BARIUM | | | | 86 B | | | |
| BERYLLIUM | | | | 1.3 B | | | |
| CADMIUM | | | 0.08 U | | | | 0.08 B |
| CALCIUM | | | | 50900 | | | |
| CHROMIUM | | | | 6.8 B | | | |
| MAGNESIUM | | | | 15400 | | | |
| MERCURY | | 0.02 B | | | | 0.02 B | |
| POTASSIUM | | | | | 2400 B | | |
| SELENIUM | | | 1.2 B | | | | 1.3 B |
| SODIUM | | | | 8430 E | | | |
| VANADIUM | | | | 12 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN408021I | IN408021I |
|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K |
| | TYPE: | TAP | TAP |
| ALUMINUM | | 257 | |
| ARSENIC | | | |
| BARIUM | | 85 B | |
| BERYLLIUM | | 1.2 B | |
| CADMIUM | | | |
| CALCIUM | | 50800 | |
| CHROMIUM | | 7.5 B | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 408
LOCATION: BUILDING 612
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN408021I | IN408021I |
|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K |
| | TYPE: | IAP | IAP |
| MAGNESIUM | | 15400 | |
| MERCURY | | | 2200 B |
| POTASSIUM | | | |
| SELENIUM | | 8390 E | |
| SODIUM | | 13 B | |
| VANADIUM | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN408010A | IN408021A |
|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A |
| | TYPE: | IAP | IAP |
| METHYLENE CHLORIDE | | 3 JDB | 3 JDB |
| TETRACHLOROETHENE | | 5 U | 1 J |
| TRICHLOROETHENE | | 3 J | 3 J |

S&A REQUEST: 409
LOCATION: S.W. CORNER OF INEL
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN409011 | IN409022 |
|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.15 | 0.16 |
| PH (UNITS) | | 7.7 | 8 |
| TEMPERATURE (DEG C) | | 11 | 11 |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN409011J | IN409022J |
|---|---|---|---|
| | SDG NO: | IN409011J | IN409011J |
| | TYPE: | PUMP | PUMP |
| CHLORIDE | | 28000 | 25000 |
| NITRATE-N | | 1990 | 2120 |
| SULFATE | | 25000 | 24000 |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 409
LOCATION: S.W. CORNER OF INEL
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN409011H | IN409011I | IN409011I | IN409022H | IN409022I | IN409022I |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011H | IN409011I | IN409011K | IN409011H | IN409011I | IN409011K |
| | TYPE: | PUMP | PUMP | PUMP | PUMP | PUMP | PUMP |
| ALUMINUM | | | 676 | | | 854 | |
| BARIUM | | | 29 B | | | 28 B | |
| BERYLLIUM | | | 2.5 B | | | 2.6 B | |
| CALCIUM | | | 40200 | | | 39700 | |
| CHROMIUM | | | 18 | | | 18 | |
| IRON | | | 506 | | | 604 | |
| MAGNESIUM | | | 9460 E | | | 9460 E | |
| MANGANESE | | | 15 | | | 17 | |
| MERCURY | | 0.02 B | | | 0.02 B | | |
| POTASSIUM | | | | 3300 B | | | 3400 B |
| SODIUM | | | 14000 E | | | 13600 E | |
| VANADIUM | | | 15 B | | | 15 B | |
| ZINC | | | 276 | | | 247 | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN409011A | IN409022A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011A | IN409011A | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| TOLUENE | | 5 U | 1 J | | | | |

S&A REQUEST: 410
LOCATION: LA 432703;LG 1130018
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN410014 | IN410025 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.23 | 0.23 | | | | |
| PH (UNITS) | | 7.8 | 7.9 | | | | |
| TEMPERATURE (DEG C) | | 14 | 14 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN410014J | IN410025J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN410014J | IN410014J | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| CHLORIDE | | 13000 | 13000 | | | | |
| NITRATE-N | | 610 N | 655 N | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 WELLS

DRAFT DO NOT CITE

S&A REQUEST: 410
LOCATION: LA 432703;LG 1130018
MEDIUM: GROUND WATER

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN410014J | IN410025J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN410014J | IN410014J | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| SULFATE | | 26000 N | 24000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN410014H | IN410014I | IN410014I | IN410025H | IN410025I | IN410025I |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011H | IN409011I | IN409011K | IN409011H | IN409011I | IN409011K |
| | TYPE: | PUMP | PUMP | PUMP | PUMP | PUMP | PUMP |
| ALUMINUM | | | 214 | | | 208 | |
| BARIUM | | | 41 B | | | 40 B | |
| BERYLLIUM | | | 2.7 B | | | 2.8 B | |
| CALCIUM | | | 44600 | | | 42100 | |
| CHROMIUM | | | 6.4 B | | | 6.1 B | |
| IRON | | | 20 U | | | 24 B | |
| MAGNESIUM | | | 16800 E | | | 16000 E | |
| MERCURY | | 0.02 B | | | 0.02 B | | |
| POTASSIUM | | | | 3000 B | | | 2800 B |
| SODIUM | | | 14800 E | | | 14700 E | |
| VANADIUM | | | 15 B | | | 15 B | |
| ZINC | | | 95 | | | 87 | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN410014A | IN410025A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011A | IN409011A | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| ACETONE | | 4 J | 10 U | | | | |
| METHYLENE CHLORIDE | | 5 U | 1 J | | | | |
| TOLUENE | | 1 J | 1 J | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 411
LOCATION: LA 432717;LG 1125015
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN411015 | IN411026 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.22 | 0.22 | | | | |
| PH (UNITS) | | 7.9 | 7.9 | | | | |
| TEMPERATURE (DEG C) | | 15 | 15 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN411015J | IN411026J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN410014J | IN410014J | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| CHLORIDE | | 20000 | 20000 | | | | |
| FLUORIDE | | 1000 | 1000 | | | | |
| NITRATE-N | | 1150 N | 1240 N | | | | |
| SULFATE | | 18000 N | 18000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN411015H | IN411015I | IN411015I | IN411026H | IN411026I | IN411026I |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011H | IN411015I | IN411015K | IN409011H | IN411015I | IN411015K |
| | TYPE: | PUMP | PUMP | PUMP | PUMP | PUMP | PUMP |
| ALUMINUM | | | 204 | | | 211 | |
| BARIUM | | | 39 B | | | 38 B | |
| BERYLLIUM | | | 2.7 B | | | 2.7 B | |
| CALCIUM | | | 36900 | | | 36400 | |
| CHROMIUM | | | 8 B | | | 7.8 B | |
| IRON | | | 68 B | | | 53 B | |
| MAGNESIUM | | | 16000 E | | | 15800 E | |
| MERCURY | | 0.02 B | | | 0.01 B | | |
| POTASSIUM | | | | 3500 B | | | 3200 B |
| SODIUM | | | 18100 | | | 18700 | |
| VANADIUM | | | 18 B | | | 18 B | |
| ZINC | | | 181 | | | 171 | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN411015A | IN411026A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011A | IN409011A | | | | |
| | TYPE: | PUMP | PUMP | | | | |
| ACETONE | | 10 U | 4 J | | | | |
| TOLUENE | | 1 J | 5 U | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2
WELLS

S&A REQUEST: 412
LOCATION: FIRE TRAINING SITE
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN412016 | IN412027 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.12 | 0.12 | | | | |
| PH (UNITS) | | 7.7 | 7.7 | | | | |
| TEMPERATURE (DEG C) | | 14 | 14 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN412016J | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016J | | | | | |
| | TYPE: | IAP | | | | | |
| CHLORIDE | | 14000 | | | | | |
| NITRATE-N | | 1200 * | | | | | |
| SULFATE | | 21000 | | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN412016H | IN412016H | IN412016I | IN412016I | IN412027A | IN412027A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN423020H | IN406018I | IN406018K | IN404016H | IN423020H |
| | TYPE: | IAP | IAP | IAP | IAP | IAP | IAP |
| ALUMINUM | | | | 267 | | | |
| BARIUM | | | | 70 B | | | |
| BERYLLIUM | | | | 1.1 B | | | 0.11 B |
| CADMIUM | | | 0.46 B | | | | |
| CALCIUM | | | | 53400 | | | |
| CHROMIUM | | | | 7.4 B | | | |
| MAGNESIUM | | | | 18900 | | | |
| MERCURY | | 0.02 B | | | | 0.02 B | |
| POTASSIUM | | | | | 2100 B | | |
| SODIUM | | | | 11000 E | | | |
| VANADIUM | | | | 15 B | | | |
| ZINC | | | | 12 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN412027B | IN412027B |
|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K |
| | TYPE: | IAP | IAP |
| ALUMINUM | | 266 | |
| BARIUM | | 71 B | |
| BERYLLIUM | | 1.6 B | |
| CADMIUM | | | |
| CALCIUM | | 56300 | |
| CHROMIUM | | 7 B | |
| MAGNESIUM | | 19800 | |
| MERCURY | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 412
LOCATION: FIRE TRAINING SITE
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN412027B | IN412027B | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K | | | | |
| | TYPE: | TAP | TAP | | | | |
| POTASSIUM | | | 2300 B | | | | |
| SODIUM | | 11500 E | | | | | |
| VANADIUM | | 15 B | | | | | |
| ZINC | | 8 U | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN412016A | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018A | | | | | |
| | TYPE: | TAP | | | | | |
| METHYLENE CHLORIDE | | 1 JD | | | | | |
| 1,1,1-TRICHLOROETHANE | | 2 J | | | | | |

S&A REQUEST: 414
LOCATION: BLDG. CFA-1
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN414018 | IN414029 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.62 | 0.62 | | | | |
| PH (UNITS) | | 7.4 | 7.4 | | | | |
| TEMPERATURE (DEG C) | | 14 | 14 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN414018I | IN414029J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN414018I | IN414018I | | | | |
| | TYPE: | TAP | TAP | | | | |
| CHLORIDE | | 77000 | 80000 | | | | |
| NITRATE-N | | 5880 | 4750 | | | | |
| SULFATE | | 32000 | 30000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN414018H | IN414018H | IN414018J | IN414018J | IN414029H | IN414029H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN415020H | IN406018I | IN406018K | IN404016H | IN415020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| ALUMINUM | | | | 281 | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 414
LOCATION: BLDG. CFA-1
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN414018H | IN414018H | IN414018J | IN414018J | IN414029H | IN414029H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN415020H | IN406018I | IN406018K | IN404016H | IN415020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| ARSENIC | | | 1.1 U | | | | 1.2 B |
| BARIUM | | | | 75 B | | | |
| BERYLLIUM | | | | 2.7 B | | | 0.09 B |
| CADMIUM | | | 0.08 U | | | | |
| CALCIUM | | | | 60200 | | | |
| CHROMIUM | | | | 16 | | | 0.4 U |
| LEAD | | | 0.5 B | | | | |
| MAGNESIUM | | | | 19200 | | | |
| MERCURY | | 0.02 B | | | | 0.03 B | |
| POTASSIUM | | | | | 3500 B | | |
| SELENIUM | | | 1.5 B | | | | 1.4 B |
| SODIUM | | | | 22800 E | | | |
| THALLIUM | | | 1.3 B | | | | 1.2 U |
| VANADIUM | | | | 14 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN414029I | IN414029I |
|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K |
| | TYPE: | TAP | TAP |
| ALUMINUM | | 271 | |
| ARSENIC | | | |
| BARIUM | | 77 B | |
| BERYLLIUM | | 1.6 B | |
| CADMIUM | | | |
| CALCIUM | | 61900 | |
| CHROMIUM | | 16 | |
| LEAD | | | |
| MAGNESIUM | | 19600 | |
| MERCURY | | | |
| POTASSIUM | | | 3700 B |
| SELENIUM | | | |
| SODIUM | | 22500 E | |
| THALLIUM | | | |
| VANADIUM | | 13 B | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN414018A | IN414029A |
|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A |
| | TYPE: | TAP | TAP |
| ACETONE | | 10 U | 12 |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 WELLS

DRAFT DO NOT CITE

S&A REQUEST: 414
LOCATION: BLDG. CFA-1
MEDIUM: GROUND WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN414018A | IN414029A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A | | | | |
| | TYPE: | IAP | IAP | | | | |
| CHLOROFORM | | 2 J | 2 J | | | | |
| METHYLENE CHLORIDE | | 2 JDB | 9 DB | | | | |
| TOLUENE | | 1 J | 5 U | | | | |
| TRICHLOROETHENE | | 5 U | 1 J | | | | |

S&A REQUEST: 415
LOCATION: BLDG. SL-1
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN415019 | IN415020 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.06 | 0.06 | | | | |
| PH (UNITS) | | 7.6 | 7.6 | | | | |
| TEMPERATURE (DEG C) | | 16 | 16 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN415019J | IN415020J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN414018I | IN414018I | | | | |
| | TYPE: | IAP | IAP | | | | |
| CHLORIDE | | 18000 | 21000 | | | | |
| FLUORIDE | | 1000 UN | 1000 N | | | | |
| NITRATE-N | | 1220 | 1400 | | | | |
| SULFATE | | 18000 | 19000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN415019H | IN415019H | IN415019I | IN415019I | IN415020H | IN415020H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN415020H | IN406018I | IN406018K | IN404016H | IN415020H |
| | TYPE: | IAP | IAP | IAP | IAP | IAP | IAP |
| ALUMINUM | | | | 190 B | | | |
| ARSENIC | | | 2.6 B | | | | 2.9 B |
| BARIUM | | | | 36 B | | | |
| BERYLLIUM | | | | 2.1 B | | | |
| CADMIUM | | | 0.09 B | | | | 0.11 B |
| CALCIUM | | | | 36600 | | | |
| CHROMIUM | | | | 6.5 B | | | |
| LEAD | | | 1 B | | | | 0.9 B |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 415
LOCATION: BLDG. SL-1
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN415019H | IN415019H | IN415019I | IN415019I | IN415020H | IN415020H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN415020H | IN406018I | IN406018K | IN404016H | IN415020H |
| | TYPE: | TAP | TAP | TAP | TAP | TAP | TAP |
| MAGNESIUM | | | | 15600 | | | |
| MERCURY | | 0.02 B | | | | 0.03 B | |
| POTASSIUM | | | | | 3400 B | | |
| SELENIUM | | | 1.2 U | | | | 1.2 B |
| SODIUM | | | | 18200 E | | | |
| VANADIUM | | | | 16 B | | | |
| ZINC | | | | 12 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN415020I | IN415020I |
|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K |
| | TYPE: | TAP | TAP |
| ALUMINUM | | 175 B | |
| ARSENIC | | 33 B | |
| BARIUM | | 2 B | |
| BERYLLIUM | | | |
| CADMIUM | | 34400 | |
| CALCIUM | | 6.2 B | |
| CHROMIUM | | | |
| LEAD | | 14700 | |
| MAGNESIUM | | | |
| MERCURY | | | 3200 B |
| POTASSIUM | | | |
| SELENIUM | | 16900 E | |
| SODIUM | | 15 B | |
| VANADIUM | | 8 U | |
| ZINC | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN415019A | IN415020A |
|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A |
| | TYPE: | TAP | TAP |
| ACETONE | | 10 U | 9 J |
| METHYLENE CHLORIDE | | 6 DB | 4 JDB |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 416
LOCATION: DOWNGRADIENT OF RWMC
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN416010 | | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.22 | | | | | |
| PH (UNITS) | | 8.1 | | | | | |
| TEMPERATURE (DEG C) | | 15 | | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN416010J | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011J | | | | | |
| | TYPE: | PUMP | | | | | |
| CHLORIDE | | 14000 | | | | | |
| NITRATE-N | | 791 | | | | | |
| SULFATE | | 27000 | | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN416010H | IN416010I | IN416010I | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011H | IN409011I | IN409011K | | | |
| | TYPE: | PUMP | PUMP | PUMP | | | |
| ALUMINUM | | | 231 | | | | |
| BARIUM | | | 42 B | | | | |
| BERYLLIUM | | | 2.7 B | | | | |
| CADMIUM | | | 1.4 B | | | | |
| CALCIUM | | | 47700 | | | | |
| CHROMIUM | | | 19 | | | | |
| COPPER | | | 12 B | | | | |
| IRON | | | 159 | | | | |
| MAGNESIUM | | | 16800 E | | | | |
| MERCURY | | 0.02 B | | | | | |
| POTASSIUM | | | | 2900 B | | | |
| SODIUM | | | 11500 E | | | | |
| VANADIUM | | | 14 B | | | | |
| ZINC | | | 304 | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN416010A | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011A | | | | | |
| | TYPE: | PUMP | | | | | |
| TOLUENE | | 1 J | | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2
WELLS

S&A REQUEST: 417
LOCATION: SOUTH OF ICPP
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: IN417011 |
|---|---|
| CONDUCTIVITY (MS/CM) | 0.79 |
| PH (UNITS) | 7.5 |
| TEMPERATURE (DEG C) | 12 |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: IN417011J<br>SDG NO: IN417011J<br>TYPE: PUMP |
|---|---|
| CHLORIDE | 160000 |
| FLUORIDE | 1000 |
| NITRATE-N | 6330 N |
| SULFATE | 40000 N |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: IN417011H<br>SDG NO: IN401013H<br>TYPE: PUMP | IN417011I<br>IN401013I<br>PUMP | IN417011I<br>IN401013K<br>PUMP |
|---|---|---|---|
| ALUMINUM | | 318 | |
| BARIUM | | 210 | |
| BERYLLIUM | | 2.9 B | |
| CALCIUM | | 79200 | |
| CHROMIUM | | 12 | |
| MAGNESIUM | | 21900 | |
| MERCURY | 0.24 | | |
| POTASSIUM | | | 5100 |
| SODIUM | | 64600 | |
| VANADIUM | | 14 B | |
| ZINC | | 123 | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 418
LOCATION: USGS-37
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN418012 | | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.61 | | | | | |
| DO (PPM) | | 7.9 | | | | | |
| PH (UNITS) | | 7.7 | | | | | |
| TEMPERATURE (DEG C) | | 18 | | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN418012J | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013J | | | | | |
| | TYPE: | PUMP | | | | | |
| CHLORIDE | | 87000 | | | | | |
| NITRATE-N | | 4970 N | | | | | |
| SULFATE | | 29000 | | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN418012H | IN418012I | IN418012I | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013H | IN402014I | IN402014K | | | |
| | TYPE: | PUMP | PUMP | PUMP | | | |
| ALUMINUM | | | 249 | | | | |
| BARIUM | | | 143 B | | | | |
| BERYLLIUM | | | 3 B | | | | |
| CALCIUM | | | 64900 | | | | |
| CHROMIUM | | | 11 | | | | |
| IRON | | | 94 B | | | | |
| MAGNESIUM | | | 16800 | | | | |
| MERCURY | | 0.08 B | | | | | |
| POTASSIUM | | | | 3700 B | | | |
| SODIUM | | | 32600 | | | | |
| VANADIUM | | | 14 B | | | | |
| ZINC | | | 265 | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2
WELLS

S&A REQUEST: 419
LOCATION: SOUTHEAST OF ICPP
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: IN419013 |
|---|---|
| CONDUCTIVITY (MS/CM) | 0.46 |
| PH (UNITS) | 7.5 |
| TEMPERATURE (DEG C) | 11 |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: IN419013J<br>SDG NO: IN417011J<br>TYPE: PUMP |
|---|---|
| CHLORIDE | 72000 |
| NITRATE-N | 3620 N |
| SULFATE | 35000 N |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: IN419013H<br>SDG NO: IN401013H<br>TYPE: PUMP | IN419013I<br>IN401013I<br>PUMP | IN419013I<br>IN401013K<br>PUMP |
|---|---|---|---|
| ALUMINUM | | 651 | |
| BARIUM | | 121 B | |
| BERYLLIUM | | 2.5 B | |
| CALCIUM | | 57800 | |
| CHROMIUM | | 12 | |
| IRON | | 296 | |
| MAGNESIUM | | 16800 | |
| MANGANESE | | 11 B | |
| MERCURY | 0.05 B | | 4300 B |
| POTASSIUM | | 29800 | |
| SODIUM | | 15 B | |
| VANADIUM | | 195 | |
| ZINC | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 420
LOCATION: LA 433401;LG 1125510
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN420016 | | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.27 | | | | | |
| DO (PPM) | | 6.4 | | | | | |
| PH (UNITS) | | 7.7 | | | | | |
| RADS (CPM) | | 40 | | | | | |
| TEMPERATURE (DEG C) | | 12 | | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN420016J | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN403015J | | | | | |
| | TYPE: | PUMP | | | | | |
| CHLORIDE | | 21000 | | | | | |
| NITRATE-N | | 710 | | | | | |
| SULFATE | | 21000 | | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN420016H | IN420016I | IN420016I | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN402014H | IN402014I | IN402014K | | | |
| | TYPE: | PUMP | PUMP | PUMP | | | |
| ALUMINUM | | | 167 B | | | | |
| BARIUM | | | 61 B | | | | |
| BERYLLIUM | | | 2.5 B | | | | |
| CALCIUM | | | 39100 | | | | |
| CHROMIUM | | | 10 | | | | |
| IRON | | | 296 | | | | |
| MAGNESIUM | | | 15600 | | | | |
| MERCURY | | 0.04 B | | | | | |
| POTASSIUM | | | | 4000 B | | | |
| SODIUM | | | 14300 | | | | |
| VANADIUM | | | 19 B | | | | |
| ZINC | | | 184 | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2
WELLS

S&A REQUEST: 421
LOCATION: USGS-43
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: IN421017 |
|---|---|
| CONDUCTIVITY (MS/CM) | 0.37 |
| PH (UNITS) | 8 |
| TEMPERATURE (DEG C) | 14 |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: IN421017J<br>SDG NO: IN409011J<br>TYPE: PUMP |
|---|---|
| CHLORIDE | 24000 |
| NITRATE-N | 3840 |
| SULFATE | 25000 |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: IN421017H<br>SDG NO: IN409011H<br>TYPE: PUMP | IN421017I<br>IN409011I<br>PUMP | IN421017I<br>IN409011K<br>PUMP |
|---|---|---|---|
| ALUMINUM | | 316 | |
| BARIUM | | 90 B | |
| BERYLLIUM | | 3 B | |
| CADMIUM | | 1.3 B | |
| CALCIUM | | 59200 | |
| CHROMIUM | | 8.8 B | |
| IRON | | 289 | |
| MAGNESIUM | | 17500 E | |
| MANGANESE | | 5.6 B | |
| MERCURY | 0.03 B | | |
| POTASSIUM | | | 2500 B |
| SODIUM | | 13100 E | |
| VANADIUM | | 14 B | |
| ZINC | | 178 | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: IN421017A<br>SDG NO: IN404016B<br>TYPE: PUMP |
|---|---|
| ACETONE | 9 J |
| METHYLENE CHLORIDE | 1 J |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 422
LOCATION: DOWNGRADIENT OF TRA
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN422018 | | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.52 | | | | | |
| PH (UNITS) | | 8.1 | | | | | |
| TEMPERATURE (DEG C) | | 16 | | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN422018J | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011J | | | | | |
| | TYPE: | PUMP | | | | | |
| CHLORIDE | | 19000 | | | | | |
| NITRATE-N | | 1670 | | | | | |
| SULFATE | | 120000 | | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN422018H | IN422018I | IN422018I | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011H | IN409011I | IN409011K | | | |
| | TYPE: | PUMP | PUMP | PUMP | | | |
| ALUMINUM | | | 349 | | | | |
| BARIUM | | | 59 B | | | | |
| BERYLLIUM | | | 3.1 B | | | | |
| CALCIUM | | | 87700 | | | | |
| CHROMIUM | | | 252 | | | | |
| MAGNESIUM | | | 20100 E | | | | |
| MERCURY | | 0.02 B | | | | | |
| POTASSIUM | | | | 3300 B | | | |
| SODIUM | | | 14200 E | | | | |
| VANADIUM | | | 12 B | | | | |
| ZINC | | | 488 | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN422018A | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016B | | | | | |
| | TYPE: | PUMP | | | | | |
| METHYLENE CHLORIDE | | 1 J | | | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2
WELLS

S&A REQUEST: 423
LOCATION: TEST REACTOR AREA
MEDIUM: GROUND WATER

| FIELD MEASUREMENTS | SAMP NO: | IN423019 | IN423020 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.18 | 0.18 | | | | |
| PH (UNITS) | | 7.9 | 7.9 | | | | |
| TEMPERATURE (DEG C) | | 21 | 21 | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN423019J | IN423020J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016J | IN404016J | | | | |
| | TYPE: | IAP | IAP | | | | |
| CHLORIDE | | 11000 | 11000 | | | | |
| NITRATE-N | | 1200 * | 1270 * | | | | |
| SULFATE | | 20000 | 20000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN423019H | IN423019H | IN423019I | IN423019I | IN423020H | IN423020H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016H | IN423020H | IN406018I | IN406018K | IN404016H | IN423020H |
| | TYPE: | IAP | IAP | IAP | IAP | IAP | IAP |
| ALUMINUM | | | | 267 | | | 1.3 B |
| ARSENIC | | | 1.1 U | | | | |
| BARIUM | | | | 52 B | | | |
| BERYLLIUM | | | | 1.3 B | | | 0.08 U |
| CADMIUM | | | 0.2 B | | | | |
| CALCIUM | | | | 55400 | | | |
| CHROMIUM | | | | 6.1 B | | | |
| MAGNESIUM | | | | 20300 | | | |
| MERCURY | | 0.03 B | | | | 0.02 B | |
| POTASSIUM | | | | | 1600 B | | |
| SELENIUM | | | 1.2 U | | | | 1.5 B |
| SODIUM | | | | 10800 E | | | |
| VANADIUM | | | | 14 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN423020I | IN423020I |
|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K |
| | TYPE: | IAP | IAP |
| ALUMINUM | | 255 | |
| ARSENIC | | 50 B | |
| BARIUM | | 1.4 B | |
| BERYLLIUM | | | |
| CADMIUM | | 53800 | |
| CALCIUM | | 5.4 B | |
| CHROMIUM | | | |

TABLE 4.3.2 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 2 DRAFT DO NOT CITE
WELLS

S&A REQUEST: 423
LOCATION: TEST REACTOR AREA
MEDIUM: GROUND WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN423020I | IN423020I | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018I | IN406018K | | | | |
| | TYPE: | IAP | IAP | | | | |
| MAGNESIUM | | 19800 | | | | | |
| MERCURY | | | | | | | |
| POTASSIUM | | | 1600 B | | | | |
| SELENIUM | | | | | | | |
| SODIUM | | 10500 E | | | | | |
| VANADIUM | | 13 B | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN423019A | IN423020A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A | | | | |
| | TYPE: | IAP | IAP | | | | |
| METHYLENE CHLORIDE | | 1 JDB | 1 JDB | | | | |

TABLE 4.4.2 GROUNDWATER SAMPLE LOCATIONS AND PURGE VOLUMES
ENVIRONMENTAL PROBLEM 2

| WELL ID | SAMPLE NUMBER | DATE | SAMPLING METHOD | VOLUME (L) |
|---|---|---|---|---|
| ANL - W-1 | IN404016 | 20JUN88 | TAP | 64345 |
| ANL - W-1 | IN404027 | 20JUN88 | TAP | 64345 |
| ANP-1 | IN408010 | 17JUN88 | TAP | 28387 |
| ANP-1 | IN408021 | 17JUN88 | TAP | 28387 |
| ANP-8 | IN406018 | 17JUN88 | TAP | 15140 |
| ANP-8 | IN406029 | 17JUN88 | TAP | 15140 |
| CFA-1 | IN414018 | 16JUN88 | TAP | * |
| CFA-1 | IN414029 | 16JUN88 | TAP | * |
| FET-1 | IN407019 | 17JUN88 | TAP | 35957 |
| FET-1 | IN407020 | 17JUN88 | TAP | 35957 |
| FIRE STA. | IN412016 | 17JUN88 | TAP | * |
| FIRE STA. | IN412027 | 17JUN88 | TAP | * |
| P&W 2 | IN401013 | 13JUL88 | PUMP | 5200.6 |
| P&W 2 | IN401024 | 13JUL88 | PUMP | 5200.6 |
| P&W 2 | IN401035 | 15JUL88 | PUMP | 5200.6 |
| SL-1 | IN415019 | 16JUN88 | TAP | * |
| SL-1 | IN415020 | 16JUN88 | TAP | * |
| TRA-1 | IN423019 | 17JUN88 | TAP | * |
| TRA-1 | IN423020 | 17JUN88 | TAP | * |
| USGS-105 | IN410014 | 23JUN88 | PUMP | 4091.6 |
| USGS-105 | IN410025 | 23JUN88 | PUMP | 4091.6 |
| USGS-110 | IN411015 | 23JUN88 | PUMP | 1570.8 |
| USGS-110 | IN411026 | 23JUN88 | PUMP | 1570.8 |
| USGS-113 | IN417011 | 28JUN88 | PUMP | 1570.8 |
| USGS-19 | IN402014 | 15JUL88 | BAILER | 2248.3 |
| USGS-19 | IN402025 | 15JUL88 | BAILER | 2248.3 |
| USGS-27 | IN403015 | 20JUL88 | PUMP | 1892.5 |
| USGS-27 | IN403026 | 20JUL88 | PUMP | 1892.5 |
| USGS-37 | IN418012 | 14JUL88 | PUMP | 7040.1 |
| USGS-43 | IN421017 | 21JUN88 | PUMP | 3603.3 |
| USGS-65 | IN422018 | 21JUN88 | PUMP | 2361.8 |
| USGS-82 | IN420016 | 20JUL88 | PUMP | 4621.5 |
| USGS-86 | IN409011 | 22JUN88 | PUMP | 2301.3 |
| USGS-86 | IN409022 | 22JUN88 | PUMP | 2301.3 |
| USGS-90 | IN416010 | 22JUN88 | PUMP | 529.9 |
| 116 | IN419013 | 28JUN88 | PUMP | 2106.4 |
| 98 | IN405017 | 28JUN88 | PUMP | 1721.0 |

*Purge volume not determined; samples collected after pH and conductivity stabilized.

## 4.8 Environmental Problem 3: Leaching Ponds

**Requests:** 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, and 522.
**Requester:** Scholl.
**Finding and Basis:** It was thought that the use of leaching ponds at the INEL may have resulted in releases of hazardous and/or radioactive wastes to the soil and/or groundwater. Leaching ponds and ANL-W ditches at the INEL that may be receiving or may have received hazardous and/or radioactive contaminants include the ANL-W industrial waste pond and its related ditches, the TRA cold waste pond, the TRA chemical/corrosive pond, the TAN/TSF disposal pond, the TAN/LOFT disposal pond, and ICPP percolation ponds 1 and 2.

There are eight percolation waste ponds at TRA: three warm waste ponds, one chemical/corrosive pond, two cold waste ponds, and two sewage disposal ponds. The warm waste ponds received all liquid waste from the site from 1952 to 1964. In 1964, cooling waters were diverted to an injection well on-site, with the remainder of the liquid waste still discharging to the warm waste ponds. The first pond of the three was suspected to have the highest concentrations of hazardous and radioactive constituents because it had been there the longest. Contaminants were believed to include metals, organics, inorganics, radionuclides (tritium, chromium, cobalt, cesium, strontium), caustics, and acids. Pesticides were also suspected within these ponds; of concern were dieldrin, endrin, and DDT (DDE, DDD).

The two cold waste ponds on-site received cooling tower blowdown that contained chromium and, potentially, radionuclides and metals. Sampling at these six ponds has not been consistent with regard to media or analytes.

The chemical/corrosive waste pond received demineralizer waste consisting mainly of metals, acids, and bases. Pesticides, solvents, and PCBs may also have been discharged to this pond, as it was common practice in the past to bring barrels

of liquid waste to the pond and empty them there. Biocides [containing bis(2-ethylhexyl) phthalate] which are used in the water of cooling towers were also thought to be discharged to the pond.

The TAN/TSF disposal pond received cooling waters, liquids from process drains, sanitary sewage, and industrial waste water. Known contaminants included: metals (arsenic, barium, chromium, cadmium, mercury, lead, silver); radionuclides (tritium, cobalt-60, cobalt-58, cobalt-57, manganese-57, silver-110, and miscellaneous fission products); phosphates; sulfates; carbon tetrachloride; caustics; and acids. Water from this pond was being sampled but analyzed for only a few constituents.

The TAN/LOFT disposal pond received cooling water and boiler blowdown and other liquid effluent. Contaminants from TAN/LOFT may have included: phosphates; hydrazine; metals (lead, mercury, arsenic, cadmium, barium, silver, boron, and chromium); caustics; acids; and radionuclides (tritium, cesium-137, cerium, cobalt-60, zirconium, niobium, strontium-90, and other miscellaneous fission products). Water from this pond was being sampled but analyzed for only a few constituents.

The ICPP percolation ponds received, and are receiving, "service waste" consisting of inorganics, metals, radionuclides, and possibly some organics. Discharge comes from process equipment waste overhead condensate, cooling tower or heat exchanger blowdown, demineralizer wastes, and, potentially, laboratory wastewater. Water samples were being collected but analyzed for radionuclides only.

The ANL-W percolation pond and ditches received cooling tower blowdown and historically received wastewater from photoprocessing operations and from laboratory drains and sinks. Contaminants were thought to include, but not be limited to, metals (chromium, cadmium, silver, barium, lead); organics; pesticides; dimethylamine; and radionuclides (tritium, cerium, cesium, cobalt-60, zirconium,

and niobium). A variety of samples had been taken at the ANL-W percolation pond for both water and sediment, but only to a shallow depth (15 cm). Recent investigations by ANL-W indicated that there may be no perched aquifer below the ANL-W Industrial Waste Pond. Based on this data (when it becomes available) and the results of the INEL Sampling and Analysis Survey, the Survey INEL Preliminary Report will be adjusted to reflect the true situation.

All ponds are 40 to 200 ft above perched aquifers or the Snake River Plain aquifer, with the possible exception of the ANL-W Industrial Waste Pond.

### 4.8.1 Sampling and Analysis Objectives

**Statement:** Samples of the water, sediment/soil, and saturated zone within the ponds and underlying regions were to be collected to ascertain the presence, type, and depth of contaminants in relation to instrument detection limits and method detection limits.

**Supporting Information:** Most of these ponds had been receiving a large variety of hazardous and radioactive constituents in unknown quantities for years. It was not known whether these contaminants were migrating to the groundwater or concentrating in the pond sediments or the vadose zone below.

### 4.8.2 Sampling and Analytical Design

#### 4.8.2.1 Sampling Design

**Request 501: TRA 1952 Northernmost Warm Waste Pond (Water) (Fig. 4.3a).** Six grab vertical composite water samples and 6 to 18 grab volatile samples (Sampling Method: References E4.2.4 and E4.3.1.2) were to be collected at three points in the TRA northernmost warm waste pond where the velocity was decreased. Sample locations were marked so that sediment samples for Request 502 could be collected at the same locations (Field Method: Reference E4.5.2 for

pH and E4.5.1 for temperature). The three sampling areas were considered to be heterogenous.

Samples were scheduled for collection on 24JUL88 at 0600; the early hour was scheduled at the request of the INEL Safety Supervisor because of the potential resuspension of dust caused by increasing wind speeds due to thermals produced by rising temperatures. At the time the team arrived on-site, the temperature was in the mid-90$^{o}$F range and winds were calm under a clear sky. The sample team dressed out in blues and yellow anti-C coveralls, including rubber boots. A Health Physicist escort was present during all sampling. Dosimeters were placed on the calf, thigh, and body of the team members and "Band-Aid" dosimeters were placed on their insteps and on the tops of their wrists. Grid numbers were distinct, arbitrary numbers assigned in the laboratory to assist in expediting tracking of samples. In the field, the area was gridded and the sample locations (determined from a random number table) were numbered according to the laboratory assigned numbers. These grid numbers and sample numbers were preassigned initially to minimize exposure of personnel in the field. A boat provided by Envirodyne was equipped with a center sampling port for water and sediment collection. The deepest point of the pond was 4 ft at the northwest corner of the outfall (inlet) pipe. The depth of the water at the transfer pipe was 1.5 ft and less than 1 ft near the sedge patch. Water samples were collected first, with a COLIWASA, in each approximately 20 ft$^2$ area. After collection, all samples were radiation screened and labeled, and equipment was decontaminated and packaged under supervision of the Health Physicist.

Samples IN501092 (grid 3 at 0804), -036 (grid 3 at 0805), -105 (grid 18 at 0815), and -047 (grid 18 at 0816) were collected from the 0 to 5 ft depth of the inlet area. Samples IN501116 (grid 10 at 0920), -058 (grid 10 at 0921), -070 (grid 23 at 0935), and -014 (grid 23 at 0936) were collected from the 0.0 to 2.0 ft depth of the outlet area. Samples IN501127 (grid 14 at 1030), -069 (grid 14 at 1030), -081 (grid 29 at 1037), and -025 (grid 29 at 1037) were collected from the 0.0 to 0.5 ft depth of the reduced flow area. QC rinsate sample IN501252 was

collected at 1215. Samples IN501138, -149, -150, -161, -172, -183, -194, -207, -218, -229, -230, and -241 could not be collected because of the shallow depth of the pond. No pesticides aliquots were collected due to DOE directive to ORNL Field Team Leader.

**Request 502: TRA 1952 Northernmost Warm Waste Pond (Sediment)** (Fig. 4.3b). Six grab sediment samples (Sampling Method: Reference "'TURCO' Method for Sediment Sampling in the INEL Ponds," INEL Sampling and Analysis Plan, Appendix E) were to be taken from the same locations as the water samples for Request 501 (Field Method: References E4.5.2 for pH and E4.5.1 for temperature). Two sediment samples were to be collected from each location after water sampling to prevent suspension of sediments in the water column. The three sampling areas were considered to be heterogenous.

Samples were to be collected at the same time as Request 501, as requested by the INEL Safety Supervisor, because of potential resuspension of dust caused by increasing wind speeds due to thermals produced by rising temperatures. The temperature was in the mid-90$^{o}$F range and winds were calm under a clear sky. The sample team dressed in blues and yellow anti-C coveralls, including rubber boots. A Health Physicist escort was present during all sampling. Dosimeters were placed on the calf, thigh, body, instep ("Band-Aid" dosimeters), and wrist of team members. A boat provided by Envirodyne was equipped with a center sampling port for water and sediment collection. The deepest point of the pond was 4 ft at the inlet area. The depth of the water at the outlet area was 1.5 ft, and less than 1 ft near the reduced flow area.

Two samples were to be collected from each 20 ft$^2$ area of interest. Field measurements for pH and temperature were not taken because of the radiation hazard and the difficulty of placing the probe through the water column. Samples IN502015 (grid 23 at 0825) and -048 (grid 23 at 0850) were collected from the 0.0 to 1.5 ft depth of the inlet area. Samples IN502026 (grid 29 at 0943) and -059 (grid 29 at 0955) were collected from the 0.0 to 1.0 ft depth of

the outlet area. Samples IN502037 (grid 3 at 1015) and IN502060 (grid 3 at 1025) were collected from the 0.0 to 0.5 ft depth of the reduced flow area. QC rinsate sample IN502071 was collected at 1215. After collection, all samples were radiation screened and labeled, and equipment was decontaminated and packaged under the supervision of the Health Physicist and transported to the CFA area. Radiation screen readings ranged from 1 to 2 mR/hr among individual containers. Because of the shallow water and the sediment depths, the sediment temperature was the same (90$^{o}$F) as the field measurements in Request 501. The sampling depths at 5 ft intervals prescribed in the INEL Sampling and Analysis Plan could not be met because of the shallow depths of water and sediment. Pesticide samples were not collected per DOE Headquarters directive to the ORNL Sampling Team Leader.

**Request 503: TRA 1952 Northernmost Warm Waste Pond (Soil) (Fig. 4.3c).** Three grab vertical composite soil samples were to be collected (Sampling Method: Reference E5.2.3) from the perimeter (as close to the berm as possible) of the TRA 1952 Warm Waste Pond from the top of the saturated zone to bedrock at a depth to be determined (Field Method: References E4.5.1 for temperature and E4.5.2 for pH ).

The Sampling Team arrived on-site 28SEP88 at 0800. A fence was cut for entry at 0805. The temperature was approximately 50$^{o}$F, skies were clear and winds were calm. The area was gravel and sand with some dirt. It was approximately 15 ft from the top of the bank to the water. Sampling Team members randomly selected three sides of the pond for sampling and divided each side into 20 segments, then randomly selected one segment for sampling.

Due to auger walking at grid 5, angle drilling was not possible and no incremental split-spoon samples could be taken. Based on the ORNL Sampling Team's discussions with DOE Survey personnel, it was determined that TRA pond augering was to be straight augering to refusal or clay, or to a maximum depth of approximately 60 ft. Straight augering began at 0925. At 1048 the Sampling

Team had augered 29 ft with the drive tube yielding only sand and gravel. Although bedrock was hit at 39 ft, no clay layer was found; therefore, no drive tube was used and volatile samples were deleted from the request. Sample IN503016 was collected from grid 5 at 1150. Soil/sand was dry. Radiation readings were high but samples read only 150 cpm when taken out of the area. According to the TRA Health Physicist, exposure was about 17 mR/hr at the pond.

The Sampling Team arrived at grid 8 at 1235. The temperature was approximately 75°F, skies were clear, and wind was at 5-10 mph from the west. QC rinsate sample IN503050 was collected at 1247. Straight augering began at 1256 and reached 24 ft at 1447. Drilling was extremely hard. No clay was found on the end of the drill bit. The drive tube was brought to the surface at 1510, but it contained only compacted sand and gravel. A GM meter scan on the drive tube's contents read only 1500 cpm for the area around the pond. The work was delayed because of worn bits and wear on the augers due to very hard drilling. No split-spoon samples were done incrementally. Work stopped at 1600 at a depth of 22 ft.

On 29SEP88, the team returned to grid 8. Augering began at 0830. The temperature was approximately 48°F, winds were calm, and the sky was clear. At 0835, the team reached 24 ft and changed the auger and bits. The team stopped at 37 ft to collect a 37 to 39.5 ft drive tube section, which contained only sand and gravel. At 47 ft, the end of the auger bit contained clay. A drive tube section was collected from 47 to 49 ft, and the lower end (48-49 ft) contents of the drive tube were dry. Sample IN503027 was collected from the drive tube. The top section of clay (47 to 48 ft) was soft and wet. Bedrock was hit at 49 ft.

At 1305, sampling was begun at grid 11. The temperature was about 66°F, with winds at about 5-10 mph from the north. A radiation scan read 1500 cpm for the area around the pond. The Sampling Team did not angle the auger or

collect split-spoon samples incrementally. Sample IN503038 was collected from the 42 to 44.5 ft depth of grid 11 at 1305. Pesticide aliquots were not collected per DOE Headquarters directive.

**Request 504: TRA Northeastern Cold Waste Pond (Water) (Fig 4.3d).** Six grab vertical composite water samples and 6 to 18 grab volatile samples (Sampling Method: References E4.2.4 and E4.3.1) were to be collected from the pond (Field Method: References E4.5.1 for temperature and E4.5.2 for pH ). Although the TRA Northeastern Cold Waste Pond was approximately 15 ft deep at the time of the Survey, the maximum depth of the pond at the time of sampling was 4 to 5 in. Sample locations for this request were to be marked so that sediment samples for Request 505 could be collected at the same locations. The three sampling areas were considered to be heterogenous.

The Sampling Team arrived on-site 22JUN88 at 1000. Per TRA site personnel, the pond was near normal with regard to flow and depth. Although the pond has two definite flow patterns, the ORNL Sampling Team did not expect them to differ. Three areas selected because of their representative distances were: 1) the inlet, 2) the still area, and 3) the slow movement and cattail area of the pond. Water samples were to be collected by immersion because of the shallow depth; sediment samples for Request 505 were to be collected 6 in. below the sand liner. The total number of samples collected depended upon the depth of the water in the pond.

In the slow movement/cattail area 3, samples IN504095 (grid 31) and IN504108 (grid 33) were collected at 1110. Samples IN504153 and IN504221 (grid 31) and IN504164 and IN504222 (grid 33) were not collected because the water was less than 5 ft deep. Samples IN504028 (grid 31) and IN504051 (grid 33), spatial composites, were collected at 1110.

Area 2 was a still area with no outlet. Samples IN504119 (grid 20) and IN504120 (grid 29) were collected at 1115. Samples IN504175 and IN504233 (grid 20) and

IN504186 and IN504244 (grid 29) were not collected because the water was less than 5 ft deep. Samples IN504039 (grid 20) and IN504062 (grid 29), spatial composites, were collected at 1115.

In inlet area 1, samples IN504073 (grid 9) and IN504084 (grid 15) were collected at 1120. Samples IN504131 and IN504197 (grid 9) and IN504142 and IN504200 (grid 15) were not collected because the water was less than 5 ft deep. Samples IN504017 (grid 9) and IN504040 (grid 15), spatial composites, were collected at 1120.

**Request 505: TRA Northeastern Cold Waste Pond (Sediment) (Fig. 4.3e).** Six grab sediment samples (Sampling Method: "'TURCO' Method for Sediment Sampling in the INEL Ponds," INEL Sampling and Analysis Plan, Appendix E) were to be collected from the TRA Northeastern Cold Waste Pond. Each of the sampling areas was considered to be heterogenous (Field Method: References E4.5.2 for pH and E4.5.1 for temperature). The sampling locations were the same as those used for water samples for Request 504.

The Sampling Team arrived at the site at 1000 on 22JUN88. The pond was near normal as far as flow and depth of water per TRA site personnel. The pond had two directions of flow. The direction of flow chosen for sampling had: 1) more water, and 2) greater distance from the discharge to farthest reach of water. Three locations were selected: 1) an inlet, 2) a still area, and 3) a reduced flow (backwater) area. Care had been taken when collecting water samples for Request 5'04 not to disturb the sediment collection areas. The outlet was not sampled because there had never been any flow to the other (dry) pond per TRA site personnel. Samples were to be collected to the depth of the sediment (6 in.), assuming that there was a sufficient sediment layer above the rock-lined bottom of the pond. Each area was divided into a 4 x 10, 40-segment grid measuring 20 $ft^2$. Sediment was collected to a depth of 6 in.

Samples IN505018 (grid 9 at 1505) and -041 (grid 15 at 1515) were collected from the 0 to 6 in. depth of the inlet area sediment. Samples IN505030 (grid 20 at 1424) and -063 (grid 29 at 1441) were collected from the 0 to 6 in. depth of the still area (selected because no outlet was in use). Samples IN505029 (grid 31 at 1420) and -052 (grid 33 at 1445) were collected from the reduced flow area.

**Request 506: TRA Northeastern Cold Waste Pond (Soil) (Fig. 4.3f).** Three grab vertical composite soil samples (Sampling Method: References E5.2.3 and E4.2.4) were to be collected from three locations along the perimeter of the pond (as close to the berm as possible) from the top of the saturated zone to bedrock (Field Method: References E4.5.1 for temperature and E4.5.2 for pH ).

The Sampling Team arrived on-site 22SEP88 at 1330. The temperature was approximately 68$^{o}$F under bright, calm skies. The team members randomly selected three sides of the pond for sampling and divided each side into 20 segments, then randomly selected one segment for sampling.

The area was heavy gravel and sand; angle drilling was not feasible because the auger would walk. Based on a discussion with the DOE Team Leader concerning sampling experience at CPP, the Team Leaders decided that, due to equipment limitations, they would straight auger the TRA Pond to refusal, or clay, or a maximum depth of 60 ft. If clay was encountered, a split-spoon sample was to be collected for volatiles. If clay or soil was absent and bedrock was encountered, volatile samples could be deleted from the request. The potential for percolation from the pond would also be decreased for depths to 60 ft. At 30 ft, the auger would be 20 ft below the bottom of the pond. Considering the infrequent use of the pond and the fact that the pond was relatively new, the ORNL Sampling Team thought that this depth (30 ft) might provide a more valuable sample than the 60 ft sample. A radiation scan of the sample location for IN506020 (grid 1) gave a reading of 150 cpm.

On 23SEP88, the team resumed augering at grid 1 at 0830. Skies were clear, and the temperature was approximately 45°F. The team augered to 57 ft. The speed of penetration indicated the possibility of clay and sand (approximately a 2 ft layer). Sample IN506020 was collected from the 58 ft depth at 0855. A radiation scan of the area gave a reading of 250 cpm.

The team began to set up for augering at grid 4. The team was to straight auger to clay above basalt, approximately 58 ft, collect trimmings for all parameters except volatiles, and drive a split spoon for the volatile aliquots. The team did not take 2.5 ft incremental samples because of stones. Sample IN506019 was not collected from grid 4 because of auger refusal at 28 ft when bedrock (basalt) was hit at 1120.

The team began drilling at grid 5 at 1230 using the same sampling protocol. No soil or clay was found, only pea gravel. The team continued to auger to 55 ft. They pulled the pilot and found indications of water. Sample IN506031 was collected at 1230 from the 0 to 58 ft depth of grid 5. Split-spoon sampling was not possible at grid 5 because of gravel. TIP readings were instrument background.

**Request 507: TRA Chemical/Corrosive Pond (Water) (Fig. 4.3g).** Six grab vertical composite water samples (Sampling Method: References E4.3.1.2 and E4.2.4) for nonvolatile analysis and 6 to 18 grab volatile samples (depending upon the depth of the water) were to be collected from the pond (Field Method: References E4.5.1 for temperature and E4.5.2 for pH) at three discrete points: the pond's inlet, outlet, and a point in the pond where velocity decreased.

On 23JUN88, the temperature was approximately 85°F, winds were 15 mph from the southwest, and skies were clear at the TRA Chemical Corrosive Pond. The Sampling Team defined a 20 $ft^2$ area at each of the sampling points and divided each area into 40 segments. They then selected two segments at random from each of the three areas. Sample locations for this request were marked so that

sediment samples for Request 508 could be collected at the same locations. The water was only 1/2 in. deep at approximately 1130. The level of the water was apparently dropping.

Samples IN507098 (grid 11 at 1045), -021 (grid 11 at 1135), -101 (grid 23 at 1050), and -054 (grid 23 at 1107) were collected from the reduced flow area. The location for sample IN507021 (grid 11) was moved 7 ft NE to avoid stirred up sediment and reach deeper water. Samples IN507156, -167, -214, and -225 could not be collected from the reduced flow area because the area was too shallow.

The Sampling Team returned at approximately 1350 and set up to sample the inlet area of the pond. The inlet pipe had been turned on during the lunch hour to allow for collection of the inlet samples. Samples IN507076 (grid 27 at 1410), -010 (grid 27 at 1450), -087 (grid 37 at 1430), and -043 (grid 37 at 1455) were collected from an area of gravel and sandy sediments approximately 20 in. north of the inlet. The location was selected because of the available surface water and the lack of the calcium carbonate precipitate.

Samples IN507134 (grid 27), -190 (grid 27), -145 (grid 37), and -203 (grid 37) could not be collected because the water was not deep enough. At the outlet, the water was not deep enough to collect samples for IN507112 (grid 13), -178 (grid 13), -236 (grid 13), -032 (grid 13), -123 (grid 39), -189 (grid 39), -247 (grid 39), and -065 (grid 39).

Request 508: **TRA Chemical/Corrosive Pond (Sediment) (Fig 4.3h).** Six grab sediment samples (Sampling Method: Reference "'TURCO' Method for Sediment Sampling in the INEL Ponds," INEL Sampling and Analysis Plan, Appendix E) were to be collected from the three water sample (see Request 507) locations at the pond (two samples at each location) (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site on 23JUN88 at 1407. The weather was clear, the temperature was approximately 85-90$^{o}$F, and winds were at 15 mph from the southwest. The team began sampling at grid 33 in the reduced flow area in the northeast corner of the pond. A 1/2 in. thick layer of white calcium carbonate precipitate on top of the sediment layer dissolved as sample IN508055 was being collected at 1407. Sample IN508022 (grid 11) was collected at 1422. This sample location was moved 7 ft northeast from the location of the water sample collected for Request 507 due to excess turbidity and a lack of water for the sediment sample. Sample IN508044 (grid 37) was collected from 0 to 3 in. at 1500 approximately 25 ft north of the inlet into the pond. The bottom sediments in this area were mostly gravel with little precipitate. Sample IN508011 (grid 27) was collected from the 0 to 3 in. depth at 1512.

Because there was no outlet, samples IN508033 (grid 13) and IN508066 (grid 39) could not be collected. No field measurements were made by the Sampling Team.

**Request 509: TRA Chemical/Corrosive Pond (Soil) (Fig. 4.3i).** Three grab vertical composite soil samples (Sampling Method: Reference E4.2.3) were to be collected from three locations along the perimeter of the pond (as close to the berm as possible) from the top of the saturated zone to bedrock (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site 26SEP88 at 0845. The temperature was 69$^{o}$F, skies were clear, and winds were from the southeast at 5 to 10 mph. The Sampling Team defined a 20 ft$^2$ area, then divided each area into a 40-segment grid. The berm area was composed of heavy gravel and sand. Due to the auger "walking" and the narrow width of the berm, angle drilling was not possible. Based on the ORNL team's discussions with DOE Survey personnel, the TRA pond could be sampled by straight augering to refusal, or clay, or to a depth of 60 ft.

The team began augering at grid 12. At 25 ft, sand began to appear slightly wet. The radiation reading was 60 to 80 cpm. Sand and gravel at 30 ft gave a radiation reading of 80 cpm. The TIP reading at 30 ft was 0 ppm. At 50 ft, the sand was very wet. Drilling became extremely difficult, possibly from clay. The team obtained a split-spoon sample at 50 to 52 ft for the volatile bottles. Bedrock was encountered at 53 ft and drilling stopped. Sample IN509012 was collected at 1140. The volatile sample obtained at 50 to 52 ft read 110 cpm with a GM meter. The team did not obtain split-spoon samples incrementally.

At grid 4, augering began at 1310. The temperature was approximately 75$^{o}$F and winds were from the south at 10 to 15 mph. At 23 ft, difficulty was encountered in augering. A split-spoon sample revealed only rock and sand. The bit was changed due to broken teeth and augering resumed at 1532. The team stopped for the day at 27 ft.

On 27SEP88, the Sampling Team returned to the site at 0800. The temperature was 50$^{o}$F, winds were 10 to 15 mph from the northwest, and the sky was partly cloudy. The team began augering at 0815 and collected sample IN509034 from the 51 to 53.5 ft depth of grid 4 at 0956. The sample was clay.

At grid 9, the volatile sample was not collected because the team hit bedrock at 42 ft with no sign of a clay layer. Sample IN509023 was collected at 1142 from the 40 ft depth of grid 9. The temperature of the soil was not accurate because the soil had been in a pan at the surface for 30 min to 2 hr.

**Request 510: TAN/TSF Disposal Pond (Water) (Fig. 4.3j).** Six grab vertical composite water samples and 6 to 18 grab volatile samples (Sampling Method: References E4.2.4 and E4.3.1.2), depending upon the depth of the TAN/TSF disposal pond, were to be collected from three discrete points: inlet, outlet, and a point in the pond where the velocity was decreased. Sample locations were marked so that sediment samples for Request 511 could be collected at the same locations.

The Sampling Team arrived on-site 29JUN88. The weather was warm and sunny with a temperature of approximately 90°F. Winds were very high. There was no outlet pipe at the pond, and the total depth of the pond was less than 5 ft. The pond was in normal condition according to the TAN Health Physicist. The pond was starting to seep into an overflow area which was considered the reduced flow area. Because the considerable disturbance on the pond surface due to the high winds could increase contamination levels in the pond through sediment disturbances, samples were collected and carried back to the team's van for shelter to complete paperwork, tags, and labeling.

The following samples were collected at a depth of 1 to 5 ft: sample IN510093 (grid 14 at 1245); IN510026 (grid 14, vertical composite, at 1310); IN510106 (grid 18 at 1300); IN510059 (grid 18, vertical composite, at 1325); IN510071 (grid 32 at 1406); IN510015 (grid 32, vertical composite, at 1420); IN510082 (grid 38 at 1410); and IN510048 (grid 38, vertical composite, at 1441). QC rinsate sample IN510253 was collected at 1415.

Because there was no outlet, samples IN510037, -060, -117, -128, -173, -184, -231, and -242 were not collected. Because the water was not deep enough (less than 5 ft), samples IN510139, -140, -151, -162, -195, -208, -219, and -220 were not collected.

**Request 511: TAN/TSF Disposal Pond (Sediment) (Fig. 4.3k).** Six grab sediment samples (Sampling Method: Reference "'TURCO' Method for Sediment Sampling in the INEL Ponds," INEL Sampling and Analysis Plan, Appendix E) were to be collected from the water sample locations for Request 510 (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site 29JUN88. The temperature was 90°F and winds were brisk. The reduced flow area was the overflow basin, which usually had some water in it according to the TAN Health Physicist. The inlet area was

in the pond, out from the inlet ditch. A large portion of the bermed area was, as usual, dry. Sediment was to be collected to its full depth with a TURCO. Hard soil was encountered at 12 in. in both sampling areas. Because of the high wind disturbance, it was difficult to see the bottom of the pond and characterize it before collecting samples.

Sample IN511027 (grid 18) was collected at 1229. Sample IN511049 (grid 38) was collected at 1247. Sample IN511050 (grid 14) was collected at 1256. Sample IN511016 (grid 32) was collected at 1335. Because there was no outlet, samples IN511038 and IN511061 were not collected.

**Request 512: TAN/TSF Disposal Pond (Soil) (Fig. 4.3l).** Three grab vertical composite soil samples (Sampling Method: Reference E5.2.3) were to be collected from the TAN/TSF Disposal Pond from three locations along the perimeter of the pond (as close to the berm as possible) from the top of the saturated zone to bedrock (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site 14SEP88 at 1300. The temperature was 68$^{o}$F, the sky was sunny and clear, and winds were calm. The pond had an effective depth of 11 ft. Drill sites were inside the berm, adjacent to the pond. An earthen ramp was constructed for access into the dry pond area. Soil around banks was wet, and the driller had to use caution in selecting a drilling site. Drilling began at 1350 and was executed with a hollow-stem drill at a 20$^{o}$ angle to 20 ft, where the first sample was collected. This level was below the suspected percolating depth of the pond. Soil at 22.5 ft was compact, saturated gray clay. Health Physics personnel directed the sampling. The soil temperature was not measured due to the heat of friction from the auger. Drilling activity was halted at 1600.

The team returned to the site on 15SEP88. The temperature was 50$^{o}$F, skies were clear and sunny, and winds were calm. Drilling began at 0830. The team had drilled to 25 ft at 0900. A PID reading at 20 ft was 2.4 (relative to 0.0).

At 37.5 ft, the PID reading ranged from 4 to 26. Because of extreme saturation, the drill string had the potential to become lodged in the hole. A final auger depth to 45 ft was completed. A PID reading of the soil was 4.7 (relative to 0.0). On the basis of the PID readings, sample IN512017 was collected at 1255 at grid 6 for analysis.

The team set up at grid 15 at 1550. The auger reached 5 ft at 1615. Auger trimmings that were found at 5 ft consisted of a slurry. Sample IN512028 was not collected because the slurry was interpreted as refusal.

On 19SEP88 the Sampling Team set up at grid 6 of the third sampling location at 0900. The sky was overcast, temperatures were approximately 38$^{o}$F, and winds were about 5 mph from northwest. The drill angle was 20$^{o}$, drilling from northwest to southeast. The auger hit refusal at 30 ft; the auger brought up only muck and packed the hollow stem. Sample IN512039 was collected at the 30 ft depth of grid 6 at 1400. All soil pH measurements were determined 1:1 (soil: distilled water mix) and noted as "soil pH in water."

**Request 513: TAN/LOFT Disposal Pond (Water) (Fig. 4.3m).** Three grab vertical composite water samples and 6 to 18 grab volatile samples (Sampling Method: Reference E4.2.3) were to be collected from the pond, approximately 15 ft deep, at three discrete points: the inlet, the outlet, and a point in the pond where the velocity was decreased (Field Method: References E4.5.2 for pH and E4.5.1 for temperature).

The Sampling Team arrived on-site 30JUN88 at 1220. The weather was warm (approximately 75$^{o}$F) with a slight breeze and clear skies. The Sampling Team defined a 20-ft$^2$ area at each of the sampling points and divided each area into 40 segments, then selected two segments at random from each of the three areas. Locations were marked so that sediment samples for Request 514 could be collected at the same locations.

A man-made berm of gray, silty-clayey soil with pebbles and cobbles of rounded basaltic rock surrounded the pond. Sparse growths of sagebrush, thistle, and desert grasses grew on the banks of the pond. Abundant waterfowl (ducks), swallows, and signs of dung indicated that antelope may have used the pond for watering. The edge of the pond was lined with algae. There was also abundant insect life (dragonflies, mosquitoes, ants). Water in the pond was a milky turquoise color, and the inlet pipe extended about 15 ft from the edge of the pond toward its center. The depth of the pond appeared to be greater than 10 ft. The reduced flow area of the pond was at the opposite end from the inlet and the water was shallow with decreasing vegetation. There were three USGS observatory water wells in the southeast corner of the reduced flow area. The water level at this area was about 2 ft deep. The water in the reduced flow area was fairly stagnant, indicating that the water level probably fluctuated very little.

QC field blank sample IN513256 was collected at 0935. Samples IN513074 (grid 6 at 1220), -018 (grid 6 vertical composite at 1220), -085 (grid 36 at 1245), and-041 (grid 36 vertical composite at 1300) were collected from the 0 to 5 ft depth of the inlet area. Samples IN513096 (grid 9 at 1400), -029 (grid 9 vertical composite at 1415), -109 (grid 23 vertical composite at 1430), and -052 (grid 23 at 1430) were collected from the 0 to 5 ft depth of the reduced flow area. Because there was no pond outlet, samples IN513030, -063, -110, -121, -176, -187, -234, and -245 were not collected. Because the actual pond depth was less than 5 ft, samples IN513085, -132, -143, -154, -165, -198, -201, -212, -223, and -245 were not collected.

**Request 514: TAN/LOFT Disposal Pond (Sediment) (Fig. 4.3n).** Six grab vertical composite water samples and 6 to 18 grab volatile samples (Sampling Method: Reference "'TURCO' Method for Sediment Sampling in the INEL Ponds," INEL Sampling and Analysis Plan, Appendix E) were to be collected from the TAN/LOFT disposal pond from the locations of water samples for Request 513 (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site 30JUN88. The weather was clear with a slight breeze of approximately 5 mph. The temperature was approximately 75°F. A man-made berm composed of gray, silty-clayey soil; pebbles; and cobbles of rounded basaltic rock surrounded the pond. Sparse growths of sagebrush, thistle, and desert grasses grew on the banks of the pond. Abundant waterfowl (ducks), swallows, and signs of dung indicated that antelope may have used the pond for watering. - The edge of the pond was lined with algae. There was also abundant insect life (dragonflies, mosquitoes, ants). Water in the pond was a milky turquoise color, and the inlet pipe extended about 15 ft from the edge of the pond toward its center.

Sample IN514019 was dark grey and contained debris of rocks and twigs. It was collected at the 2 ft 10 in. depth of grid 6 at 1307. Sample IN514042 was brown to dark grey in color and contained organic debris. It was collected from the 0 to 2.9 ft depth of grid 36 at 1315. Sample IN514053 was brown in color and contained sand, twigs, and organic materials. It was collected from the 12 to 14 in. depth of grid 23 at 1440. Sample IN514020 was collected from the 0 to 1.0 ft depth of grid 9 at 1450. Samples IN514031 (grid 7) and IN514064 (grid 18) were not collected because the pond had no outlet.

**Request 515: TAN/LOFT Disposal Pond (Soil) (Fig. 4.3o).** Three grab vertical composite soil samples (Sampling Method: Reference E5.2.3) were to be collected from three locations along the perimeter of the pond (as close to the berm as possible) from the top of the saturated zone to bedrock (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site at approximately 0700 on 12SEP88. The temperature was in the mid-40s, and skies were sunny and clear. The contract drillers arrived about 0930. The team completed their Safe Work permit and set-up at grid 17 at 1000. The INEL Sampling and Analysis Plan assumed the configuration of the pond to be similar to a swimming pool, but in reality the

slides sloped. The driller stated he could only drill at 20° in keeping with the INEL Sampling and Analysis Plan, which did not consider the slope of the pond and the resultant distance required for auger hole. Moist soil began at 12.5 ft. All depth increments were composited. Bedrock was hit at the 27.5 ft depth. Sample IN515010 was collected from the 27.5 ft depth of grid 17 at 1540.

On 13SEP88, the team set-up at grid 5 at 9030. Weather was cloudy with intermittent rain showers, wind was from the northwest at approximately 5 mph, and the temperature was approximately 50°F. A radiation scan read 80 cpm. A pH measurement was made for sample IN515010 collected on 12SEP88. All pH values were noted as "soil pH in water." The soil became moist at 12 ft, and moisture increased with depth. Soil appeared to be saturated at approximately 24 ft (approximately 22 ft effective vertical depth). Soil became very sandy at 31 ft vertical depth, indicating that the auger was near bedrock strata. Bedrock was hit at 35 ft. Drilling stopped with refusal of auger. Sample IN515021 was collected from the 35 ft depth of grid 5 at 1535.

On 14SEP88, the team arrived on-site at approximately 0815. Weather was clear, sunny, and the temperature was approximately 45°F. The team set up at grid 1 at 0915. Augering started at 0920. A radiation scan by the EG&G Health Physicist gave a reading of 120 cpm. Bedrock was encountered at 23 ft without going through saturated soil. The team collected all sample aliquots except IN515032A (volatiles) from the 0 to 23 ft depth of grid 1 at 1115.

**Request 516: ICPP Percolation Pond 2 (Water) (Fig. 4.3p).** Six grab vertical composite water samples and 6 to 18 grab volatile samples (Sampling Method: E4.3.1.2 and E4.2.4) were to be taken from ICPP Percolation Pond 2. Samples were to be taken from three discrete points: the inlet, the outlet, and a point in the pond where flow velocity was decreased (Field Method: References E4.5.1 for temperature and E4.5.2 for pH). Sample locations were to be marked so that sediment samples for Request 517 could also be collected.

The Sampling Team arrived at the ICPP on 24JUN88 at 0945. It was a very clear day with a 15 mph wind and an approximate temperature of 94°F. The areas of interest were: 1) the inlet area because of fairly heavy flow from the inlet pipe, more obvious sediment, and good location for water sampling; 2) the reduced flow area farthest away from the inlet pipe; and 3) the outlet area. A radiation map, provided by the team's escort, was included in the pocket of the logbook.

The Sampling Team changed into "blues" and dressed out in Zone 3 attire, minus hoods and respirators. The team went to the pond and got out all sampling equipment and placed it in a clean zone. A pick-up zone was determined by the Health Physicist where the samples were to be collected and passed on to the Sampling Team member designated as the "clean" person. Volatile samples were collected first and passed on to the "clean" person. The WINCO Health Physicist checked all samples. No implements were used to collect the water samples because all samples were collected by immersion. A lot of algae was present in the water. Preservatives were added to the appropriate bottles before samples were collected.

Samples IN516011 (grid 5 at 1145), -077 (grid 5 at 1145), -044 (grid 12 at 1215), and -088 (grid 12 at 1215) were collected from the 0 to 6 in. depth of the inlet area. Samples IN516099 (grid 2 at 1149), -022 (grid 2 at 1158), -055 (grid 13 at 1231), and -102 (grid 13 at 1231) were collected from the 0 to 6 in. depth of the reduced flow area. Because the pond was too shallow, samples IN516011, -022, -044, and -055 were collected as grab samples rather than vertical composite samples as requested in the INEL Sampling and Analysis Plan. Because the pond was too shallow, samples IN516135, -146, -157, -168, -191, -204, -215, and -226 were not collected. Because there was no outlet area to be sampled, samples IN516033, -066, -113, -124, -179, -180, -237, and -248 were not collected. QC rinsate sample IN516259 was not collected because all samples were collected by immersion; therefore, there were no implements to rinse.

After collecting the water samples for Request 516, the sediment sampling equipment was delivered by the "clean" person to the team members collecting sediment samples for Request 517.

**Request 517: ICPP Percolation Pond 2 (Sediment) (Fig. 4.3q).** Six grab sediment samples (Sampling Method: Reference "'TURCO' Method for Sediment Sampling in the INEL Ponds," INEL Sampling and Analysis Plan, Appendix E) were to be collected from three locations at the pond (two samples at each location) (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH). The sampling locations were the same as those used for collection of water samples for Request 516. Samples were to be collected to the depth of the sediment. It was assumed that there would be a sufficient sediment layer above the rock-lined bottom of the pond. If rocks had to be moved in order to reach the sediment, Sampling Team members were to notify appropriate INEL site personnel. If the rocks were large, the team would have to rely on the INEL for equipment to move the rocks.

On 24JUN88, it was very hot and sunny. Skies were clear and windy, and the temperature was 96$^{o}$F. The Sampling Team started collecting sediment samples after completing Request 516. Samples were collected at the same grid locations as Request 516. Sediment was very fine and the pond very rocky. An attempt was made to remove larger rocks. Shovels were used to collect the samples. The team was dressed out in Zone 3 attire except for hoods and respirators.

Grid area 12 at the inlet indicated slight radioactivity above instrument background. A radiation scan by ORNL was 90 cpm. The WINCO Health Physicist indicated about 0.8 mr/hr (0.5 mr/hr was reference). All samples, with the exception of volatiles, were collected and passed to the clean person after collection.

Samples IN517012 (0 to 1 ft depth of grid 5 at 1200) and -045 (0 to 1 ft depth of grid 12 at 1200) were collected from the inlet area. Samples IN517023 (0 to 1

ft depth of grid 2 at 1200) and -056 (0 to 1 ft depth of grid 13 at 1200) were collected from the reduced flow area. Samples IN517034 and -067 were not collected because there was no outlet area. QC rinsate sample IN517078 was inadvertently omitted. The team decided to collect a rinsate for another request.

**Request 518: ICPP Percolation Pond 2 (Soil) (Fig. 4.3r).** Three grab vertical composite soil samples (Sampling Method: Reference E5.2.3) were to be collected from three locations along the perimeter of ICPP Percolation Pond 2 (as close to the berm as possible) from the top of the saturated zone to bedrock (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived at the ICPP Percolation Pond at approximately 0815 on 20SEP88. It was raining and cloudy, with the temperature approximately 45$^{o}$F. Because of the depth of the pond, the nearest distance the team could begin augering, and the sloping sides of the pond berm, it would require 76 ft of auger to reach a point under the pond. It was determined that samples would be collected after augering at a 20$^{o}$ angle to a maximum depth of 60 ft, or refusal, because there was no possibility of augering beneath the pond.

The team began drilling set-up at grid 15 at 0930. A surface radiation scan reading was 150 cpm. At 33 ft, the auger walked to an unacceptable angle deviation from the 20$^{o}$ design. The driller was concerned that pressure could break the auger. A decision was made to delete sample IN518013 (grid 15) because of auger refusal. At grid 18, no soil was encountered to the 33 ft. depth, only coarse gravel. When the drill string was pulled, there was clay on the cutting head, indicating the proximity of bed rock. Sample IN518024 could not be collected because there was no soil. The team switched to a larger auger in an attempt to keep the auger from walking. The only possible way to deep sample appeared to be straight augering, which provided no potential to sample under the pond. Concurrence with the DOE Team Leader was deemed necessary.

On 21SEP88, a phone conversation with the DOE Team Leader resulted in the decision to resample by augering straight to basalt (approximately 35 ft) and collecting samples for all parameters except volatiles and PCBs/pesticides. Collection of sample IN518013 (grid 15) was repeated by straight auger. The team began straight augering for sample IN518024 at grid 18. A radiation scan of grid 18 was 150 cpm. The auger refused at bedrock at 32 ft. Because there was no sand or clay/soil for sampling, sample IN518024 could not be collected.

The team began to sample grid 1 at 1300. A surface radiation scan was 150 cpm. The auger reached bedrock at 1415. The team was able to collect all parameters except volatiles and pesticides for sample IN518035. Volatile samples could not be collected because the bedrock would not permit split spoon sampling.

On 22SEP88, the re-sampling at grid 15 began at 0900. Skies were clear and sunny, and the temperature was in the low 40's. The team hit bedrock at 1025, and at 32 ft re-collected sample IN518013. No volatiles, pesticides, or herbicide aliquots were to be collected. The pilot bit contained no clay but was wet, indicating water.

**Request 519: ANL-W Disposal Pond (Water) (Fig. 4.3s).** Six grab vertical composite water samples and 6 to 18 grab volatile samples (Sampling Method: References E4.3.1.2 and E4.2.4) were to be collected from the ANL-W Disposal Pond. The three sampling areas were considered heterogeneous (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH). Locations for Request 519 were marked so that sediment samples for Request 520 could be collected at the same locations.

The Sampling Team arrived at the site at 0900 on 20JUN88. The weather was sunny at first, but by the time the team was ready to collect samples, it was cloudy and very windy. Due to extreme weather conditions and the need to use a raft to collect samples, it was decided to record all information on waterproof

paper and transfer it to the Field Logbook at a later time. Also, a decision was made not to grid the area because of drifting in the boat. The depth of the sediment was approximately 2 to 3 ft, so it was not possible to wade and collect samples. The team prepared equipment, the raft was pumped up, and the TURCO was decontaminated. The Sampling Team decided to select reference areas for sampling. Although this was judgmental, there was no discernible reason why each area of interest (inlet, outlet, reduced flow) should be different within itself. This change in strategy would still show any differences from area to area and should represent each area individually.

A hard rain fell during the sampling, and samples from the inlet area were taken from the entry ditch before it widened into the pond. The area was dense with cattails. The outlet area was near the inlet and consisted of a vertical pipe with an inflow cage at the top. The level of the water was approximately 1 ft below the inflow cage. The reduced flow area was selected at the far end, out from the dense cattail area in a straight line with the outlet pipe. Water depths at the three areas were: inflow, 2.5 to 3.8 ft; outlet, 2.5 ft; and reduced flow area, 2 ft. No volatile samples were collected from 0 to 5 ft or 5 to 10 ft. All water samples were taken with a COLIWASA to the depth of the water column. The ANL-E Health Physicist checked some of the samples. No radiation problem was found.

Samples IN519116 (grid 17 at 1125), -069 (grid 17 vertical composite at 1135), -127 (grid 29 at 1145), and -036 (grid 29 vertical composite at 1155) were collected from the 0 to 2.5 ft depth of the outlet area. Samples IN519070 (grid 14 at 1331), -014 (grid 14 vertical composite at 1345), -081 (grid 30 at 1347), and -047 (grid 30 vertical composite at 1355) were collected from the 0 to 3.8 ft depth of the inlet area. Samples IN519092 (grid 29 at 1335), -058 (grid 29 vertical composite at 1413), -105 (grid 38 at 1350), and -025 (grid 38 vertical composite at 1347) were collected from the 0 to 2 ft depth of the reduced flow area.

Because the deepest part of the pond was only 3.8 ft deep, samples IN519138, -149, -150, -161, -172, -183, -194, -207, -218, -229, -230, and -241 were not collected.

**Request 520: ANL-W Disposal Pond (Sediment) (Fig. 4.3t).** Six grab sediment samples (Sampling Method: Reference "'TURCO' Method for Sediment Sampling in the INEL Ponds," INEL Sampling and Analysis Plan, Appendix E) were to be collected from the three locations at the pond (two samples at each location) (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH) of water samples for Request 519.

The Sampling Team began collecting sediment samples after completion of the water sampling for Request 519. The weather was windy and cloudy with thunderstorms. The grids were not used due to high winds and boat drift. Hard rain, thundershowers, and wind were experienced intermittently during sample collection. The samples from the inlet area were taken from the ditch before it fanned out into the pond. The area was heavily covered with cattails. The outlet area was to the left and right sides of the outlet pipe. The reduced flow area was out from the cattails in a straight line from the outlet pipe. Samples were collected to the depth of the sediment using the TURCO sampler.

Samples IN520017 (grid 14 at 1430) and -040 (grid 30 at 1430) were collected at the 2.1 to 2.4 ft depth of the inlet area. Samples IN520039 (grid 29 at 1430) and -062 (grid 17 at 1430) were collected at the 3.0 to 3.1 ft depth of the outlet area. Samples IN520028 (grid 38 at 1500) and -051 (grid 29 at 1500) were collected from the 2.4 ft depth of the reduced flow area.

**Request 521: ANL-W Disposal Pond (Soil) (Fig. 4.3u).** This request was deleted per DOE Headquarters because this particular site was underlaid by bedrock. Six grab vertical composite soil samples (Sampling Method: Reference E5.2.3) were to have been collected from three locations along the perimeter of the pond (as close to the berm as possible) from the top of the saturated zone to bedrock

(Field Method: References E4.5.1 for temperature and E4.5.2 for pH). Samples IN521018, -029, and -030 were not collected because this request was deleted.

**Request 522: ANL-W Ditches (Soil) (Fig. 4.3v).** Six grab soil samples (Sampling Method: Reference E5.2) were to be collected from two ditches leading to the ANL-W Percolation Pond (three samples from each ditch). One of the ditches led to the pond from the HFEF Building, and the other ditch from the EBR-II sump. The ditches were to be considered heterogeneous with respect to each other and to potential contaminants along the course of the ditches between their origin and the pond (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site 20JUN88. The day was windy (approximately 20 mph) and a light rain was falling. The temperature was approximately 80°F. Each ditch was divided into a 1 x 60-segment grid, starting at the origin of the ditch and ending at the point where the ditches combined. For each ditch, the Sampling Team randomly selected a segment between 1 and 20 and designated it segment 1. Three samples were collected 20 segments apart beginning with segment 1. A posthole digger was used to collect the samples at a depth of approximately 0 to 2 ft.

Ditch 2 was sampled first. The water in the ditch was approximately 6 in. deep and clear, with a thin coating of moss. Sample IN522042 was collected from the 0 to 1.5 ft depth of grid 9 at 1428. It was finely textured with gravel mixed in and light and dark bands of brown. Sample IN522053 was collected from the 0 to 2.0 ft depth of grid 29 at 1500. Sample IN522064 was collected at the 0 to 2 ft depth of grid 49 at 1540.

The team returned to the ANL-W drainage ditches on 21JUN88 at 1015. Under partly cloudy skies, the temperature was approximately 90°F. Winds were 5 to 10 mph and the humidity approximately 20 to 30%. The grid for ditch 1 had been placed by ORNL personnel on 20JUN 88. At grid 18, the ditch was

approximately 8 ft wide with flow at 20 to 30 gpm. Sample IN522019 was collected at 1030 approximately 2 ft from the edge of the ditch to a depth of 2 ft. The sediment was very fine with light and dark brown color bands in it. At grid 38, the ditch was approximately 6 ft wide. Sample IN522020 was collected at 1100 approximately 2 ft from the edge of the bank to a depth of 2 ft. The sample was fine with gravel mixed in and light and dark bands of brown color running through it. At grid 58, the ditch was approximately 4 ft wide. Sample IN522031 was collected at 1130 approximately 2 ft from the edge of the bank to a depth of 2 ft. The sample was fine with gravel mixed in and light and dark bands of brown color running through it. QC rinsate sample IN522075 was collected at 1100.

#### 4.8.2.2 Analytical Design

**Request 501:** The field parameters measured for Request 501 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; tritium oxide; total uranium; strontium-90; americium; and gamma scan (cobalt, cesium, and chromium). Pesticides and PCBs aliquots were not collected/analyzed per DOE HQ request. Chromium (total) by AA was requested when the concentration was suspected to be low and greater sensitivity was needed.

**Request 502:** The field parameters to have been measured for Request 502 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; tritium oxide; total uranium; strontium-90; americium; and gamma scan (cobalt, cesium, and chromium). Pesticides and PCBs aliquots were not collected/analyzed per DOE HQ request.

**Request 503:** The field parameters measured for Request 503 were pH and temperature. The parameters analyzed included volatiles; PCBs; ICP metals; AA mercury; AA chromium (total); anions; tritium oxide; total uranium; strontium-90; americium; and gamma scan (cobalt, cesium, and chromium). Aliquots for some

volatiles were uncollectible. Pesticides aliquots were not collected/analyzed per DOE HQ request.

**Request 504:** The field parameters measured for Request 504 were pH and temperature. The parameters analyzed included volatiles, ICP metals, AA mercury, AA chromium (total), anions, gross alpha, gross beta, gamma scan, and tritium oxide.

**Request 505:** The field parameters measured for Request 505 were pH and temperature. The parameters analyzed included volatiles, ICP metals, AA mercury, AA chromium (total), anions, gross alpha, gross beta, gamma scan, and tritium oxide.

**Request 506:** The field parameters measured for Request 506 were pH and temperature. The parameters analyzed included volatiles, ICP metals, AA mercury, AA chromium (total), anions, gross alpha, gross beta, gamma scan, and tritium oxide.

**Request 507:** The field parameters to be measured for Request 507 were pH and temperature. The parameters analyzed included volatiles, pesticides, PCBs, ICP metals, AA mercury, AA chromium (total), anions, gross alpha, gross beta, gamma scan, and tritium oxide.

**Request 508:** The field parameters to have been measured for Request 508 were pH and temperature. The parameters analyzed included volatiles, pesticides, PCBs, ICP metals, AA mercury, AA chromium (total), anions, gross alpha, gross beta, gamma scan, and tritium oxide.

**Request 509:** The field parameters measured for Request 509 were pH and temperature. The parameters analyzed included volatiles, pesticides, PCBs, ICP metals, AA mercury, AA chromium (total), anions, gross alpha, gross beta, gamma scan, and tritium oxide.

**Request 510:** The field parameters measured for Request 510 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium, manganese); tritium oxide; strontium-90; and americium.

**Request 511:** The field parameters measured for Request 511 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium, manganese); tritium oxide; strontium-90; and americium.

**Request 512:** The field parameters measured for Request 512 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium, manganese); tritium oxide; strontium-90; and americium.

**Request 513:** The field parameters measured for Request 513 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium); tritium oxide; total uranium; strontium-90; iodine-131; and americium. Pesticides aliquots were not collected/analyzed per DOE HQ request.

**Request 514:** The field parameters measured for Request 514 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium); tritium oxide; total uranium; strontium-90; iodine-131; and americium. Pesticides aliquots were not collected/analyzed per DOE HQ request.

**Request 515:** The field parameters measured for Request 515 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan

(cobalt, cesium); tritium oxide; total uranium; strontium-90; iodine-131; and americium. Pesticides aliquots were not collected/analyzed per DOE HQ request.

**Request 516:** The field parameters measured for Request 516 were pH and temperature. The parameters analyzed included volatiles; 2,4-D; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium); tritium oxide; total uranium; total strontium; iodine-131; isotopic thorium; americium; and plutonium. Pesticides aliquots were not collected/analyzed per DOE HQ request.

**Request 517:** The field parameters measured for Request 517 were pH and temperature. The parameters analyzed included volatiles; 2,4-D; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium); tritium oxide; total uranium; total strontium; iodine-131; isotopic thorium; and plutonium. Pesticides aliquots were not collected/analyzed per DOE HQ request.

**Request 518:** The field parameters to have been measured for Request 518 were pH and temperature. The parameters analyzed included ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium); tritium oxide; total uranium; total strontium; iodine-131; isotopic thorium; and plutonium. Volatiles aliquots could not be collected. Pesticides aliquots were not collected/analyzed per DOE HQ request.

**Request 519:** The field parameters measured for Request 519 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; anions; gross alpha; gross beta; gamma scan (cesium, cobalt); tritium oxide; and strontium-90. Pesticides aliquots were not collected/analyzed per DOE HQ request.

**Request 520:** The field parameters measured for Request 520 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA

mercury; anions; gross alpha; gross beta; gamma scan (cesium, cobalt); tritium oxide; and strontium-90. Although collected, no pesticides aliquots were analyzed per DOE HQ.

Request 521: The field parameters to have been measured for Request 521 were pH and temperature. The parameters to have been analyzed included volatiles, pesticides, ICP metals, AA mercury, anions, gross alpha, gross beta, gamma scan (cesium, cobalt), tritium oxide, and strontium-90. This request was deleted per DOE HQ.

Request 522: The field parameters measured for Request 522 were pH and temperature. The parameters analyzed included volatiles; ICP metals; AA mercury; AA chromium (total); anions; gross alpha; gross beta; gamma scan (cobalt, cesium); tritium oxide; and strontium-90. Although collected, no pesticides aliquots were analyzed per DOE HQ.

### 4.8.3 Field and Analytical Data

Field Data:

Request 501: *The field data are recorded in Table 4.3.3. Water samples were collected from three separate locations of the pond. The three inlet samples had a pH of 7.8 and a constant temperature of 24$^{o}$C. The reduced flow zone, at the opposite end of the pond about midway below the inlet, and the outlet zone had two samples with a pH of 7.8 and temperature of 24$^{o}$C and two samples with a pH of 7.9 and temperature of 25$^{o}$C, respectively. Two outlet zone samples had a pH of 7.8 and temperature of 24$^{o}$C; the other two outlet samples had a pH of 7.9 and temperature of 24$^{o}$C. Overall, the pH and temperature readings are constant.*

Request 502: *The field data are recorded in Table 4.3.3. Although pH and temperature measurements were requested, the sampling team was advised against*

*taking these measurements due to radiological exposure. The collected sediment was not accessible to take these measurements.*

**Request 503:** *The field data are recorded in Table 4.3.3. The pH measurements of the three subsoil samples were 6.5, 7.1, and 7.4. The temperature was the same for the three samples at 14°C. Radiation scans were taken and the samples all read 1500 cpm. For two of the samples, PID readings were taken; sample IN503027 showed 54 ppm and sample -038 showed 131 ppm.*

**Request 504:** *The field data are recorded in Table 4.3.3. Samples were collected from three different parts of the pond. At the inlet zone, the pH measured 6.7 and the temperature was 20°C. Conductivity measured 0.4 mS/cm. Dissolved oxygen was found to be 7.4 ppm. At reduced flow area 1, the pH was 6.8 and the temperature 20°C. Conductivity was 0.35 mS/cm and dissolved oxygen was 7.1 ppm. At reduced flow area 2, the pH was 7 and the temperature was the highest of the three areas at 31°C. Conductivity was also the highest at 0.83 mS/cm. Dissolved oxygen was the lowest of the three zones at 3.1 ppm.*

**Request 505:** *The field data are recorded in Table 4.3.3. The pH and temperature of the sediments associated with the water samples collected in Request 504 show that, at the inlet zone, the pH was 6.9 and 21°C for sample IN505018 and 6.8 and 22°C for sample IN505041. At the reduced flow area (referred to as reduced flow area 1 in Request 504), both samples gave identical pH and temperature readings at 6.8 and 23°C. In the still area (referred to as reduced flow area 2 in Request 504), the pH and temperature of one sample was 6.9 and 22°C and the other was 7 and 21°C.*

**Request 506:** *The field data are recorded in Table 4.3.3. Only two of the three subsoil samples were collected; their pH readings were 7.8 and 7.5. No temperature was recorded due to heat generated by auger friction. The radiological scan showed 250 cpm. The PID reading was 0.7 in sample IN506020 and 24 in sample IN506031.*

Request 507: *The field data are recorded in Table 4.3.3. Although the plan called for samples to be taken from three areas, the very low water depth of the pond allowed sample collected from only two areas--inlet and reduced flow. The pH of the inlet water ranged from 3.7 to 7.6 and the temperature from 20 to 27°C. Although not requested, the conductivity ranged from 0.21 to 1.6 mS/cm. At the reduced flow zone, the pH showed a more limited range of 8.3 to 8.6 and the temperature was 25 and 26°C. Conductivity was much higher than the inlet water samples, and ranged from 4.3 to 5.1 mS/cm.*

Request 508: *The field data are recorded in Table 4.3.3. The plan called for measurements of pH and temperature of the sediment from the TRA Chemical/Corrosive Pond (see Request 507). Although samples were collected, no field measurements were recorded.*

Request 509: *The field data are recorded in Table 4.3.3. The pH and temperature of three subsoil samples were measured. Sample IN509012 had a pH of 6 and temperature of 22°C. The other two subsoils had slightly alkaline pHs of 7.4 and 7.9, with associated temperatures of 16 and 14°C. It was noted that the sample which had a temperature of 16°C (61°F) may not reflect the actual temperature downhole because the sample had been placed on a pan for 1/2 to 2 hours before readings were taken.*

Request 510: *The field data are recorded in Table 4.3.3. The four inlet water samples collected at the depth of 1 to 5 ft had pHs ranging from 9.3 to 9.5 and identical temperatures of 18°C. Conductivity readings were all the same at 0.76 mS/cm. At the reduced flow zone, the pH, temperature, and conductivity measurements were identical for the four samples: the pH was 8.7, the temperature was 18°C, and the conductivity was 0.58 mS/cm.*

Request 511: *The field data are recorded in Table 4.3.3. Although six samples were to be collected from three areas, the pond did not have an outlet and only*

*four samples were collected. For the two inlet samples, the pH was 7.1 and 7.9 and conductivity was 0.92 and 0.81. The temperature of the sediment was not recorded. At the reduced flow area, the two samples had pH readings of 7.1 and 7.8 and conductivity readings of 0.68 and 0.89. No temperature readings were recorded. The sediment pH at the inlet area was lower than the pH observed for the inlet water (pH 9.3 to 9.5).*

**Request 512:** *The field data are recorded in Table 4.3.3. Although three samples of subsoil were to be collected, only two were collected because slurry was recovered at the 5 ft depth of one sampling location and interpreted as refusal. The other two samples showed pH readings of 7.7 and 8. Temperatures were not recorded because the core auger generated frictional heat. PID readings showed that sample IN512039 had no measurable organic vapor and sample IN512017 gave a reading of 4.2 ppm. A radiation scan gave a reading of 50 cpm.*

**Request 513:** *The field data are recorded in Table 4.3.3. A total of eight samples were collected for this request. The reduced number collected, as compared with the INEL S&A Plan, is due to the absence of an outlet area for sampling and the shallowness of the pond. The inlet water samples were taken from both sides of the inlet pipe. IN513018 and -074 were replicates and show pHs of 9.8; IN513041 and -085 were replicates and show pHs of 10. The water temperature and conductivity were constant for all samples at 22$^{o}$C and 0.27 mS/cm. In the reduced flow area, samples IN513029 and -096 are replicates and show pHs of 10, a water temperature of 23$^{o}$C, and conductivity at 0.24 mS/cm. IN513052 and -109 are replicates and also show pHs of 110, but slightly higher temperature and conductivity readings of 24$^{o}$C and 0.26 mS/cm, respectively. The reduced flow area was across from and approximately 400 ft away from the inlet area.*

**Request 514:** *The field data are recorded in Table 4.3.3. Although the INEL S&A Plan called for pH and temperature measurements to be taken for the*

*sediment samples of the TAN/LOFT disposal pond, no measurements were recorded.*

Request 515: *The field data are recorded in Table 4.3.3. The subsoil samples taken adjacent to the pond have pH readings ranging from 8.1 to 8.6. No temperature readings were recorded. PID readings showed no volatile organics. The radiation scans gave readings of 50 cpm for two samples and 100 cpm for the third.*

Request 516: *The field data are recorded in Table 4.3.3. Although the INEL S&A Plan called for collecting water samples from three areas, samples were collected from only two areas--the inlet and reduced flow areas. The inlet samples showed that the two samples from grid 5 (IN516011 and -077) had pHs of 8.8, water temperatures of 25$^{o}$C, and a conductivity of 0.32 mS/cm. Samples IN516044 and -088 of grid 12 showed that sample IN516044 had a slightly lower pH (8.7 vs. 8.8) and a slightly higher conductivity (0.34 vs. 0.32) while both water temperatures were 25$^{o}$C. At the reduced flow area, sample IN516099 had a pH of 8.9 and a temperature of 29$^{o}$C while its replicate (-022) showed a pH of 8.8 and 26$^{o}$C. However, the difference in conductivity between sample IN516099 at 1.2 mS/cm and -022 at 0.46 mS/cm is striking. The other two samples from grid 13 had pH readings of 8.6 and 8.8; temperatures of 26 and 28$^{o}$C; and conductivity readings of 0.37 and 0.36 mS/cm.*

Request 517: *The field data are recorded in Table 4.3.3. The field measurements of the two sediment samples collected from the inlet area of the ICPP Percolation Pond show that the pH was constant at 7.2 and that temperatures were 25 and 26$^{o}$C. Conductivity was similar at 0.47 and 0.48 mS/cm. Two sediment samples were also collected from the reduced flow area. pH was 7.1 in one sample and 7.6 in the other, while the temperature was the same at 25$^{o}$C. The conductivity of the lower pH sample was 0.39, compared with 0.33 for the sample with the higher pH.*

**Request 518:** *The field data are recorded in Table 4.3.3. Only sample IN518035 was collected in a sufficient amount for field measurements. The pH of this sample was 7.5. No temperature was recorded because the frictional heat from the auger would give a false reading of the temperature. The PID reading showed no organic vapor. The radiation scan showed 150 cpm.*

**Request 519:** *The field data are recorded in Table 4.3.3. Water samples were collected from three different areas of the ANL disposal pond--the inlet, the reduced flow area, and the outlet area. The samples from the inlet areas had pH readings of 8.3 for three samples and 8 for the fourth (IN519047). Samples IN519014 and -070 had temperatures of 26°C and samples IN519047 and -081 had temperatures of 25°C. Dissolved oxygen and conductivity remained the same for all samples at 6.8 ppm and 2.5 mS/cm, respectively.*

*At the reduced flow area, all readings for the four samples from grids 29 and 38 were the same: pH at 8.1; temperature at 24°C; dissolved oxygen at 5.8 ppm; and conductivity at 1.6 mS/cm.*

*At the outlet area, readings for the four samples from grids 17 and 29 were the same for pH at 8.4, temperature at 23°C, and conductivity at 1.8 mS/cm. The dissolved oxygen varied slightly. The conductivity of samples at grid 17 was 2.4 mS/cm; at grid 29, it was 2.5 mS/cm.*

**Request 520:** *The field data are recorded in Table 4.3.3. Sediment samples were collected from the inlet, reduced flow, and outlet areas. At the inlet, the two samples showed identical field readings of pH at 8.5, temperature at 26°C, conductivity at 1.4 mS/cm, and dissolved oxygen at 8.4 ppm. At the reduced flow area, identical readings were obtained for temperature, conductivity, and dissolved oxygen: 22°C, 1.2 mS/cm, and 8.6 ppm, respectively. The pH of one sample was 8.5 and the other 8.6. At the outlet, measurements were identical: pH at 8.9, temperature at 22°C, conductivity at 1.2 mS/cm, and dissolved oxygen*

*at 8.9 ppm. The trend in the sediments was to increase in pH and decrease in temperature from the inlet to the reduced flow area and finally to the outlet.*

**Request 521:** *This request was deleted by the DOE Survey team because the pond was underlain by bedrock.*

**Request 522:** *The field data are recorded in Table 4.3.3. Three samples were collected from each of two ditches leading to the ANL-W pond. Samples IN522019, -020, and 031 were taken from ditch 1 originating from the HFEF building; samples IN522042, -053, and -064 were taken from ditch 2 originating from EBR-2 sump. The pH in ditch 1 ranged from 7 to 9.6 and in ditch 2 from 7.2 to 7.7. The temperatures in both ditches ranged from 24 to 30°C.*

**Field Data Evaluation:**

**Request 501:** Because the Horiba instrument was calibrated for pH and temperature prior to field use, the results are reliable.

**Request 502:** No field measurements were made in accordance with the recommendation of the Health Physicist.

**Request 503:** Because the instrument was calibrated prior to field use, the results are reliable for temperature and pH. The radiological instrument was calibrated at the sampling team's laboratory and the results are reliable for this rugged instrument. The PID instrument was calibrated prior to use and the results are reliable. The pH readings were made using distilled water added to the soil to form a suspension.

**Request 504:** Because the instrument was calibrated prior to field use for pH, temperature, and conductivity, the results are reliable. The dissolved oxygen probe was calibrated at the sampling team's laboratory prior to departure; it's value is in comparison of data under similar conditions. In each of the three

areas, the field parameter is identical for the four samples collected. Field notes indicate that only one reading was made and the measurement for the remaining samples were copied.

**Request 505:** Because the instrument was calibrated for pH and temperature prior to field use, the results are reliable.

**Request 506:** Because the instrument was calibrated for pH and PID readings, the results are reliable. The radiological scan was made with an instrument calibrated at the sampling team's laboratory; the results are reliable for this rugged field instrument. A sample was not collected because the auger hit a hard rock at 28 feet.

**Request 507:** Because the instrument was calibrated for pH, temperature, and conductivity prior to field use, the results are reliable. It should be noted that the time of sampling of inlet water samples may be useful in interpreting the range of values for pH, conductivity, and temperature. Because the inlet water only started to flow during the lunch hour, it reflects non-equilibrated conditions. Sample IN507076 was taken at 1410; -087 at 1430; -010 at 1450; and -043 at 1455. In contrast, the reduced flow samples were taken while there was no inlet flow and, therefore, represent water which was at equilibrium.

**Request 508:** No field measurements were recorded due to an oversight.

**Request 509:** Because the instruments for the PID, pH, and temperature measurements were calibrated prior to field use, the readings are reliable. The radiation scan was performed with a rugged field instrument calibrated at the sampling team's laboratory prior to departure to the site and the readings are considered reliable.

**Request 510:** Because the instrument was calibrated prior to field use, the results are reliable.

Request 511: Because the instrument was calibrated prior to field use, the results are reliable.

Request 512: Because the instrument was calibrated prior to field use, the pH and PID readings are reliable. The radiation scan instrument is a reliable field instrument and was calibrated at the sampling team's laboratory prior to site departure; therefore, readings are considered reliable.

Request 513: Because the instrument was calibrated prior to field use, the readings are reliable.

Request 514: No measurements were reported due to an oversight.

Request 515: Because the Horiba and PID instruments were calibrated prior to field use, the results are reliable. No temperature readings were recorded because the augured samples would be affected by the heat of drilling (friction). Because the radiological instrument was calibrated at the sampling team's laboratory prior to departure to the site, the readings of the rugged field instrument are considered reliable.

Request 516: Because the instrument was calibrated prior to field use, the results are reliable. From the field notes, the difference noted for the samples was that algae was not observed for the sample with the highest conductivity (IN516099).

Request 517: Because the instrument was calibrated prior to field use, the results are reliable.

Request 518: Because the instrument was calibrated prior to field use, the results are reliable.

**Request 519:** Because the instrument was calibrated for pH, temperature, and conductivity prior to field use, the results are reliable. The dissolved oxygen probe was calibrated at the sampling team's laboratory prior to departure to the site; the results are considered reliable, especially if the values are compared with other similar samples.

**Request 520:** Because the instrument was calibrated for pH, temperature, and conductivity prior to field use, the results are reliable. The dissolved oxygen probe was calibrated at the sampling team's laboratory prior to departure to the site; the results are considered reliable, especially if the values are compared with other similar samples.

**Request 521:** NA. This request was deleted by the DOE Survey team.

**Request 522:** Because the instrument was calibrated prior to field use, the results are reliable. A noticeable feature of the data is the incremental increases in pH of the sediment. In comparing the order of sampling, the samples collected later in the day correlated with the samples with the higher temperature. From IN522019 to -064 (which is also the time sequence of sampling), the times were 1030, 1100, 1130, 1428, 1500, and 1540 hours. The sample which showed a pH of 9.6 was the sample in ditch 1 closest to the HFEF building.

**Analytical Data:**

**Request 501:**

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The two inlet samples analyzed for anions show chloride concentrations of 5400 and 6900 ug/L, nitrate-N at 160 and 10 ug/L, and sulfate at 23,000 and 24,000 ug/L. In order to better quantify the low level of nitrate-N in these samples, the anion was determined using flow injection (in contrast to chromatography);*

*the results shown in Table 4.3.3 reveal concentrations of 0.01 and 0.16 ug/mL, or 10 and 160 ug/L. At the reduced flow area, the chloride concentrations were 5,400 and 5,600 ug/L, and sulfate was 23,000 and 24,000 ug/L. The nitrate-N was analyzed by flow injection and the results were 10 and 950 ug/L of nitrogen. At the outlet area, the chloride concentration was 5,600 and 5,400 ug/L and sulfate was 24,000 and 23,000 ug/L. The nitrogen by flow injection analysis was 760 and 30 ug/L.*

*Metals. Analytical data for metals in surface water at the pond inlet are presented in Table 4.3.3. Of the 16 metals detected, the following 6 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, cadmium, copper, mercury, and nickel. Of the metals of interest detected, chromium ranged from 25 to 93 ug/L and zinc from 35 to 70 ug/L.*

*Analytical data for metals in surface water at the pond outlet are presented in Table 4.3.3. Of the 17 metals detected, the following 6 metals of interest to the Survey were below the CRDL in the sample collected: barium, beryllium, cadmium, copper, nickel, and silver. Of the metals of interest detected, chromium was 253 ug/L; mercury, 0.26 ug/L; and zinc, 284 ug/L.*

*Analytical data for metals in surface water at the reduced flow area are presented in Table 4.3.3. Of the 15 metals detected, the following 5 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, cadmium, mercury, and nickel. Of the metals of interest detected, chromium ranged from 26 to 33 ug/L and zinc from 39 to 50 ug/L.*

*Analytical data for metals in surface water at the pond outlet are presented in Table 4.3.3. Of the 14 metals detected, the following 4 metals of interest to the Survey were below the CRDL in the sample collected: barium, beryllium, mercury, and nickel. Of the metals of interest detected, chromium was 30 ug/L and zinc was 27 ug/L.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. PCBs/pesticides aliquots were not collected/analyzed per DOE HQ directive.*

*Volatile organics. Acetone was detected in four of the six surface water samples in estimated concentrations of 9 ppb or less. Acetone was also detected in the associated blank in all cases.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Six surface water samples from the TRA 1952 northernmost waste water pond contained the following ranges of concentrations of radionuclides in pCi/L: tritium, 1,200,000 to 1,300,000; manganese-54, 0 to 14; chromium-51, 9,200 to 11,000; cobalt-58, 15 to 31; cobalt-60, 1,100 to 3,300; total strontium 1,000 to 1,200; antimony-124, 110 to 130; cesium-134, 12 to 32; cesium-137, 1,100 to 4,700; and americium-241, 0.97 to 6.7. In addition, uranium was detected in a range of 1.9 to 2.8 ug/L. Recount of the samples show that over 94% of the total strontium was strontium-90.*

*Field blank sample IN501252 contained only cobalt-60 (78 pCi/L), total strontium (0.76 pCi/L), cesium-137 (200 pCi/L), americium-241 (1 pCi/L), and total uranium (0.55 ug/L).*

Request 502:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The sediment at the inlet of the pond contained chloride at 10 mg/kg, nitrate-N at 0.56 mg/kg, and sulfate at 43 mg/kg. At the reduced flow area, the chloride was 82 and 110 mg/k, the nitrate-N was 1.6 and 6.1 mg/kg, and sulfate was 190 and 540 mg/kg. At the outlet area the chloride had reduced to 9 and 19 mg/kg, the nitrate-N had reduced to 0.25 and 3.3 mg/kg, and the sulfate had widely*

*differing concentrations of 240 and 1,400 mg/kg. In addition, ortho-phosphate-phosphorus was present at 0.59 and 0.75 mg/kg.*

*Metals. Analytical data for metals in sediment sample IN502048 at the pond inlet are presented in Table 4.3.3. Of the 22 metals detected, the following 2 metals of interest to the Survey were below the CRDL in the sample collected: arsenic and selenium. Of the metals of interest detected, antimony was 196 mg/kg; barium, 1440 mg/kg; beryllium, 9.9 mg/kg; cadmium, 31 mg/kg; chromium, 6400 mg/kg; copper, 354 mg/kg; lead, 445 mg/kg; mercury, 21 mg/kg; nickel, 214 mg/kg; silver, 94 mg/kg; and zinc, 2530 mg/kg.*

*Analytical data for metals in sediment sample IN502015 at the pond inlet are presented in Table 4.3.3. Of the 22 metals detected, the following 2 metals of interest to the Survey were below the CRDL in the sample collected: arsenic and selenium. Of the metals of interest detected, antimony was 205 mg/kg; barium, 1910 mg/kg; beryllium, 6.5 mg/kg; cadmium, 13 mg/kg; chromium, 6600 mg/kg; copper, 170 mg/kg; lead, 245 mg/kg; mercury, 3.6 mg/kg; nickel, 111 mg/kg; silver, 142 mg/kg; and zinc, 1130 mg/kg.*

*Analytical data for metals in sediment at the pond outlet are presented in Table 4.3.3. Of the 22 metals detected, the following 2 were below the CRDL in both samples: arsenic and selenium. Of the metals of interest detected, antimony was 156 mg/kg; barium ranged from 556 to 2620 mg/kg; beryllium, 8.9 to 21 mg/kg; cadmium, 17 to 44 mg/kg; chromium, 1500 to 5300 mg/kg; copper, 213 to 263 mg/kg; lead, 332 to 428 mg/kg; mercury, 10 to 34 mg/kg; nickel, 104 to 286 mg/kg; silver, 98 to 160 mg/kg; and zinc, 1620 to 5190 mg/kg.*

*Analytical data for metals in sediment at the reduced flow area are presented in Table 4.3.3. Of the 20 metals detected, the following 2 metals of interest to the Survey were below the CRDL in both samples: antimony and barium. Of the metals of interest detected, beryllium was 21 mg/kg; cadmium ranged from 48 to 56 mg/kg; chromium, 3400 to 3900 mg/kg; copper, 252 to 277 mg/kg; lead, 488*

*to 531 mg/kg; mercury, 38 to 53 mg/kg; nickel, 1050 to 1160 mg/kg; silver, 79 to 85 mg/kg; and zinc, 4520 to 4980 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. PCBs/pesticides aliquots were not collected/analyzed for this request per DOE HQ directive.*

*Volatile organics. Of the six sediment samples for this request, four samples had 4 compounds detected, one sample had 5 compounds detected, and one sample (IN502015) had 13 compounds detected. Methylene chloride was present in all six of these sediment samples in concentrations ranging from 81 to 480 ppb. Some 1,1,1-trichloroethane was also detected in each of the six samples in measured or estimated concentrations ranging from 11 to 21 ppb. Toluene was detected in five of the samples in concentrations below the quantitation limit and estimated at 20 ppb or less. Acetone was also detected in all samples (maximum concentration of 200 ppb) and 2-butanone was detected in two of the samples (highest measured or estimated concentration was measured at 51 ppb). Estimated concentrations of TICs (sample IN502015 only) were 110 ppb or less, including one tentatively identified hydrocarbon with an estimated concentration of 40 ppb.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Six sediment samples from the TRA 1952 northernmost waste water pond contained the following ranges of radionuclide concentrations in pCi/kg: tritium, 880,000 to 1,500,000; cobalt-60, 7,000,000 to 200,000,000; total strontium, 2,000,000 to 10,000,000; cesium-134, 32,000 to 4,300,000; cesium-137, 10,000,000 to 400,000,000; and americium-241, 56,000 to 540,000. In addition, total uranium was detected in a range of 3,000 to 21,000 ug/kg. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Request 503:

*Anions and cyanide*. *The analytical results for anions are shown in Table 4.3.3. The three samples of subsoil taken at the perimeter of the pond contained chloride which ranged from 1 to 3.2 mg/kg. The fluoride concentration ranged over a narrow limit of 1 to 2 mg/kg. The nitrate-N ranged from 0.38 to 0.45 mg/kg and ortho-phosphate from 0.33 to 0.82 mg/kg. Sulfate had a much wider range of concentrations at 6.9, 22, and 190 mg/kg.*

*Metals*. *Analytical data for metals in soil are presented in Table 4.3.3. Of the 20 metals detected, the following 4 metals of interest to the Survey were below the CRDL in all three samples: antimony, cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 179 to 378 mg/kg; beryllium, 1.3 to 2.2 mg/kg; chromium, 20 to 38 mg/kg; copper, 18 to 30 mg/kg; mercury, 0.05 to 0.09 mg/kg; nickel, 23 to 44 mg/kg; and zinc, 53 to 109 mg/kg. Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables*. *No PCBs, pesticides, etc., were reported for these requests.*

*Volatile organics*. *There were two volatile organic compounds identified in one soil sample and seven compounds identified in the other. Benzene (150 ppb), chlorobenzene (140 ppb), chloroform (estimated concentration of 3 ppb), and toluene (160 ppb) were detected in sample IN503038. Methylene chloride was detected (estimated concentration of 6 ppb) in the sample IN503027 and in the blank, but not in sample IN503038. Some 1,1,1-trichloroethane was detected in both samples in concentrations of 25 and 130 ppb. The highest measured or estimated concentration of any volatile organic compound was 420 ppb of 1,1-dichloroethene in sample IN503038.*

*Radiochemistry*. *Analytical data for radiochemistry are given in Table 4.3.3. Three soil samples from the TRA 1952 northernmost warm waste pond contained*

*the following ranges of radionuclide concentrations in pCi/kg: tritium, 32,000 to 350,000; potassium-40, 11,000 to 17,000; cobalt-60, 2,000 to 2,900; total strontium, 11,000 to 14,000; cesium-137, 30 to 940; total uranium, 980 to 1,200; and americium-241 11 to 98. Recount of the samples show that over 94% of the total strontium was strontium-90.*

**Request 504:**

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The inlet area of this pond contained chloride at 11,000 ug/L, nitrate-N at 1200 and 1310 ug/L, and sulfate at 20,000 ug/L. In reduced flow area 1, the two composites had chloride at 11,000 ug/L, nitrate-N at 1110 and 1060 ug/L, and sulfate at 21,000 ug/L. In reduced flow area 2, the chloride was 11,000 ug/L, the nitrate-N was 994 and 1150 ug/L, and the sulfate was 20,000 and 21,000 ug/L.*

*Metals. Analytical data for metals in surface water at reduced flow area 2 are presented in Table 4.3.3. Of the 13 metals detected, the following 5 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, copper, and mercury.*

*Analytical data for metals in surface water at the inlet are presented in Table 4.3.3. Of the 11 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, and mercury.*

*Analytical data for metals in surface water at reduced flow area 1 are presented in Table 4.3.3. Of the 11 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, and mercury.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*Volatile organics. Toluene was detected in all six of these surface water samples, always below the quantitation limit and with an estimated concentration of 1 ppb. Methylene chloride was detected in one sample below the quantitation limit and with an estimated concentration of 1 ppb. Acetone was also detected below the quantitation limit in one sample. Otherwise, no volatile organic compounds were detected in these samples.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Six surface water samples from the TRA northeastern cold waste pond contained the following ranges of radionuclide concentrations in pCi/L: gross alpha, 0 to 12; gross beta, 0 to 61; tritium, 0 to 140; and cesium-137, 3.6 to 17.*

Request 505:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. At the inlet, the sediment contained 2.2 and 8.8 mg/kg of chloride, 1 and 2.1 mg/kg of fluoride, 0.23 and 4.3 mg/kg of nitrate-N, 3.2 and 12 mg/kg of ortho-phosphate, and 8.6 and 31 mg/kg of sulfate. With the exception of nitrate-N, one sample was higher in all the anions. At the reduced flow area (referred to as reduced flow area 1 in Request 504), the chloride was 3 and 3.1 (average of 3.05) mg/kg, the nitrate-N was 0.27 and 0.23 mg/kg, the ortho-phosphate was 4.2 and 5.2 (average of 4.7) mg/kg, and the sulfate was 9.1 and 4.3 (average of 6.7) mg/kg. In the still area (formerly referred to as reduced flow area 2 in Request 504), the chloride had increased to 6 and 11 (average of 8.5) mg/kg compared to the reduced flow area, the fluoride was 1.5 and 2.5 mg/kg, the nitrate-N was 1.1 and 0.23, the ortho-phosphate increased to 6.8 and 12 (average of 9.4) mg/kg compared to the reduced flow area, and the sulfate had reduced slightly to 7.1 and 7.8 (average of 7.45) mg/kg.*

*Metals*. *Analytical data for metals in sediment at the reduced flow area are presented in Table 4.3.3. Of the 20 metals detected, the following 3 metals of interest to the Survey were below the CRDL in both samples: beryllium, cadmium, and selenium. Of the metals of interest detected, barium ranged from 90 to 129 mg/kg; chromium, 16 to 95 mg/kg; copper, 42 to 87 mg/kg; lead was 108 mg/kg; mercury ranged from 0.52 to 0.66 mg/kg; nickel, 19 to 23 mg/kg; silver was 6.1 mg/kg; and zinc ranged from 71 to 119 mg/kg.*

*Analytical data for metals in sediment at the pond inlet are presented in Table 4.3.3. Of the 19 metals detected, the following 2 metals of interest to the Survey were below the CRDL in both samples: cadmium and lead. Of the metals of interest detected, barium ranged from 109 to 202 mg/kg; beryllium was 3 mg/kg; chromium ranged from 44 to 65 mg/kg; copper, 58 to 79 mg/kg; mercury, 0.55 to 1.2 mg/kg; nickel, 22 to 40 mg/kg; silver was 3.6 mg/kg; and zinc ranged from 100 to 157 mg/kg.*

*Analytical data for metals in sediment at the still area are presented in Table 4.3.3. Of the 19 metals detected, lead was below the CRDL in both samples. Of the metals of interest detected, barium ranged from 89 to 117 mg/kg; beryllium, 1.2 to 1.4 mg/kg; cadmium was 1.2 mg/kg; chromium ranged from 29 to 37 mg/kg; copper, 40 to 59 mg/kg; mercury, 0.24 to 0.35 mg/kg; nickel, 18 to 20 mg/kg; silver was 3.3 mg/kg, and zinc ranged from 74 to 97 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*Volatile organics*. *Four of the six sediment samples each contained two detectable volatile organic compounds, one sample contained one detectable compound, and no volatile organics were detected in the remaining sample. Methylene chloride was detected in four of the six sediment samples for this request and was also present in the blank. The highest concentration value*

*given for methylene chloride was a measured 7 ppb. A TIC was estimated at 130 ppb, but all other concentrations were 50 ppb or less.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Six sediment samples from the TRA northeastern cold waste pond contained the following ranges of radionuclide concentrations in pCi/kg: gross alpha, 3,200 to 13,000; gross beta, 29,000 to 380,000; tritium, 200 to 1,200; potassium-40, 17,000 to 19,000; cobalt-60, 240 to 24,000; cesium-134, 330 to 1,600; cesium-137, 9,100 to 47,000; europium-154, 0 to 2,100; and europium-155, 230 to 1,200.*

Request 506:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. For the two subsoil samples collected from the perimeter of the pond, the chloride concentrations were 2.5 and 4.2 mg/kg, fluoride were 2 and 1.8 mg/kg, nitrate-N were 0.54 and 0.79 mg/kg, and sulfate were 16 and 29 mg/kg.*

*Metals. Analytical data for metals in sediment are presented in Table 4.3.3. Of the 21 metals detected, the following 5 metals of interest to the Survey were below the CRDL in both samples: antimony, arsenic, cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 191 to 283 mg/kg; beryllium, 1.4 to 2.1 mg/kg; chromium, 28 to 74 mg/kg; copper, 27 to 42 mg/kg; mercury was 0.04 mg/kg; nickel ranged from 32 to 49 mg/kg; and zinc, 84 to 142 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*Volatile organics. Toluene was detected at 7 ppb in one of these two samples.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Two soil samples from the TRA northeastern cold waste pond contained 4,800*

*and 5,600 pCi of gross alpha activity per kg; 6,400 and 7,500 pCi of gross beta activity per kg; 1,000 and 1,600 pCi of tritium per kg; and 20,000 and 21,000 pCi of potassium-40 per kg. Rinsate sample IN506053 contained 1,300 pCi of tritium per L.*

Request 507:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The inlet area samples showed chloride at 5,300 and 4,500, nitrate-N at 565 and 497, and sulfate at 380,000 and 60,000 in concentration units of ug/L. The higher concentrations of the three anions were from the same sample and the field parameter of this sample showed that the conductivity and pH was higher than the replicate. At the reduced flow area, the chloride concentrations were 8,800 and 8,100 ug/L, the fluoride were 2,600 and 2,400 ug/L, and the sulfate were 1,500,000 and 2,400,000 ug/L. The chloride and sulfate increased from the inlet area to the reduced flow area. In addition, measurable quantities of fluoride were found in the reduced flow area.*

*Metals. Analytical data for metals in surface water at the reduced flow area are presented in Table 4.3.3. Of the 16 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: copper, lead, nickel, and zinc. Of the metals of interest detected, barium ranged from 893 to 955 ug/L; beryllium, 5.7 to 6 ug/L; chromium, 44 to 90 ug/L; and mercury, 7.4 to 13 ug/L.*

*Analytical data for metals in surface water at the pond inlet are presented in Table 4.3.3. Of the 12 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, and zinc. Of the metals of interest detected, mercury ranged from 0.4 to 3.4 ug/L.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the two samples tested.*

*PCBs and other extractables. Aroclor 1260 was detected below the quantitation limit (and below 1 ppb) in three of the four surface water samples from the TRA chemical/corrosive pond.*

*Volatile organics. Four surface water samples were taken for this request. Acetone was detected below the quantitation limit in one sample, and methylene chloride was detected below the quantitation limit in two of the remaining samples. The highest estimated concentration of methylene chloride was 1 ppb.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Four surface water samples collected from the TRA Chemical/Corrosive pond contained the following ranges of radionuclide concentrations in pCi/L: gross alpha, 0 to 8; gross beta, 4 to 38; tritium, 0 to 260, cobalt-60, 0 to 5.6; and cesium-137, 0.1 to 1.*

Request 508:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The sediment in the inlet area contained chloride at 27 and 19, fluoride at 5.8 and 2.8, nitrate-N at 9.0 and 5.9, and sulfate at 5,000 and 1,700 in concentration units of mg/kg. The higher concentrations of each anion were found in one sample. At the reduced flow area, the chloride was 29 and 18, fluoride was 42 and 32, and sulfate was 9,200 in concentration units of mg/kg. It appears that the fluoride and sulfate increased but chloride decreased in the reduced flow area.*

*Metals. Analytical data for metals in sediment at the reduced flow area are presented in Table 4.3.3. Of the 18 metals detected, the following 5 metals of interest to the Survey were below the CRDL in both samples: beryllium, cadmium, copper, nickel, and zinc. Of the metals of interest detected, barium*

*ranged from 1990 to 8520 mg/kg; chromium, 2.6 to 9.8 mg/kg; lead was 100 mg/kg; and mercury ranged from 34 to 91 mg/kg.*

*Analytical data for metals in sediment at the pond inlet are presented in Table 4.3.3. Of the 17 metals detected, the following 3 were below the CRDL in both samples: beryllium, copper, and nickel. Of the metals of interest detected, barium ranged from 1460 to 2860 mg/kg; chromium, 1.9 to 2.9 mg/kg; lead was 44 mg/kg; mercury ranged from 31 to 43 mg/kg; and zinc was 4.9 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. Aroclor 1260 was measured in concentrations ranging from 270 to 1800 ppb in three of the four sediment samples from the TRA chemical/corrosive pond.*

*Volatile organics. Four sediment samples were taken for this request. Methylene chloride was detected below the quantitation limit in three samples (highest estimated concentration was 6 ppb). It was also present in the method blank in two cases. Acetone was present in all four samples, and one TIC was detected in sample IN508011. No measured or estimated concentrations of any volatile organic compound exceeded 37 ppb.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Four sediment samples from the TRA Chemical/Corrosive pond contained the following ranges of radionuclide concentrations in pCi/kg: gross alpha, 690 to 2,900; gross beta, 0 to 1,600; tritium, 100 to 1,000; and potassium-40, 14,000 to 16,000.*

Request 509:

*Anions and cyanide*. *The analytical results for anions are shown in Table 4.3.3. The three subsoil samples contained chloride ranging from 4 to 13 mg/kg, fluoride from 3.3 to 7.9, nitrate-N from 1.5 to 2.0, and sulfate from 580 to 4,500 in concentration units of mg/kg. The low range of values were from one of the three grab samples.*

*Metals*. *Analytical data for metals in soil are presented in Table 4.3.3. Of the 21 metals detected, the following 4 metals of interest to the Survey were below the CRDL in all three samples: antimony, arsenic, cadmium, and lead. Of the metals of interest detected, barium ranged from 128 to 547 mg/kg; beryllium, 1.2 to 2.8 mg/kg; chromium, 28 to 55 mg/kg; copper, 17 to 52 mg/kg; mercury, 0.05 to 0.18 mg/kg; nickel, 20 to 59 mg/kg; silver was 1.9 mg/kg; and zinc ranged from 50 to 197 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables*. *No PCBs, pesticides, etc. were reported for these requests.*

*Volatile organics*. *Three compounds were identified in one of these soil samples and two compounds were identified in the other. Methylene chloride was identified in both samples and also in the blank. Some 1,1,1-trichloroethane was identified in both samples. All concentrations were measured or estimated at less than 55 ppb.*

*Radiochemistry*. *Analytical data for radiochemistry are given in Table 4.3.3. Three soil samples from the TRA Chemical/Corrosive pond contained the following ranges of radionuclide concentrations in pCi/kg: gross alpha, 6,100 to*

*8,500; gross beta, 6,700 to 11,000; tritium 1,200 to 38,000; and potassium-40, 10,000 to 24,000.*

Request 510:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The inlet area contained chloride at 130,000 and 140,000, fluoride at 1,000, nitrate-N at 768 and 249, and sulfate at 39,000 and 44,000 in concentration units of ug/L. At the reduced flow area, the chloride had reduced to 86,000 and 69,000, the nitrate-N was 497 and 316, and the sulfate was 43,000 and 39,000. No fluoride was detected in the reduced flow area above the detection limit of the instrument.*

*Metals. Analytical data for metals in surface water at the reduced flow area are presented in Table 4.3.3. Of the 15 metals detected, the following 5 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, copper, and nickel. Of the metals of interest detected, mercury was 0.42 ug/L, and zinc ranged from 90 to 124 ug/L.*

*Analytical data for metals in surface water at the pond inlet are presented in Table 4.3.3. Of the 18 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: beryllium, cadmium, mercury, and nickel. Of the metals of interest detected, barium was 241 ug/L; copper, 102 ug/L; chromium, 19 ug/L; silver, 35 ug/L; and zinc ranged from 57 to 389 ug/L.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*Volatile organics. There were 11 ppb of acetone in sample IN510106 taken from the reduced flow area. No other volatile organic compounds were detected in the samples taken for this request.*

*Radiochemistry.* *Analytical data for radiochemistry are given in Table 4.3.3. Four surface water samples from the TAN/TSF Disposal Pond contained the following ranges of radionuclide concentrations in pCi/L: gross alpha, 8 to 22; gross beta, 34 to 85; tritium, 0 to 100; cobalt-60, 0 to 5.9; total strontium, 3.5 to 12; cesium-137, 0 to 10; and americium-241, 0 to 0.13. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Request 511:

*Anions and cyanide.* *The analytical results for anions are shown in Table 4.3.3. At the inlet the sediment contained chloride at 38 and 91 mg/kg, fluoride at 1.6 mg/kg, nitrate-N at 12 and 1.9 mg/kg, ortho-phosphate-P at 0.62 and 0.75, and sulfate at 440 and 200 mg/kg. At the reduced flow area, the chloride was 38 and 27 mg/kg, fluoride was 1 and 1.4 mg/kg, nitrate-N was 1.1 and 2.5 mg/kg, ortho-phosphate-P was 1.1 mg/kg, and sulfate was 10 and 21 mg/kg.*

*Metals.* *Analytical data for metals in sediment at the reduced flow area are presented in Table 4.3.3. Of the 19 metals detected, lead was below the CRDL in both samples. Of the metals of interest detected, barium ranged from 212 to 222 mg/kg; beryllium, 2.1 to 2.2 mg/kg; cadmium, 1.3 to 1.4 mg/kg; chromium, 29 to 30 mg/kg; copper, 37 to 50 mg/kg; mercury was 0.13 mg/kg; nickel, 36 mg/kg; silver ranged from 3.5 to 9 mg/kg; and zinc, 137 to 202 mg/kg.*

*Analytical data for metals in sediment at the pond inlet are presented in Table 4.3.3. Of the 19 metals detected, lead was below the CRDL in both samples. Of the metals of interest detected, barium ranged from 226 to 248 mg/kg; beryllium, 2.3 to 2.4 mg/kg; cadmium, 1.6 to 1.7 mg/kg; chromium, 35 to 39 mg/kg; copper, 37 to 78 mg/kg; mercury, 0.08 to 1.7 mg/kg; nickel, 44 to 45 mg/kg; silver, 3.3 to 26 mg/kg; and zinc, 196 to 293 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*Volatile organics. There were three volatile organic compounds identified in each of the three samples for this request. Methylene chloride was identified in two samples and also in the blank. Acetone was identified in all three samples and at least one TIC was present in each sample. Measured or estimated concentrations of volatile organics were always 60 ppb or less.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Four sediment samples from the TAN/TSF Disposal Pond contained the following ranges of radionuclide concentrations in pCi/kg: gross alpha, 3,900 to 9,100; gross beta, 13,000 to 34,000; tritium, 0 to 780; potassium-40, 18,000 to 21,000; manganese-54, 180 to 280; cobalt-60, 570 to 42,000; total strontium, 520 to 3,000; cesium-137, 4,400 to 59,000; and americium-241, 9.1 to 17. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Request 512:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The three subsoil samples contained chloride ranging from 15 to 21 mg/kg, fluoride from 2.6 to 3 mg/kg, nitrate-N from 0.23 to 0.70 mg/kg, and sulfate from 13 to 15 mg/kg.*

*Metals. Analytical data for metals in soil are presented in Table 4.3.3. Of the 21 metals detected, the following 5 metals of interest to the Survey were below the CRDL in all three samples: antimony, arsenic, cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 214 to 272 mg/kg; beryllium, 1.8 to 2.1 mg/kg; chromium, 22 to 32 mg/kg; copper, 20 to 26 mg/kg; mercury, 0.05 to 0.06 mg/kg; nickel, 31 to 40 mg/kg; and zinc, 85 to 119 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*Volatile organics. Chloroform, methylene chloride, and 1,1,1-trichloroethane were identified in two of these soil samples. Only toluene was detected in the remaining sample. In one sample, the 1,1,1-trichloroethane had a concentration of 43 ppb, but all other volatile organics had measured or estimated concentrations of less than 20 ppb.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Three soil samples from the TAN/TSF Pond contained the following ranges of radionuclide concentrations in pCi/kg: gross alpha, 4,100 to 6,700; gross beta, 4,900 to 7,900; tritium, 200 to 1,200; potassium-40, 14,000 to 18,000; total strontium, 0 to 760; and americium-241, 4 to 21. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Request 513:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. At the inlet, the water contained chloride at 42,000 and 43,000 ug/L, nitrate-N at 226 ug/L, and sulfate at 36,000 ug/L. At the reduced flow area, the concentrations remained relatively constant with chloride at 42,000 and 45,000 ug/L, the nitrate at 271 and 226 ug/L, and sulfate at 34,000 and 33,000 ug/L.*

*Metals. Analytical data for metals in surface water at the reduced flow area are presented in Table 4.3.3. Of the 13 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, and mercury. Of the metals of interest detected, zinc ranged from 24 to 37 mg/kg.*

*Analytical data for metals in surface water at the pond inlet are presented in Table 4.3.3. Of the 13 metals detected, the following 4 metals of interest to the*

*Survey were below the CRDL in both samples: barium, beryllium, chromium, and mercury. Of the metals of interest detected, zinc ranged from 67 to 97 ug/L.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. PCBs/pesticides aliquots were not collected/analyzed per DOE HQ directive.*

*Volatile organics. Acetone was identified in two of these four surface water samples in concentrations of 14 ppb or less. Toluene was identified in two samples in estimated concentrations of 1 ppb. One of the samples contained no detectable volatile organics.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Four surface water samples from the TAN/LOFT Disposal Pond contained the following ranges of radionuclide concentrations in pCi/L: gross alpha, 3 to 19; gross beta, 15 to 29; tritium, 0 to 160; cesium-137, 0 to 4.4; and americium-241, 0.002 to 0.22. A field blank contained only 2.9 pCi of total strontium per L and 0.85 ug of total uranium per L. Iodine-131 was below the instrument detection limit. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Request 514:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. In the sediment of the inlet area, the concentrations of chloride were 15 and 23 mg/kg, fluoride were 1.3 and 1 mg/kg, nitrate-N were 1.9 and 0.54 mg/kg, and sulfate were 95 and 99 mg/kg. Where the flow was reduced, the chloride concentrations were 20 and 12 mg/kg, the nitrate-N were 1.9 and 1.3 mg/kg, and the sulfate were reduced to 19 and 15 mg/kg. Fluoride was below the detection level of 1 mg/kg.*

*Metals. Analytical data for metals in sediment at the reduced flow area are presented in Table 4.3.3. Of the 18 metals detected, the following 2 metals of interest to the Survey were below the CRDL in both samples: lead and mercury. Of the metals of interest detected, barium ranged from 181 to 165 mg/kg; beryllium, 1.8 to 265 mg/kg; cadmium was 1.0 mg/kg; chromium ranged from 20 to 27 mg/kg; copper, 22 to 33 mg/kg; nickel, 31 to 49 mg/kg; and zinc, 88 to 143 mg/kg.*

*Analytical data for metals in sediment at the pond inlet are presented in Table 4.3.3. Of the 19 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: cadmium, lead, mercury, and silver. Of the metals of interest detected, barium ranged from 188 to 218 mg/kg; beryllium, 2.1 to 2.2 mg/kg; chromium, 27 to 29 mg/kg; copper, 26 to 30 mg/kg; nickel, 35 to 41 mg/kg; and zinc, 113 to 126 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. PCBs/pesticides aliquots were not collected/analyzed per DOE HQ directive.*

*Volatile organics. Four volatile organic compounds were detected in each of these four sediment samples. Methylene chloride was detected in one sample (estimated concentration 12 ppb) and also in the blank. Toluene was detected in three samples (highest measured or estimated concentration was 15 ppb) and also in the blank. Some 1,1,1-trichloroethane (highest concentration was 26 ppb) was present in all four samples and also in the blank. There was 2-butanone in all four samples in concentrations ranging from 110 to 230 ppb.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Four sediment samples from the TAN/LOFT Disposal Pond contained the*

*following ranges of radionuclide concentrations in pCi/kg: gross alpha, 3,900 to 8,400; gross beta, 6,000 to 6,500; tritium, 200 to 1,000; potassium-40, 12,000 to 15,000; total strontium 0 to 180; and americium-241, 2.9 to 6.6. In addition, 1,300 to 1,600 ug/kg of total uranium were found. Iodine-131 was below the instrument detection level. Recount of the samples show that over 94% of the total strontium was strontium-90.*

**Request 515:**

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The three subsoil samples had chlorides ranging from 4.7 to 7.8 mg/kg, fluoride from 1.9 to 3.3 mg/kg, nitrate-N from 0.32 to 1.6 mg/kg, and sulfate from 1.4 to 17 mg/kg.*

*Metals. Analytical data for metals in soil are presented in Table 4.3.3. Of the 21 metals detected, the following 6 metals of interest to the Survey were below the CRDL in all three samples: antimony, arsenic, cadmium, lead, mercury, and silver. Of the metals of interest detected, barium ranged from 146 to 219 mg/kg; beryllium, 1.7 to 2 mg/kg; chromium, 33 to 74 mg/kg; copper, 21 to 38 mg/kg; nickel, 27 to 49 mg/kg; and zinc, 61 to 91 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. PCBs/pesticides aliquots were not collected/analyzed per DOE HQ directive.*

*Volatile organics. Chloroform, methylene chloride, and 1,1,1-trichloroethane were all identified in both of these soil samples. Measured or estimated concentrations of these compounds were always 26 ppb or less.*

*Radiochemistry*. *Analytical data for radiochemistry are given in Table 4.3.3. Three soil samples from the TAN/LOFT Pond contained, in pCi/kg: gross alpha, 4,200 to 5,300; gross beta, 4,800 to 6,400; tritium, 0 to 2,000; potassium-40, 12,000 to 14,000; and total strontium, 40 to 310. Total uranium was found in concentrations from 1,000 to 1,400 ug/kg. Iodine-131 was below the instrument detection level. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Request 516:

*Anions and cyanide*. *The analytical results for anions are shown in Table 4.3.3. The two samples of the inlet water contained chloride at 18,000 and 19,000 ug/L, nitrate-N at 226 and 542 ug/L, and sulfate at 24,000 ug/L. At the reduced flow area, the concentration of anions had increased: chloride was 200,000 and 230,000 ug/L, fluoride was 1,000 ug/L, nitrate-N was 7460 and 4290 ug/L, and sulfate was 28,000 ug/L.*

*Metals*. *Analytical data for metals in surface water at the reduced flow area are presented in Table 4.3.3. Of the 14 metals detected, the following 5 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, chromium, copper, and zinc. Of the metals of interest detected, mercury ranged from 0.4 to 0.42 ug/L.*

*Analytical data for metals in surface water at the inlet are presented in Table 4.3.3. Of the 16 metals detected, the following 3 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, and nickel. Of the metals of interest detected, chromium was 30 ug/L; copper ranged from 73 to 140 ug/L; mercury, 0.52 to 1.3 ug/L; and zinc, 28 to 59 ug/L.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables*. *NA. PCBs/pesticides aliquots were not collected/analyzed per DOE HQ directive.*

*Volatile organics*. *No volatile organic compounds were reported in the samples for this request.*

*Radiochemistry*. *Analytical data for radiochemistry are given in Table 4.3.3. Four surface water samples from the ICPP Percolation Pond 2 contained the following ranges of radionuclides concentrations in pCi/L: gross alpha, 5 to 37; gross beta, 130 to 340, tritium 110 to 3,600; cobalt-60, 0 to 11; total strontium, 2.9 to 22; ruthenium-106, 72 to 770; antimony-125, 30 to 110; cesium-134, 7.3 to 28; cesium-137, 73 to 310; thorium-228, 0 to 1.2; thorium-232, 0 to 0.06; plutonium-238, 8.9 to 46; and plutonium-239, 0.28 to 2.9. Iodine-131 was analyzed for but below detection level.*

**Request 517:**

*Anions and cyanide*. *The analytical results for anions are shown in Table 4.3.3. The two sediment samples from the inlet area contained chloride at 40 and 64 mg/kg, fluoride at 1.2 and 1.8 mg/kg, nitrate-N at 0.68 and 1.1 mg/kg, ortho-phosphate-P at 0.62 and 0.33 mg/kg, and sulfate at 20 and 12 mg/kg. At the reduced flow area, the concentrations of chloride were 58 and 68 mg/kg, nitrate-N were 2.3 and 1.3 mg/kg, and sulfate were 16 and 77 mg/kg. No measurable quantities of fluoride and ortho-phosphate-P were present. Although the water samples associated with the location of the two sediment samples showed increased anions in the reduced flow area, the sediment samples do not show this difference.*

*Metals*. *Analytical data for metals in sediment at the reduced flow area are presented in Table 4.3.3. Of the 18 metals detected, the following 2 metals of interest to the Survey were below the CRDL in both samples: cadmium and lead. Of the metals of interest detected, barium ranged from 83 to 98 mg/kg;*

*beryllium, 1 to 1.1 mg/kg; chromium, 17 to 19 mg/kg; copper, 15 to 16 mg/kg; mercury, 0.95 to 1.7 mg/kg; nickel, 15 to 17 mg/kg; and zinc, 39 to 52 mg/kg.*

*Analytical data for metals in sediment at the pond inlet are presented in Table 4.3.3. Of the 19 metals detected, one metal of interest to the Survey, lead, was below the CRDL in both samples. Of the metals of interest detected, barium ranged from 81 to 96 mg/kg; beryllium was 1.1 mg/kg; cadmium, 0.94 mg/kg; chromium ranged from 17 to 23 mg/kg; copper, 54 to 62 mg/kg; mercury, 3.6 to 4.1 mg/kg; nickel was 21 mg/kg; silver, 1.9 mg/kg; and zinc ranged from 58 to 65 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. PCBs/pesticides aliquots were not collected/analyzed per DOE HQ directive.*

*Volatile organics. Methylene chloride was detected in sample IN517023 in a concentration estimated at 2 ppb.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Four sediment samples from the ICPP Percolation Pond 2 contained the following ranges of concentration of radionuclides in pCi/kg: gross alpha, 9,600 to 53,000; gross beta 18,000 to 360,000; tritium, 100 to 1,500; potassium-40, 19,000 to 22,000; cobalt-60, 320 to 1,700; total strontium, 500 to 2,500; ruthenium-106, 1,700 to 36,000; antimony-125, 0 to 34,000; cesium-134, 1,400 to 18,000; cesium-137, 20,000 to 200,000; cerium-144, 1,200 to 24,000; europium-154, 0 to 3,300; europium-155, 180 to 1,400; thorium-228, 500 to 580; thorium-230, 400 to 800; thorium-232, 650 to 1,200; plutonium-238, 27,000 to 82,000; and plutonium-239, 1,800 to 5,300. In addition, from 940 to 1,100 ug of uranium per kg of sediment were found. Iodine-131 was below the instrument detection level.*

Request 518:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. Two subsoil samples showed chloride at 9.7 and 5.4 mg/kg, fluoride at 2.4 and 1.2 mg/kg, nitrate-N at 0.79 and 2.0 mg/kg, and sulfate at 17 mg/kg.*

*Metals. Analytical data for metals in soil are presented in Table 4.3.3. Of the 18 metals detected, the following 2 metals of interest to the Survey were below the CRDL in both samples: antimony and lead. Of the metals of interest detected, barium ranged from 141 to 151 mg/kg; beryllium was 1.1 mg/kg; chromium ranged from 12 to 16 mg/kg; copper, 16 to 17 mg/kg; mercury, 0.04 to 0.05 mg/kg; nickel, 18 to 23 mg/kg; and zinc, 49 to 52 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. PCBs/pesticides aliquots were not collected/analyzed per DOE HQ directive.*

*Volatile organics. NA. Volatiles aliquots were not collectible.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Two soil samples from ICPP Percolation Pond 2 contained the following radionuclide concentrations in pCi/kg: gross alpha 5,200 and 5,600; gross beta 5,700 and 6,000; tritium, 1,800 and 2,600; potassium-40, 19,000 and 22,000; total strontium, 150 and 330; thorium-228, 510 and 590, thorium-230, 320 and 380; thorium-232, 460 and 540; and plutonium-238, 0 and 19. Iodine-131 was below the instrument detection level.*

Request 519:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. The two samples from the inlet area contained chloride at 61,000 and 59,000 ug/L, fluoride at 2,100 ug/L, nitrate-N at 2710 and 2940 ug/L, ortho-phosphate-P at 2350 and 1790 ug/L, and sulfate at 350,000 ug/L. At both the reduced flow and outlet areas, the concentrations of anions, with the exception of nitrate-N, remained similar to that at the inlet. The nitrate-N concentration was about an order of magnitude lower at the reduced flow and outlet areas.*

*Metals. Analytical data for metals in surface water at the reduced flow area are presented in Table 4.3.3. Of the 16 metals detected, the following 6 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, copper, mercury, nickel, and silver. Of the metals of interest detected, chromium ranged from 19 to 187 ug/L and zinc was 116 ug/L.*

*Analytical data for metals in surface water at the pond inlet are presented in Table 4.3.3. Of the 13 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, mercury, and zinc. Of the metals of interest detected, chromium ranged from 15 to 16 ug/L.*

*Analytical data for metals in surface water at the pond outlet are presented in Table 4.3.3. Of the 13 metals detected, the following 4 metals of interest to the Survey were below the CRDL in both samples: barium, beryllium, mercury, and zinc. Of the metals of interest detected, chromium was 14 ug/L.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. PCBs/pesticides aliquots were not collected/analyzed per DOE HQ directive.*

*Volatile organics*. *Two compounds were detected in four samples and one compound was detected in each of the remaining two surface water samples for this request. Methylene chloride was the compound detected in all six samples, but it was above the quantitation limit in only one sample, where it was given as 6 ppb. Toluene was detected in one sample in an estimated concentration of 4 ppb. Acetone appeared in three samples, with concentrations as high as 140 ppb in sample IN519070.*

*Radiochemistry*. *Analytical data for radiochemistry are given in Table 4.3.3. Six surface water samples from the ANL-W Disposal Pond contained the following ranges of radionuclide concentrations in pCi/L: gross alpha, 1 to 24; gross beta, 0 to 60; tritium, 6,600 to 7,200; cobalt-60, 0 to 3.8; and cesium-137, 0 to 6.2. Recount of the samples show that over 94% of the total strontium was strontium-90.*

**Request 520:**

*Anions and cyanide*. *The analytical results for anions are shown in Table 4.3.3. The two samples of sediment from the inlet contained chloride at 44 and 34 mg/kg, fluoride at 9 and 9.1 mg/kg, and sulfate at 270 and 470 mg/kg. At the reduced flow area, the chloride was 22 and 33 mg/kg, fluoride was 6.6 and 8.7 mg/kg, nitrate-N was 0.27 and 0.25 mg/kg, and sulfate was 1,800 and 3,300 mg/kg. At the outlet area the chloride was 27 and 36 mg/kg, fluoride was 6.7 and 6.8 mg/kg, nitrate-N was 0.23 and 0.70 mg/kg, ortho-phosphate-P was 0.42 and 0.39 mg/kg, and sulfate was 550 and 290 mg/kg. The most notable difference in distribution was the higher sulfate content in the sediment at the reduced flow area; this is not surprising because the inlet and outlet areas are relatively close to each other, and the reduced flow area is across the pond from these two sites.*

*Metals*. *Analytical data for metals in sediment at the reduced flow area are presented in Table 4.3.3. Of the 19 metals detected, lead was the only metal of*

*interest to the Survey below the CRDL in both samples. Of the metals of interest detected, barium ranged from 149 to 242 mg/kg; beryllium, 1.6 to 1.9 mg/kg; cadmium, 0.88 to 1.1 mg/kg; chromium, 718 to 956 mg/kg; copper, 30 to 37 mg/kg; mercury, 0.17 to 0.42 mg/kg; nickel, 20 to 25 mg/kg; silver, 3.3 to 8.6 mg/kg; and zinc, 224 to 272 mg/kg.*

*Analytical data for metals in sediment at the pond inlet are presented in Table 4.3.3. Of the 19 metals detected, the following 2 metals of interest to the Survey were below the CRDL in both samples: cadmium and lead. Of the metals of interest detected, barium ranged from 149 to 186 mg/kg; beryllium, 1.7 to 2.2 mg/kg; chromium, 48 to 52 mg/kg; copper, 21 to 36 mg/kg; mercury, 0.18 to 0.23 mg/kg; nickel, 22 to 27 mg/kg; silver was 9.6 mg/kg; and zinc ranged from 113 to 170 mg/kg.*

*Analytical data for metals in sediment at the pond outlet are presented in Table 4.3.3. Of the 19 metals detected, the following 2 metals of interest to the Survey were below the CRDL in both samples: cadmium and lead. Of the metals of interest detected, barium ranged from 122 to 130 mg/kg; beryllium was 1.6 mg/kg; chromium ranged from 24 to 25 mg/kg; copper was 13 mg/kg; mercury ranged from 0.07 to 0.09 mg/kg; nickel, 16 to 17 mg/kg; silver, 3.4 to 4.2 mg/kg; and zinc, 65 to 68 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. Although collected, no PCBs/pesticides aliquots were analyzed per DOE HQ directive.*

*Volatile organics. There were six sediment samples taken for this request. Four volatile organic compounds were detected in three of the samples, three compounds were detected in two of the samples, and seven were detected in the remaining sample (IN520051). Chloroform was detected below the quantitation*

*limit in two samples (estimated concentrations were 4 and 5 ppb). Methylene chloride ranged from 27 to 300 ppb in all six samples. Toluene was detected below the quantitation limit in two samples (estimated concentrations were 3 and 5 ppb). Some 1,1,1-trichloroethane was detected below the quantitation limit in two samples, and measured at 21 ppb in another. Some 2-butanone was present in all six samples, ranging from 97 to 200 ppb.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Six sediment samples from the ANL-W Disposal Pond contained the following ranges of radionuclide concentrations in pCi/kg: gross alpha, 2,000 to 6,700; gross beta, 2,800 to 25,000; tritium, 700 to 2,600; potassium-40, 12,000 to 16,000; cobalt-60, 10 to 1,500; total strontium, 0 to 290; and cesium-137, 270 to 52,000. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Request 521: *Request deleted by DOE Survey team because the site was underlain by bedrock.*

Request 522:

*Anions and cyanide. The analytical results for anions are shown in Table 4.3.3. Three samples each from two ditches were analyzed for anions. In ditch 1 the chloride ranged from 8.3 to 14 mg/kg; fluoride from 3 to 4.8 mg/kg; nitrate-N from 0.66 to 4.7 (with the third sample being 4.7) mg/kg; ortho-phosphate-P from 0.49 to 0.82 mg/kg; and sulfate from 24 to 140 (with the third sample being 41) mg/kg. The samples from ditch 2 showed chloride ranging from 19 to 37 mg/kg; fluoride from 4.2 to 7 mg/kg; nitrate-N from 1.32 to 2.1 (with the third being 2.0) mg/kg; ortho-phosphate-P from 1.1 to 5.5 mg/kg; and sulfate from 110 to 620 (with the third being 160) mg/kg. Ditch 2 had higher concentrations of all the anions except nitrate-N.*

*Metals. Analytical data for metals in soil are presented in Table 4.3.3. Of the 19 metals detected, lead was the only metal of interest to the Survey below the*

*CRDL in all six samples. Of the metals of interest detected, barium ranged from 151 to 273 mg/kg; beryllium, 1.5 to 2 mg/kg; cadmium, 1 to 1.9 mg/kg; chromium, 15 to 66 mg/kg; copper, 13 to 59 mg/kg; mercury, 0.06 to 0.14 mg/kg; nickel, 20 to 28 mg/kg; silver, 188 to 153 mg/kg; and zinc, 55 to 139 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.3 were below the IDL for the samples tested.*

*PCBs and other extractables. NA. Although collected, no PCBs/pesticides aliquots were analyzed per DOE HQ request.*

*Volatile organics. Four volatile organic compounds were detected in each of three soil samples and five compounds were detected in each of the other three samples. Chloroform was detected below the quantitation limit in two of the samples (estimated at 3 and 4 ppb). Methylene chloride was detected in all six samples, ranging from 50 to 210 ppb. Toluene was detected below the quantitation limit in two samples (estimated at 3 and 4 ppb). Measurable amounts of 1,1,1-trichloroethane occurred in all six samples with concentrations ranging from 11 to 530 ppb. Measurable amounts of 2-butanone were also present in all samples with concentrations ranging from 100 to 180 ppb. A tentatively identified trimethyloctane was present in one sample (estimated at 49 ppb).*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.3. Six soil samples from the ANL-W ditches contained the following ranges of radionuclide concentrations in pCi/kg: gross alpha, 3,300 to 4,000; gross beta, 3,600 to 7,000; tritium, 400 to 2,600; potassium-40, 12,000 to 17,000; cobalt-60, 0 to 95; total strontium, 0 to 100; and cesium-137, 0 to 1,100. Rinsate sample IN522075 contained in pCi/L: gross alpha, 6; gross beta, 4; tritium, 28,000; and total strontium, 12. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Analytical Data Evaluation:

Request 501:

Anions and cyanide. Because the calibration verification of sulfate was 88%, the results may be biased low. The chloride concentration met all applicable quality assurance standards and the result is reliable. In this request, the nitrate-N was determined using the flow injection technique. Because this technique is especially suited for low concentrations of nitrogen, the results are reliable.

Metals. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL in the pond inlet samples for this request. Three metals of interest--chromium, mercury, and zinc--were detected above either the CRDL or the IDL in one pond outlet sample for this request. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL in the other pond outlet sample for this request. Two metals of interest--chromium and zinc--were detected above either the CRDL or the IDL in the reduced flow area for this request.

PCBs and other extractables. NA.

Volatile organics. The only compound detected in four of the six samples was acetone in concentrations too small to measure but estimated at 9 ppb or less. Acetone was also always present in the blank.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 502:

Anions and cyanide. The spike recovery of nitrate-N was out of compliance, the recovery being 116%. One of the phosphate (IN502026) results and a nitrate (IN502037) result were at or below instrument detection limits of 1 mg/kg when the solution was analyzed.

Metals. Eleven metals of interest--antimony, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL in the pond inlet samples for this request. Eleven metals of interest--antimony, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL in the pond outlet samples for this request. Nine metals of interest--beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL in the reduced flow area samples for this request.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride, 1,1,1-trichloroethane, and toluene were present in all or most of the sediment samples for this request. All measured or estimated concentrations of these compounds were less than 500 ppb. All toluene concentrations were below the quantitation limit and are, therefore, estimates. TICs were always 110 ppb or less.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 503:

Anions and cyanide. The calibration verifications for chloride, fluoride, and nitrate-N all exceeded compliance; the recoveries were 118%, 125%, and 115% for the three anions, respectively. Nitrate-N also was out of compliance for spike recovery; the recovery was 130%.

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Benzene, chlorobenzene, chloroform, and toluene were detected in sample IN503038. Methylene chloride was detected below the quantitation limit in the other sample and was also detected in the blank, but was not in sample IN503038. Some 1,1,1-trichloroethane was detected in both samples in concentrations of 130 ppb or less.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 504:

Anions and cyanide. Because the chloride spike recovery was out of compliance (the recovery being 115% for this SDG), the results could be biased high. The calibration verification for sulfate was 83%; in this case, the result could be biased low. The nitrate-N results met all quality assurance standards except that laboratory controls were not run; the results are reliable.

Metals. No metals of interest were detected above either the CRDL or the IDL for this request.

Volatile organics. Toluene was detected below the quantitation limit in all six samples. Methylene chloride was detected below the quantitation limit in one sample. Otherwise, no volatile organic compounds were detected in these samples.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 505:

Anions and cyanide. The calibration verification for the SDG associated with these samples showed all of the anions being out of compliance. The following percentage recoveries were experienced: chloride, 112%; fluoride, 111%; nitrate-N, average of 125%; ortho-phosphate, 121%; and sulfate, 78%. With the exception of sulfate, which would be biased low, the remaining anion results would be biased high.

Metals. At the reduced flow area, eight metals of interest--barium, chromium, copper, lead, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request. At the inlet, eight metals of interest--barium, beryllium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request. At the pond still area, nine metals of interest--barium, beryllium, cadmium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Methylene chloride was detected in some samples (always 7 ppb or less).

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 506:

Anions and cyanide. The calibration verification of fluoride was out of compliance; the recoveries were 75 and 115%. The recoveries should not be averaged, which would result in an acceptable 95%. The sulfate calibration verification was out of compliance, the recoveries being 112 and 89%. The nitrate-N spike recovery was 129%.

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Toluene was detected at 7 ppb in one sample.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 507:

Anions and cyanide. The calibration verification of sulfate was out of compliance, and the recovery was 80%, which would bias the results low. The spike recovery of nitrate-N was 122%, which would bias the results high. The

fluoride and chloride were in compliance for all the quality assurance standards except laboratory controls, which were not run, and their results are reliable.

Metals. At the reduced flow area, four metals of interest--barium, beryllium, chromium, and mercury--were detected above either the CRDL or the IDL for this request. At the pond inlet, one metal of interest--mercury--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. Aroclor 1260 was detected in samples from the water and sediment of this pond. Concentrations were as high as 1800 ppb in one of the sediment samples.

Volatile organics. Methylene chloride was detected in estimated concentrations of 1 ppb in two of the four samples.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 508:

Anions and cyanide. The calibration verifications of fluoride, nitrate-N, and sulfate were out of compliance. The recovery was 89% for fluoride, averaged 116% for nitrate-N, and averaged 83% for sulfate. The results for fluoride and sulfate would be biased low, and for nitrate biased high. The chloride analysis was in compliance with quality assurance standards except that laboratory controls were not run. The chloride results are reliable.

Metals. At the reduced flow area, four metals of interest--barium, chromium, lead, and mercury--were detected above either the CRDL or the IDL for this request. At the pond inlet, five metals of interest--barium, chromium, copper,

lead, mercury, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. Aroclor 1260 was detected in samples from the water and sediment of this pond. Concentrations were as high as 1800 ppb in one of the sediment samples.

Volatile organics. Methylene chloride was detected below the quantitation limit in three samples and in the method blank for two of the samples.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 509:**

Anions and cyanide. For samples IN509012 and -023, the calibration verification was out of compliance for fluoride and sulfate for the associated SDG: the recoveries were 75 and 115% for fluoride, and 112 and 89% for sulfate. These values cannot be averaged for recoveries because averaging would place them in compliance; hence, samples could be biased high or low depending on which detector system or on which day they were analyzed. For the other sample, the calibration verification was out of compliance for chloride, fluoride, and nitrate-N. The recoveries were 118% for chloride, an average of 125% for fluoride, and an average of 115% for nitrate-N; for this sample, the three anions are biased high. The spike recoveries for the nitrate-N were 129% for the two samples of the same SDG and 130% for the other; the results for all the nitrate-N are biased high.

Metals. Eight metals of interest--barium, beryllium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride was identified in both samples and in the blank. Some 1,1,1-trichloroethane was identified in both samples. All concentrations were measured or estimated at less than 55 ppb. No TICs were noted.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 510:

Anions and cyanide. The total of four samples were analyzed under three different SDGs. Under SDG IN510015, non-compliance was noted for chloride for spike recovery and nitrate-N for calibration verification, duplicate analysis, and a holding time which exceeded 3 days. Under SDG IN510048, nitrate-N was out of compliance for calibration verification and a holding time which exceeded 6 days. In SDG IN510026, spike recovery of chloride, nitrate-N, and sulfate and calibration verification of nitrate-N and sulfate were out of compliance. Only fluoride results at the inlet are reliable.

Metals. At the reduced flow area, two metals of interest--mercury, and zinc--were detected above either the CRDL or the IDL for this request. At the pond inlet, five metals of interest--barium, chromium, copper, silver, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Other than 11 ppb of acetone in one sample, no volatile organic compounds were detected.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 511:

Anions and cyanide. All the anion analysis met the quality assurance standards except that laboratory controls were not run. All results are reliable.

Metals. Nine metals of interest--barium, beryllium, cadmium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Methylene chloride was identified in two of three samples and also in the blank. The measured or estimated concentration of methylene chloride was 11 ppb or less.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 512:

Anions and cyanide. For two samples analyzed in SDG IN512028, the fluoride and nitrate-N were out of compliance regarding the calibration verification; the fluoride recovery was 112% and the nitrate-N recovery was 111%. For the other

sample, only the fluoride was out of compliance regarding calibration verification; the fluoride recovery was 114%. The chloride and sulfate results met quality assurance standards except that laboratory controls were not run; these anions results are considered reliable. The fluoride and nitrate results are usable because the noncompliances are of the same magnitude.

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Chloroform, methylene chloride, toluene, and 1,1,1-trichloroethane were identified in at least one of these soil samples. Concentrations were always 43 ppb or less.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 513:

Anions and cyanide. For the four samples from the two sites, all the analysis were out of compliance regarding spike recovery. The following recoveries were found; chloride, 116%; nitrate, 129%; sulfate, 83%; and ortho-phosphate-P, 82%. Chloride and nitrate-N results are biased high, and sulfate and ortho phosphate-P results are biased low. In addition, the calibration verifications of nitrate-N and sulfate were 117% and 89%, respectively. This might further bias the nitrate-N values high and the sulfate values low.

Metals. One metal of interest--zinc--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Two volatile organic compounds, acetone and toluene, were identified, but neither were detected in all four samples. No concentrations exceeded 14 ppb.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 514:**

Anions and cyanide. Only nitrate was out of compliance in the four sediment samples. The spike sample recovery for this SDG of all four samples was 116%. Chloride, fluoride, and sulfate met all quality assurance standards except that laboratory controls were not run. The results are reliable.

Metals. At the reduced flow area, seven metals of interest--barium, beryllium, cadmium, chromium, copper, nickel, and zinc--were detected above either the CRDL or the IDL for this request. At the pond inlet, six metals of interest--barium, beryllium, chromium, copper, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride and toluene were detected in some samples and also in the blank. Concentrations of those compounds were always 15 ppb or less. Some 1,1,1-trichloroethane was present at 26 ppb or less in all four samples and also in the blank. There was 2-butanone in all four samples in concentrations ranging from 110 to 230 ppb.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 515:**

Anions and cyanide. Results which were out of compliance were spike recovery of nitrate-N at 131% and the calibration verification of fluoride at 114%. These noncompliances would bias the results high for nitrate-N and fluoride. Chloride and sulfate results met all quality assurance standards except that laboratory controls were not run. The results are reliable.

Metals. Six metals of interest--barium, beryllium, chromium, copper, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Chloroform, methylene chloride, and 1,1,1-trichloroethane were all identified in both of these soil samples. Chloroform was below the quantitation limit in both samples. Methylene chloride was below the quantitation limit in one sample and 13 ppb in the other. The 1,1,1-trichloroethane was 25 or 26 ppb.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 516:

Anions and cyanide. Both calibration verification and spike recovery were out of compliance for nitrate-N and sulfate. In each anion case, the direction of the non-compliance was the same: recovery of 113% for calibration verification and 124% for spike recovery for nitrate-N, and recovery of 85% for calibration verification and 81% for spike recovery for sulfate. Thus, the nitrate-N results may be biased high and the sulfate results may be biased low. Fluoride concentrations are at or below instrument detection level.

Metals. At the reduced flow area, one metal of interest--mercury--was detected above either the CRDL or the IDL for this request. At the pond inlet, four metals of interest--chromium, copper, mercury, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were reported in the samples for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 517:

Anions and cyanide. The four sediment samples were analyzed with two SDGs. For SDG IN508011, samples were out of compliance in calibration verification. Recoveries were: fluoride, 89%; nitrate-N, 116%; ortho-phosphate-P, 87%; and sulfate, 83%. Thus, for the two samples associated with this SDG, the results are may be biased high for nitrate-N but low for fluoride, phosphate, and

sulfate. For SDG IN517045, samples were out of compliance in calibration verification and spike recovery. Calibration verification recoveries were: chloride, 116%; nitrate-N, 119%; and sulfate, average 81%. Spike recoveries were: nitrate-N, 116%; and sulfate, 70%. Thus, nitrate-N results may be biased high and one of the chloride (SDG517045) results may be biased high. Fluoride, ortho-phosphate, and sulfate results are biased low.

Metals. At the reduced flow area, seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request. At the pond inlet, nine metals of interest--barium, beryllium, cadmium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride was detected below the quantitation limit in one sample.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 518:**

Anions and cyanide. Calibration verification was out of compliance for fluoride and nitrate-N. For fluoride, the recovery was 112% and for nitrate-N the recovery was 111%. Chloride and sulfate met all quality assurance standards except that laboratory controls were not run. The results are reliable.

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were reported in the samples for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 519:

Anions and cyanide. Two SDGs were associated with the samples of this request. For SDG IN404016, the noncompliances include fluoride spike recovery at 84.5%, sulfate calibration verification at 86%, nitrate duplicate variation at 20%, and ortho-phosphate duplicate variation at 27%. For SDG IN409011, the noncompliances, include chloride spike recovery at 115% and sulfate calibration verification at 83%.

Metals. At the reduced flow area, two metals of interest--chromium, and zinc--were detected above either the CRDL or the IDL for this request. At the pond inlet and outlet, one metal of interest--chromium--was detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride was above the quantitation limit in only one sample at 6 ppb. Toluene was detected in one sample in an estimated concentration of 4 ppb. Acetone appeared in three samples, with concentrations up to 140 ppb in sample IN519070.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 520:

Anions and cyanide. The nitrate-N results are biased high because noncompliance includes a spike recovery of 122% and a calibration verification average of 117%. In addition, the calibration verification of sulfate was 79%, which would bias the results low.

Metals. At the reduced flow area, nine metals of interest--barium, beryllium, cadmium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request. At the pond inlet and outlet, eight metals of interest--barium, beryllium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. NA.

Volatile organics. Chloroform was detected below the quantitation limit in two samples. Methylene chloride was always less than 300 ppb. Toluene was below the quantitation limit in two samples. Measured or estimated concentrations of 1,1,1-trichloroethane were always 21 ppb or less. Some 2-butanone was present in all samples, ranging from 97 to 200 ppb. One TIC occurred in one sample.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 521:** NA.

**Request 522:**

Anions and cyanide. The calibration verification was out of compliance for nitrate-N and sulfate; for nitrate-N, the recovery was 118%, and for sulfate, it was 79%. In addition, the spike recovery for nitrate-N was 125%. For nitrate-N, the results may be biased high, and for sulfate, the results may be biased low.

Metals. Nine metals of interest--barium, beryllium, cadmium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL in ditch 2.

PCBs and other extractables. NA.

Volatile organics. Chloroform and toluene were detected below quantitation limits in some samples. Methylene chloride was measured in all six samples (always 210 ppb or less). Measurable amounts of 1,1,1-trichloroethane also occurred in all six samples (always 530 ppb or less). Measurable amounts of 2-butanone were also present in all samples (always 180 ppb or less).

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

### 4.8.4 Limitations and Qualifications

Data Quality Level:

Request 501: The sampling design and field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

Request 502: The sampling design and field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

Request 503: The sampling design and field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

Request 504: The sampling design and field sampling are rated Quality Level II. The overall analytical Quality Level is I.

Request 505: The sampling design and field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

Request 506: The sampling design is rated Quality Level I; the field sampling is rated Quality Level II. The overall analytical Quality Level rating is I.

Request 507: The sampling design is rated Quality Level I because the level of the pond varied over time and with operations and no prediction could be made of the pond's status during sampling. The field sampling is rated Quality Level I. The overall analytical Quality Level rating is I.

Request 508: The sampling design is rated Quality Level I; the field sampling is rated Quality Level II. The overall analytical Quality Level is I.

Request 509: The sampling design and field sampling are both rated Quality Level I. The overall analytical Quality Level rating is II.

**Request 510:** The sampling design and field sampling are both rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 511:** The sampling design and field sampling are both rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 512:** The sampling design and field sampling are both rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 513:** The sampling design and field sampling are both rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 514:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level rating is II.

**Request 515:** The sampling design and field sampling are both rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 516:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level rating is I.

**Request 517:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level rating is I.

**Request 518:** The sampling design and field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 519:** The sampling design and the field sampling are both rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 520:** The sampling design and the field sampling are both rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 521:** No rating can be assigned because this request was deleted and no samples were collected.

**Request 522:** The sampling design and the field sampling are both rated Quality Level I. The overall analytical Quality Level rating is I.

Field Data:

**Request 501:** Both the sampling design and field sampling were rated Quality Level I.

**Request 502:** Both the sampling design and the field sampling were rated Quality Level I. The absence of field measurements for the sediment was a result of prudent health physics recommendation.

**Request 503:** Both the sampling design and the field sampling were rated Quality Level I. Although the plan requesting slant auguring for the subsoil samples was not implementable because of equipment shortcomings, the principle is sound.

**Request 504:** The field measurements were taken only once. The identical data reported for the remaining samples, including the time of sampling, are strong evidence for this conclusion. For this reason, the field sampling is rated Quality Level II.

**Request 505:** Both the sampling design and field sampling are rated Quality Level I.

**Request 506:** The rating of Quality Level II for the field sampling is due to non recording of the temperature for the field measurement.

**Request 507:** Both the sampling design and the field sampling are rated Quality Level I.

**Request 508:** The field measurements of pH and temperature were not recorded. The field description of observing "white calcium carbonate" would make the sediment alkaline in pH. Because samples were collected for analysis, the rating is Quality Level II.

**Request 509:** A rating of Quality Level I is assigned to field sampling in spite of the oversight in not taking the temperature immediately. This can be considered a minor error which would not affect the analyses, except for volatiles which would have been a separate sample.

**Request 510:** Both the sampling design and the field sampling were rated Quality Level I, although the number of samples were less than originally planned. It could not be predetermined that the water level at the time of sampling would be much lower than anticipated.

**Request 511:** Both the sampling design and the sampling were rated Quality Level I. The reduced number of samples reflects the absence of an outlet area.

**Request 512:** Both the sampling design and the sampling were rated Quality Level I. The reduced number of samples was due to encountering refusal at one of the auguring sites.

**Request 513:** Both the sampling design and the sampling were rated Quality Level I. The reduced number of samples was due to absence of an outlet zone and the shallowness of the pond.

**Request 514:** Although measurements of pH and temperature were not recorded, samples were collected for laboratory analysis. Therefore, field sampling was assigned a Quality Level II.

**Request 515:** Both the sampling design and field sampling were Quality Level I.

**Request 516:** The basis for the Quality Level II assignment for the field sampling is that the pond had an outlet and Fig. 4.3p shows a flow direction of the water that suggests that outlet samples could have been taken near the overflow pipe.

**Request 517:** The Quality Level II assignment is based on the justification for a Quality Level of II for Request 516; that is, the pond had an outlet and the outlet area could have been sampled.

**Request 518:** Both the sampling design and field sampling were Quality Level I.

**Request 519:** Both the sampling design and the field sampling were rated Quality Level I.

**Request 520:** Both the sampling design and the field sampling were rated Quality Level I.

Request 521: NA.

**Request 522:** Both the sampling design and the field sampling were rated Quality Level I.

Analytical Data:

Request 501:

Anions and cyanide. The data Quality Level for anions is II mainly due to noncompliance of calibration verification and spike recovery.

Metals. Analytical results for ICP metals were Quality Level I except for zinc at Quality Level III. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL. The sample result was less than 10 times the blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The TCL data are listed as being of Quality Level I. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III. Concentrations were often below quantitation limits and are considered estimates.

Radiochemistry. All data are Quality Level I.

Request 502:

Anions and cyanide. The data Quality Level for anions is II mainly due to noncompliance of the spike recovery.

Metals. Analytical results for ICP metals were Quality Level I. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The overall TCL quality assessment is Quality Level I. In addition, specifically identified TIC data are of Quality Level II and unknown TIC data are of Quality Level III. Concentrations were often below quantitation limits and are, therefore, considered estimates.

Radiochemistry. All data are Quality Level I.

**Request 503:**

Anions and cyanide. The data Quality Level for anions is II mainly due to noncompliance of the calibration verification.

Metals. Analytical results for ICP metals were Quality Level I, except for antimony and zinc at Quality Level III. For antimony, the percent recovery for spikes was less than 30% and the reported sample result was positive. Data should be considered as confirmation of the qualitative presence of the analyte only. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL and the sample result was less than 10 times the blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. The data are Quality Level III due mainly to poor recovery of all target spike compounds.

Volatile organics. TCL data are Quality Level I. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Request 504:

Anions and cyanide. The data Quality Level for anions is II due to noncompliance of the calibration verification for sulfate and of the spike recovery for chloride.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

Volatile organics. The overall TCL data quality is Quality Level I. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III. Concentrations were often below quantitation limits.

Radiochemistry. All data are Quality Level I.

Request 505:

Anions and cyanide. The data Quality Level for anions is II due to noncompliance of all the anions in calibration verification.

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level III. For antimony, the percent recovery for spike is less than 30% and the reported sample result is less than the IDL, indicative of severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

Volatile organics. The overall TCL quality assessment for this sample data group is Quality Level I. In addition, specifically identified TIC data are of Quality Level II and unknown TIC data are of Quality Level III. For volatile organics, concentrations were often below quantitation limits and compounds were often identified in the blanks as well as in the samples.

Radiochemistry. All data are Quality Level I.

Request 506:

Anions and cyanide. The data Quality Level for anions is II due to noncompliance of calibration verification and spike recovery.

Metals. Analytical results for ICP metals were Quality Level I except for antimony and zinc at Quality Level III. For antimony the percent recovery for spikes was less than 30% and the reported sample result was positive. Data should be considered as confirmation of the qualitative presence of the analyte only. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL, and the sample result was less than 10 times the blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

Volatile organics. Data are of Quality Level I.

Radiochemistry. All data are Quality Level I.

Request 507:

Anions and cyanide. The data Quality Level for anions is II due to noncompliance of calibration verification and spike recovery.

Metals. Analytical results for ICP metals were Quality Level I. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. The data are Quality Level III, due mainly to the extraction holding time being exceeded by 64 days. The only PCB detected was Aroclor-1260, which is indicated as an exceptionally stable compound that should not be greatly affected by the longer holding time. However, matrix spiking

solution was mistakenly added to the sample, so the sample was used as the matrix spike and matrix spike duplicate. The levels of spiked compounds found corresponded well with what was spiked.

Volatile organics. The overall TCL data quality is level I. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III. Concentrations were often below quantitation limits.

Radiochemistry. All data are Quality Level I.

Request 508:

Anions and cyanide. The data Quality Level for anions is II due to noncompliance of calibration and verification.

Metals. Analytical results for ICP metals were Quality Level I except for zinc at Quality Level III. For zinc, positive values were obtained for the calibration verification blank which were greater than the CRDL, indicative of severe analytical deficiencies. The data is unusable. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. The data are Quality Level III due mainly to the extraction holding time being exceeded by 65 days. The only PCB detected was Aroclor 1260, which is indicated as an exceptionally stable compound that should not be greatly affected by the longer holding time. However, matrix spiking solution was mistakenly added to the sample, so the sample was used as the matrix spike and matrix spike duplicate. The levels of spiked compounds found corresponded well with what was spiked.

Volatile organics. The overall TCL Quality Level is I. However, the tentatively identified compound 1,1,2-trichloro-1,2,2-trifluoroethane was also present in the blank, and is, therefore, assigned Quality Level III. Specifically identified TIC

data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

**Request 509:**

Anions and cyanide. The data Quality Level for anions is III due to noncompliance of calibration verification and spike recovery. No anion concentration was within compliance for all three samples.

Metals. Analytical results for ICP metals were Quality Level I except for antimony and zinc at Quality Level III. For antimony, the percent recovery for spikes was less than 30% and the reported sample result was positive. Data should be considered as confirmation of the qualitative presence of the analyte only. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL and the sample result was less than 10 times the blank result, indicating that the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. Data are of Quality Level I. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

**Request 510:**

Anions and cyanide. The data Quality Level for anions is III due to noncompliance of calibration verification, spike recovery, and holding time for nitrate-N.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

Volatile organics. Data are of Quality Level I. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

**Request 511:**

Anions and cyanide. The data Quality Level for anions is I. All quality assurance standards except laboratory controls, which were not run, were satisfactorily met.

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level III. For antimony, the percent recovery for spikes was less than 30% and the reported sample result was positive. Data should be considered as confirmation of the qualitative presence of the analyte only. Analytical results for AA metals were Quality Level I.

Volatile organics. The overall quality assessment for this sample data group is level I. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Request 512:

Anions and cyanide. The Quality Level for anions is II. Calibration verification were out of control for two of the four anions.

Metals. Analytical results for ICP metals were Quality Level I except for antimony and zinc at Quality Level III. For antimony, the percent recovery for spikes is less than 30% and the reported sample result is positive. The data is considered as confirmation of the qualitative presence of the analyte only. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL, and the sample result was less than 10 times the blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

Volatile organics. TCL data are Quality Level II due to some deviations from holding-time requirements. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Request 513:

Anions and cyanide. The data Quality Level for anions is III. Spike recoveries were all out of compliance for four of the anions quantified, and two of the calibration verifications were also out of compliance.

Metals. Analytical results for ICP metals and AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. This sample data group was given an overall TCL data Quality Level rating of I. However, volatile organic compounds were often below

quantitation limits and also were frequently detected in the blank samples. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

**Request 514:**

Anions and cyanide. With the exception of spike recovery being out of compliance by about 6%, and all the other quality standards being met, the data Quality Level for the anions is I.

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level II. For antimony, the percent recovery for spikes was within the range of 30 to 74% and the sample result is positive, indicating the possibility of false negatives. Analytical results for AA metals were Quality Level I.

Volatile organics. The sediment TCL data is given an overall quality ranking of 1. Because 1,1,1-trichloroethane, methylene chloride, and toluene were present in the blank, they should be interpreted with caution. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

**Request 515:**

Anions and cyanide. The data Quality Level for anions is II. Spike recovery for nitrate-N and calibration verification of fluoride were out of compliance.

Metals. Analytical results for ICP metals were Quality Level I except for antimony and zinc at Quality Level III. For antimony, the percent recovery for spikes is less than 30% and the reported sample result is positive. The data is considered as confirmation of the qualitative presence of the analyte only. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL, and the sample result was less than 10 times the blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. TCL data are Quality Level II due to some deviations from holding-time requirements. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Request 516:

Anions and cyanide. The data Quality Level for anions is II. Spike recovery and calibration verification of nitrate-N and sulfate were out of compliance.

Metals. Analytical results for ICP metals were Quality Level I. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were detected in the samples for this request.

Radiochemistry. All data are Quality Level I.

Request 517:

Anions and cyanide. The data Quality Level for anions is III. No anion was in compliance for all the quality assurance standards.

Metals. Analytical results for ICP metals were Quality Level I. For zinc, positive values were obtained for the calibration verification blank which were greater than the CRDL, indicative of severe analytical deficiencies. The data is unusable. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. Data from this SDG are Quality Level I. For this request, only methylene chloride was detected in only one sample, and that was below the quantitation limit. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Request 518:

Anions and cyanide. The data Quality Level for anions is I. Although the calibration verifications for nitrate-N and fluoride were out of compliance, the recoveries were 112% and 111%, which were very close to the acceptable value of 110%.

Metals. Analytical results for ICP metals were Quality Level I except for antimony and zinc at Quality Level III. For antimony, the percent recovery for spikes was less than 30% and the reported sample result was positive. Data should be considered as confirmation of the qualitative presence of the analyte only. For zinc, a positive value was observed in the preparation blank which was greater than the CRDL, and the sample result was less than 10 times the

blank result, indicating the analyte detected may be due to contamination. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. No volatile organic compounds were reported in the samples for this request.

Radiochemistry. All data are Quality Level I.

Request 519:

Anions and cyanide. The data Quality Level for anions is III. No anion was in compliance for all the quality assurance standards.

Metals. Analytical results for ICP metals were Quality Level I except for arsenic at Quality Level II and silver at Quality Level III. For arsenic, the percent recovery for spikes was within the range 30 to 74% and the reported sample result is less than the IDL, indicating the possibility of false negatives. For silver, the calibration verification result was less than 90% and the element was not detected in the sample. The data are considered marginally usable. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The overall TCL data is Quality Level I. Concentrations were often below quantitation limits. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Request 520:

Anions and cyanide. The data Quality Level for anions is II. Noncompliances included spike recovery of nitrate and calibration verification of nitrate and sulfate.

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level III. For antimony, the percent recovery for spike is less than 30% and the reported sample result is less than the IDL, indicative of severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. Overall TCL data Quality Level is I. The concentrations of 1,1,1-trichloroethane were usually below the quantitation limit. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Request 521: This request was deleted.

Request 522:

Anions and cyanide. The data Quality Level for anions is II. Noncompliances included spike recovery of nitrate and calibration verification of nitrate and sulfate.

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level III. For antimony, the percent recovery for spike is less than 30% and the reported sample result is less than the IDL, indicative of

severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. NA.

Volatile organics. The overall TCL data are Quality Level I. Chloroform and toluene were each detected in only two samples, and were always below quantitation limits. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Environmental Problem: 3
Request Number: 501

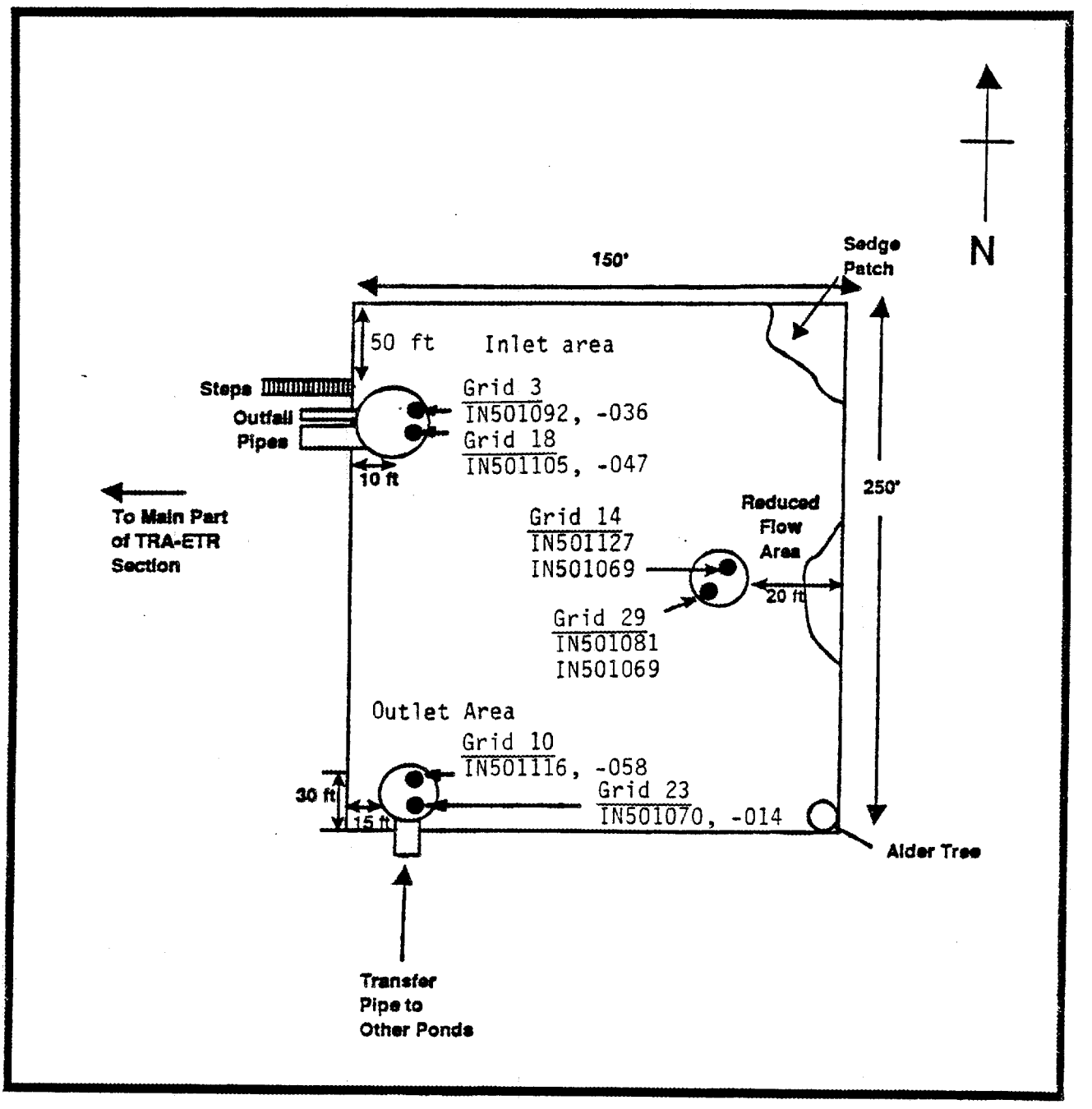


Figure 4.3a. TRA 1952 Northernmost Warm Waste Pond (Request 501)

Environmental Problem: 3
Request Number: 502

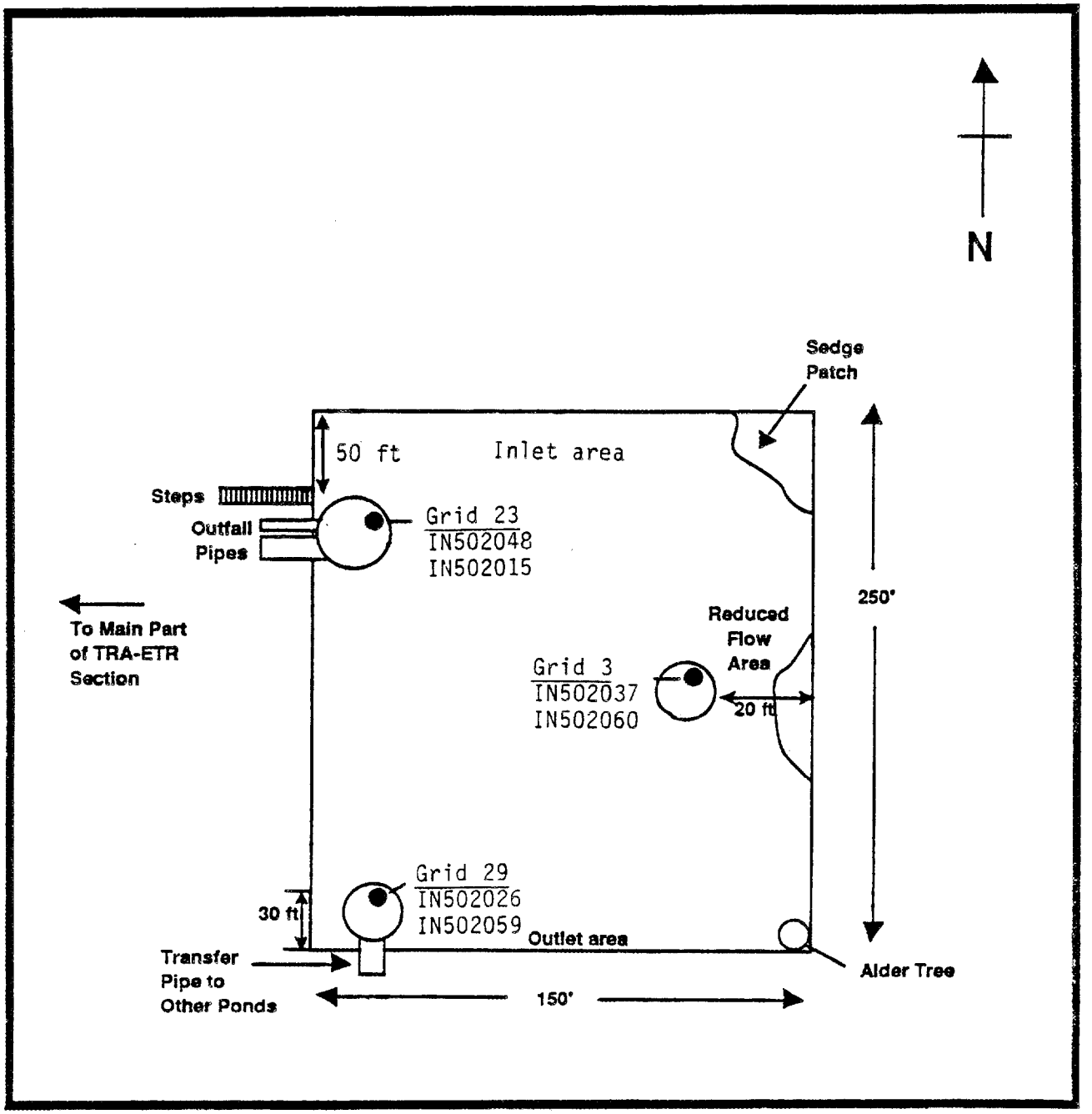


Figure 4.3.b. TRA 1952 Northernmost Warm Waste Pond (Request 502)

Environmental Problem: 3
Request Number: 503

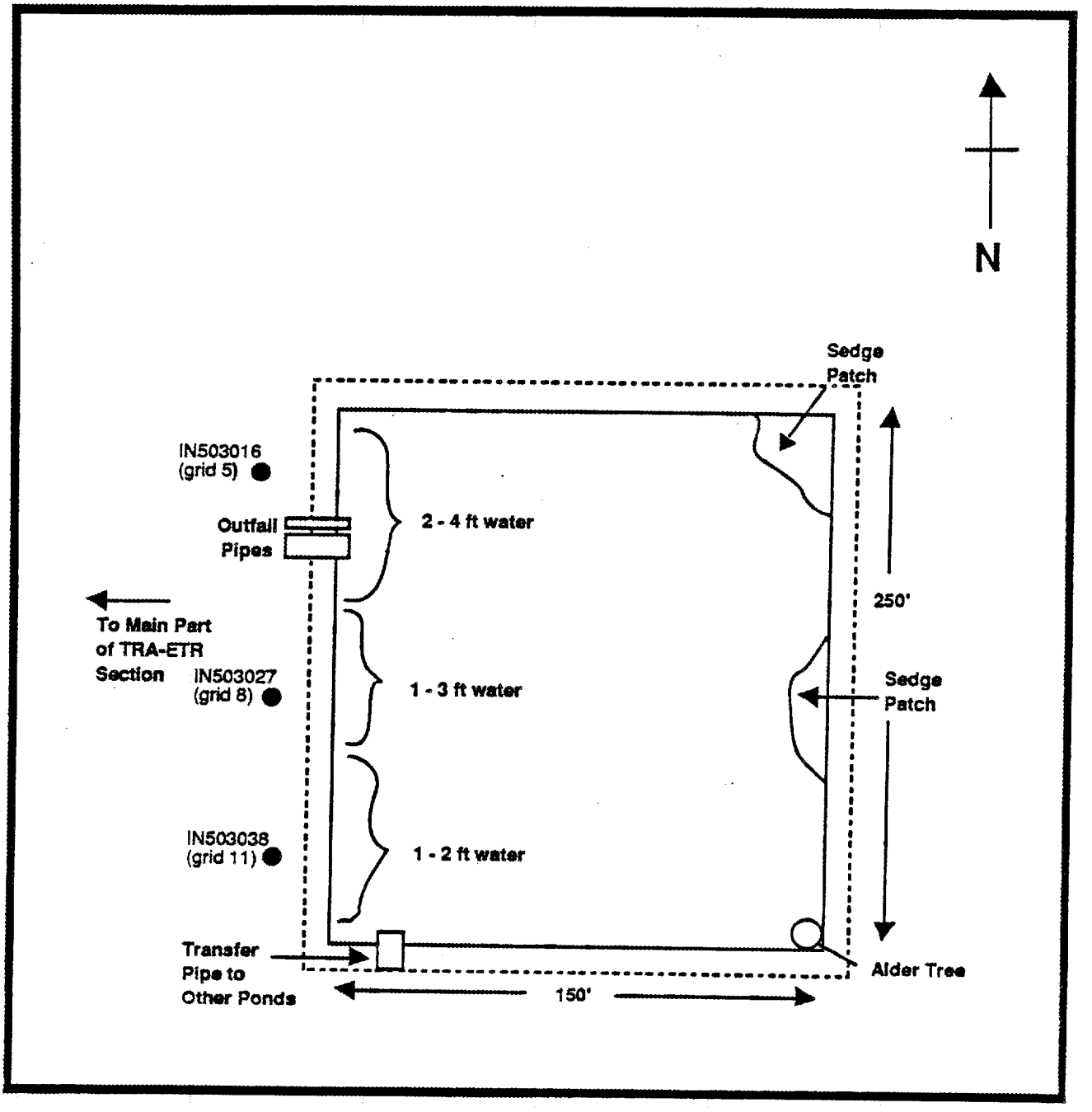


Figure 4.3c. TRA 1952 Northernmost Warm Waste Pond (Request 503)

Environmental Problem: 3
Request Number: 504

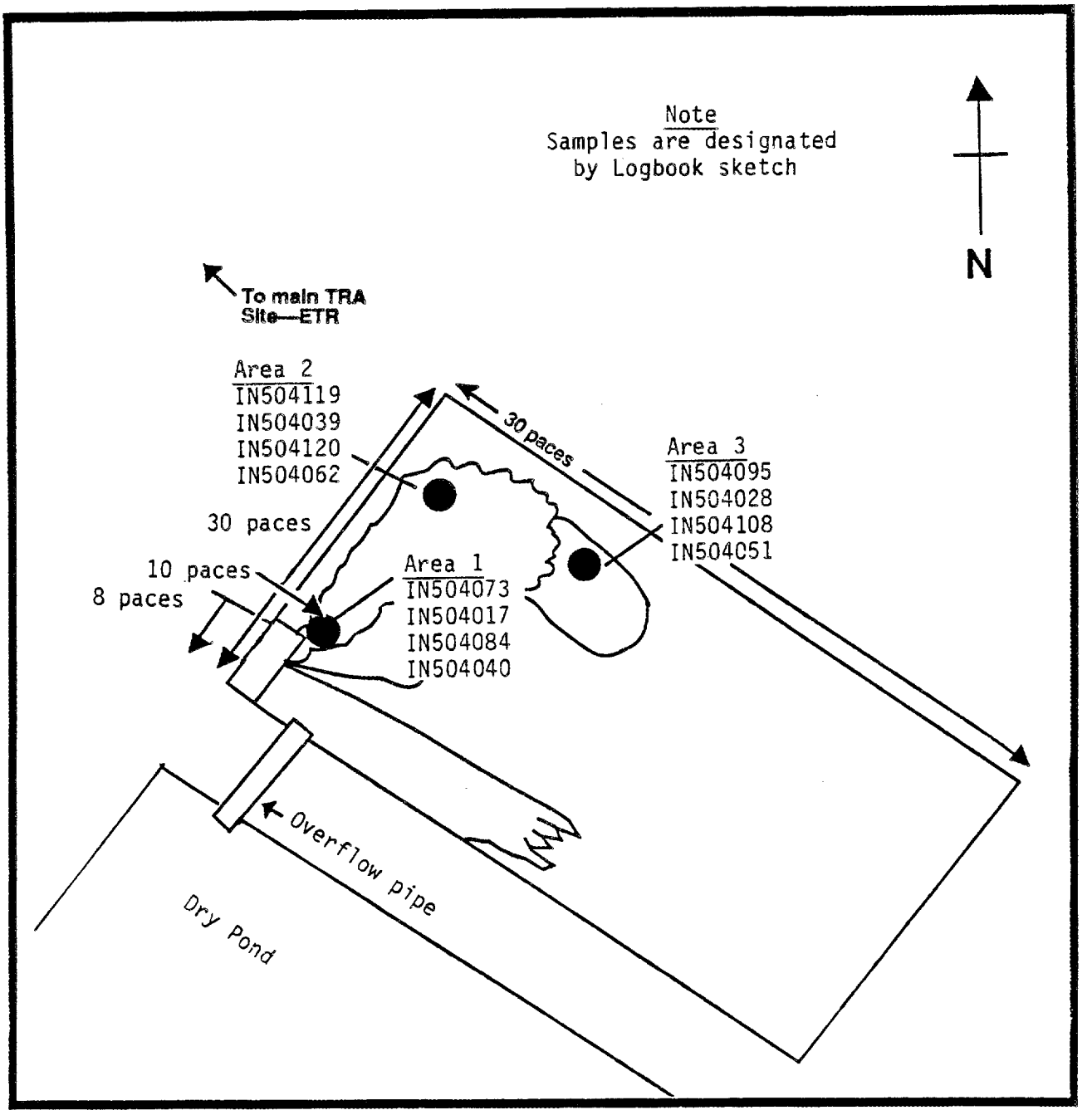


Figure 4.3d. TRA Northeastern Cold Waste Pond (Request 504)

Environmental Problem: 3
Request Number: 505

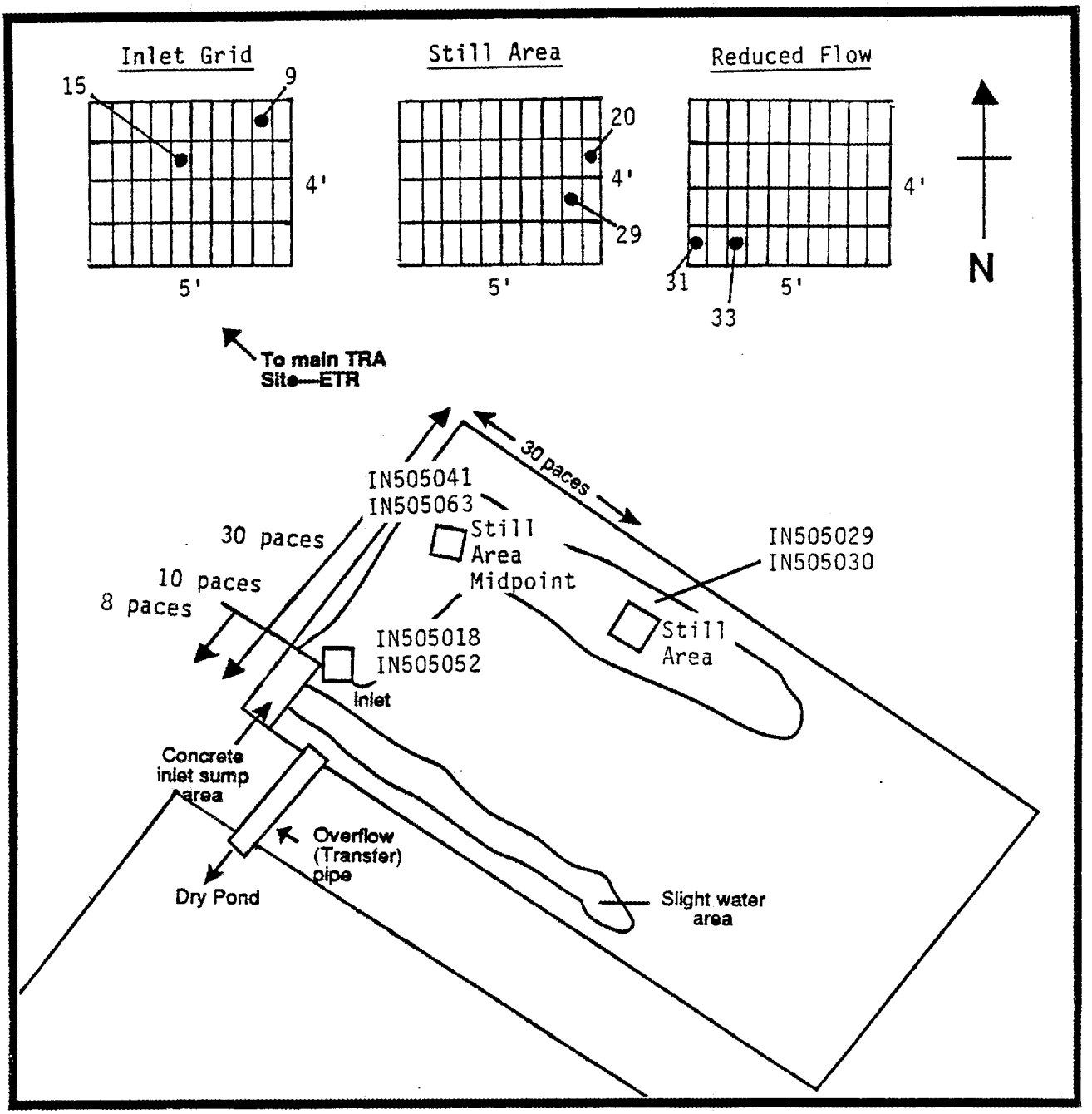


Figure 4.3e. TRA Northeastern Cold Waste Pond (Request 505)

Environmental Problem: 3
Request Number: 506

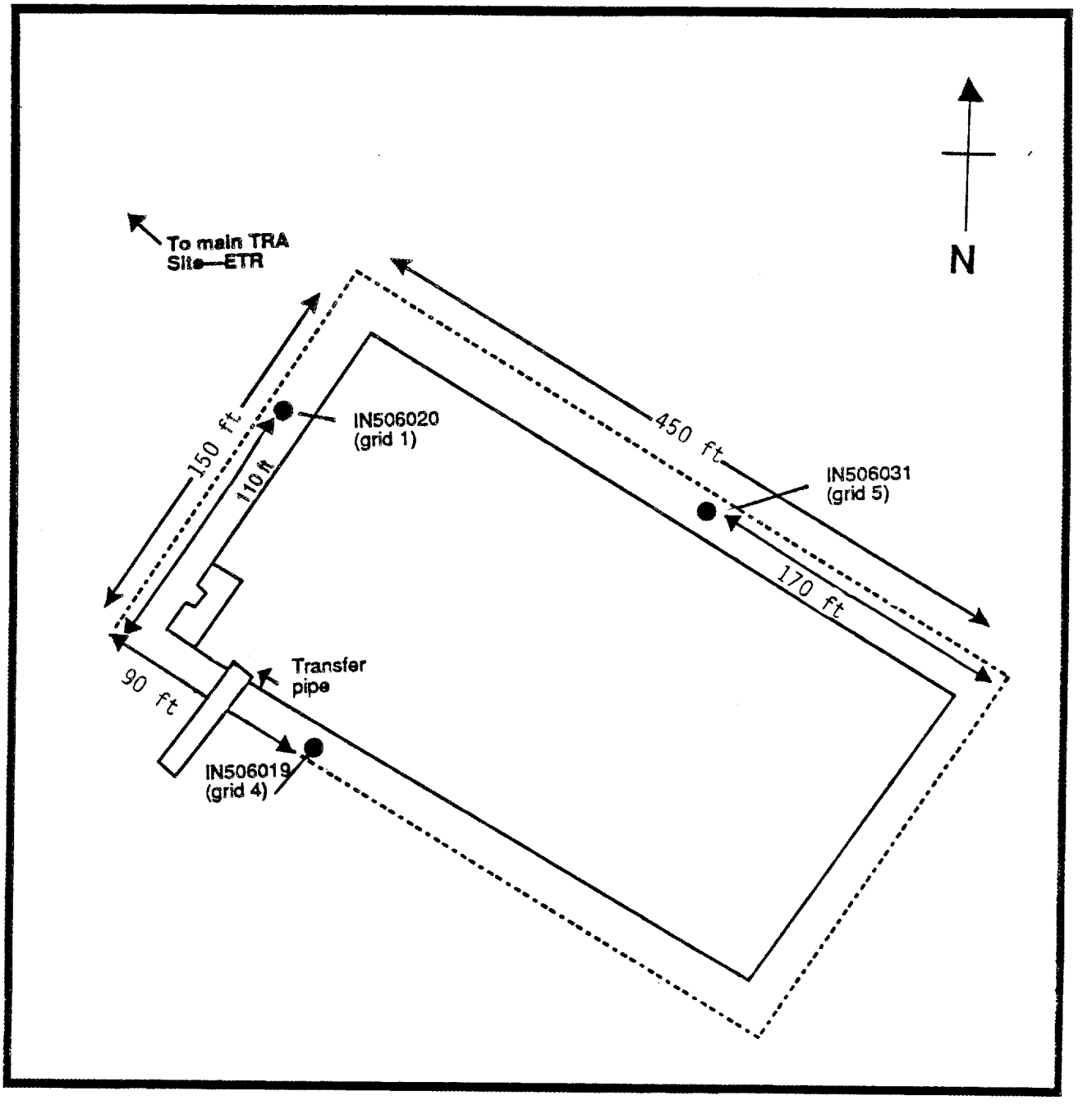


Figure 4.3f. TRA Northeastern Cold Waste Pond (Request 506)

Environmental Problem: 3
Request Number: 507

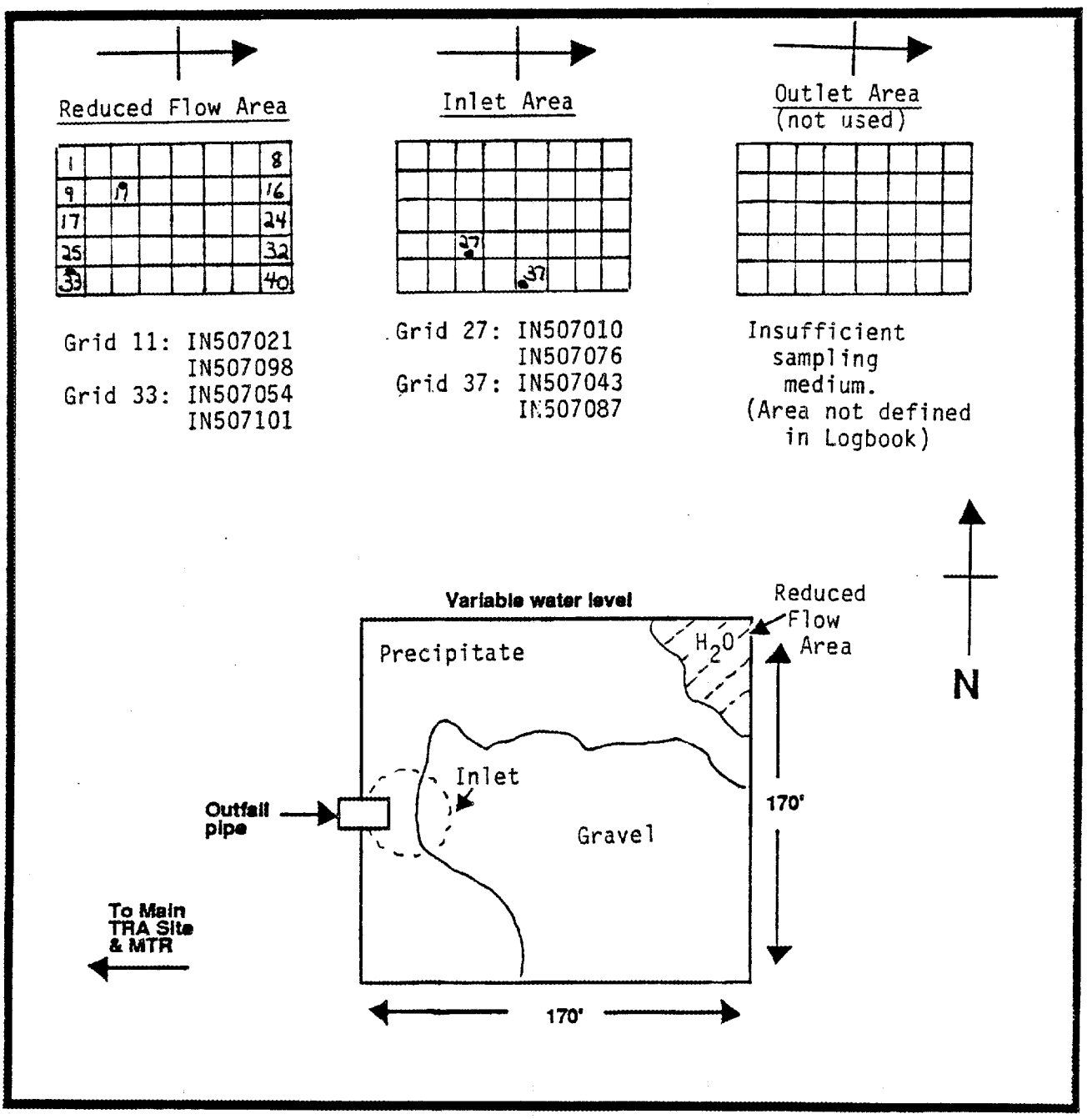


Figure 4.3g. TRA Chemical/Corrosive Pond (Request 507)

Environmental Problem: 3
Request Number: 508

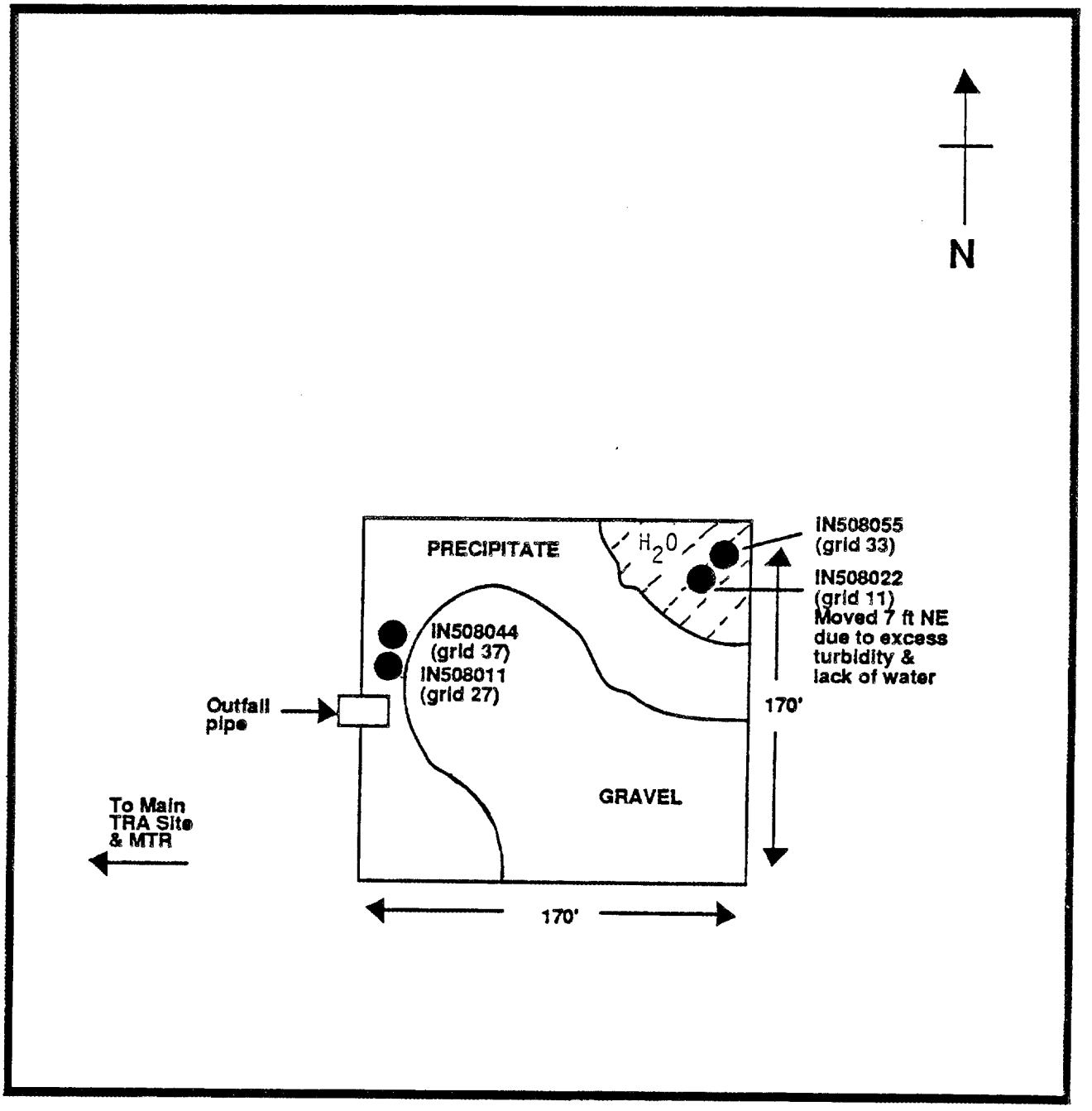


Figure 4.3h. TRA Chemical/Corrosive Pond (Request 508)

Environmental Problem: 3
Request Number: 509

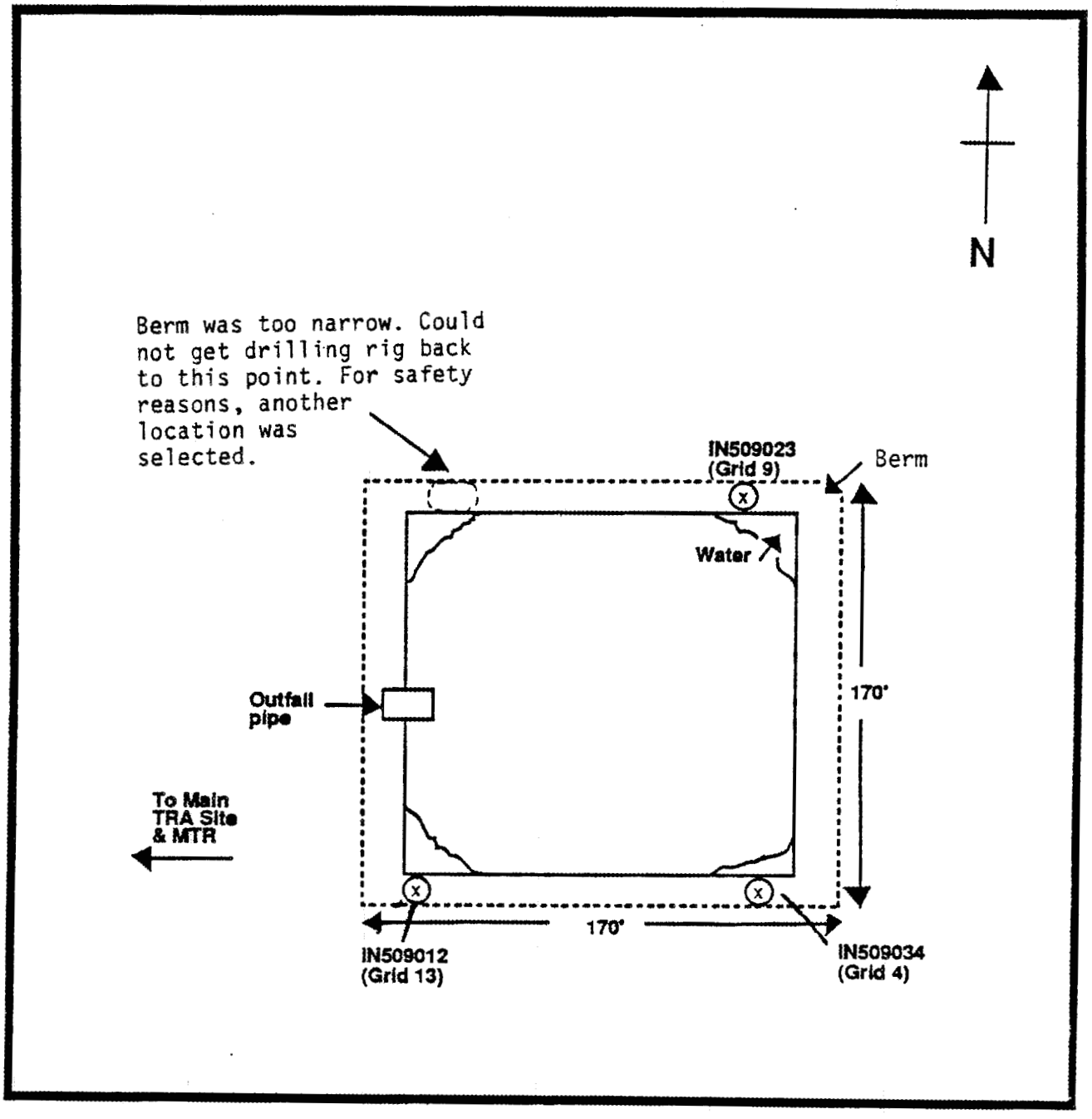


Figure 4.3i. TRA Chemical/Corrosive Pond (Request 509)

Environmental Problem: 3
Request Number: 510

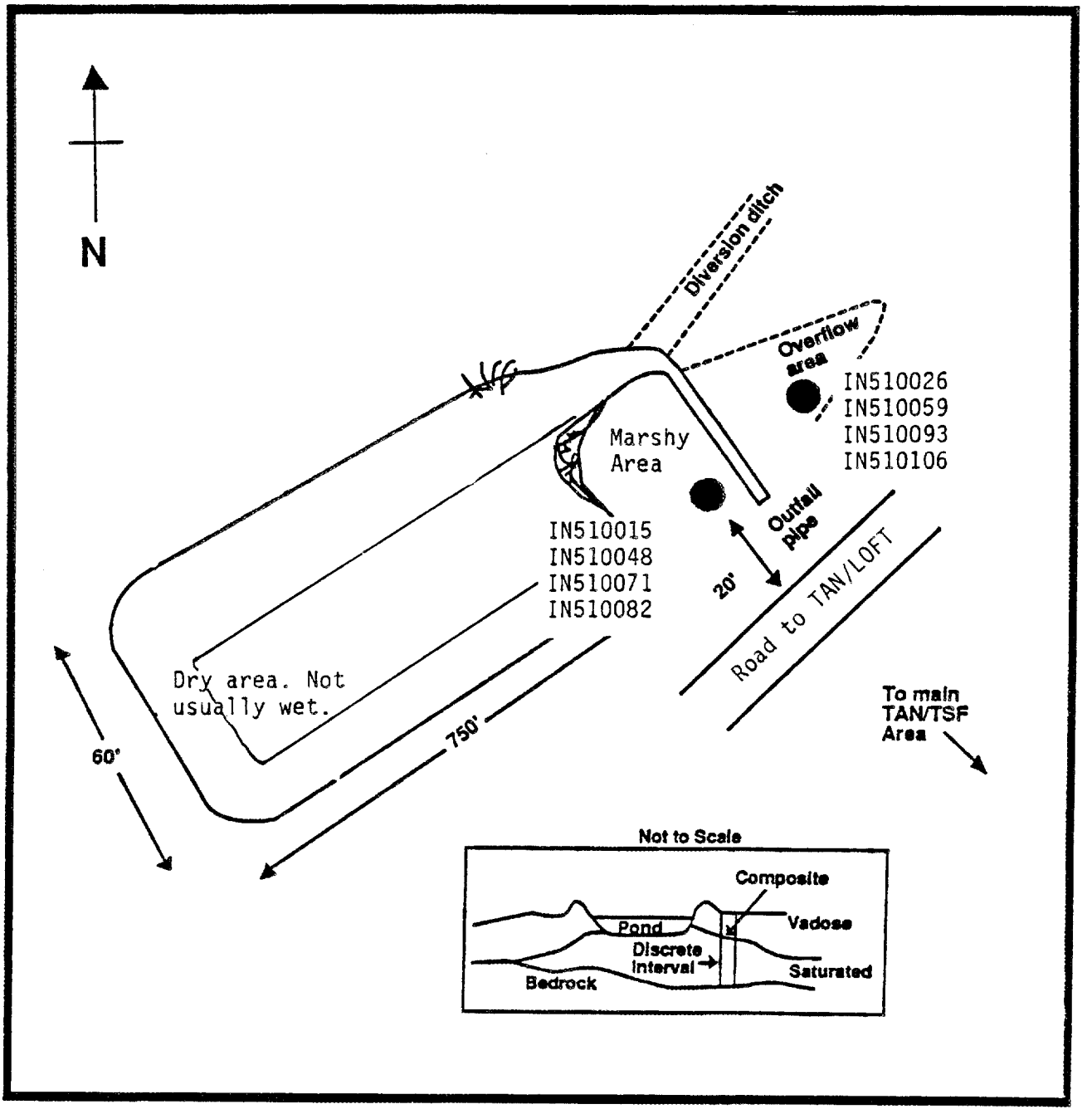


Figure 4.3j. TAN/TSF Disposal Pond (Request 510)

Environmental Problem: 3
Request Number: 511

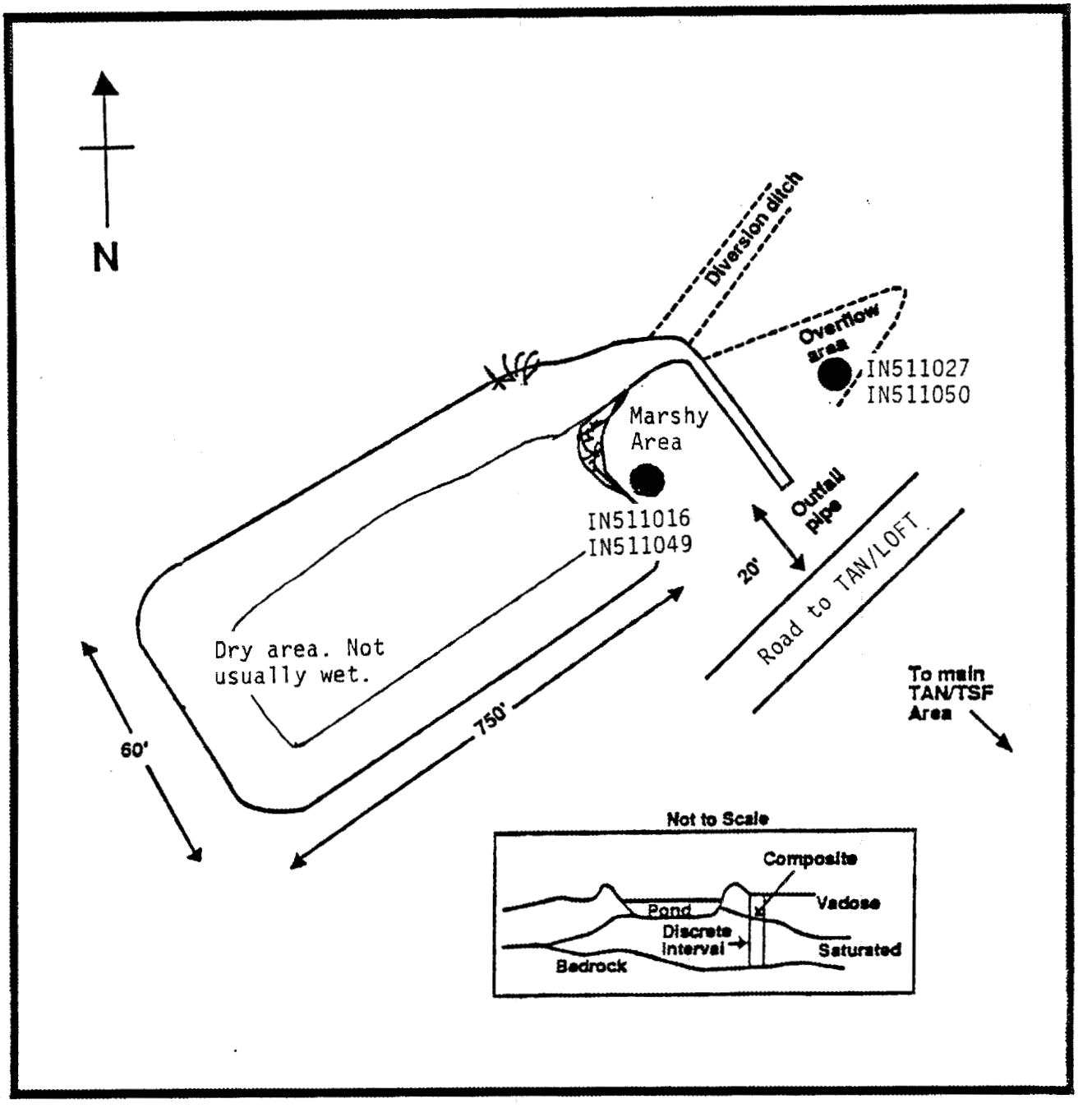


Figure 4.3k. TAN/TSF Disposal Pond (Request 511)

Environmental Problem: 3
Request Number: 512

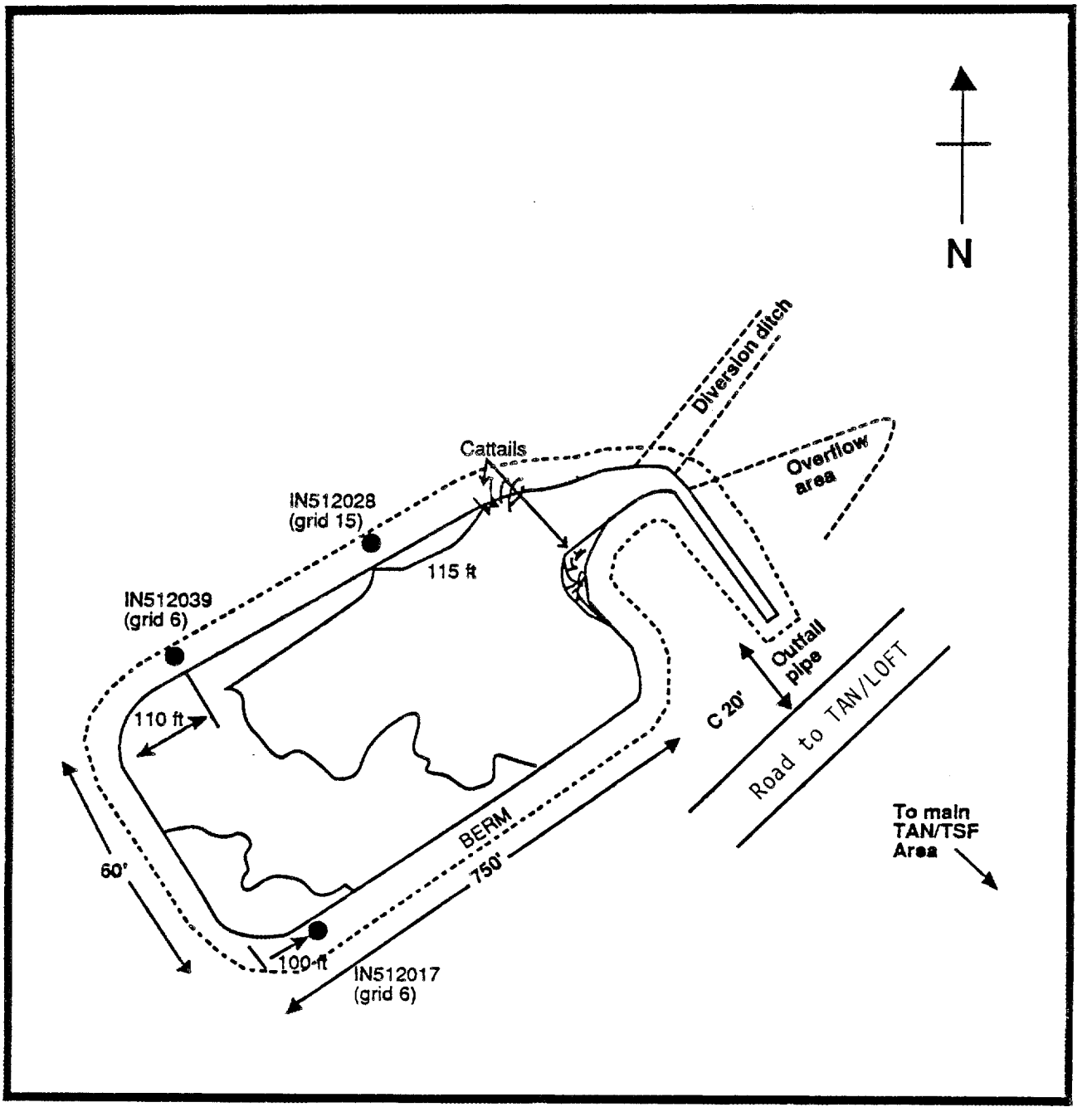


Figure 4.3l. TAN/TSF Disposal Pond (Request 512)

Environmental Problem: 3
Request Number: 513

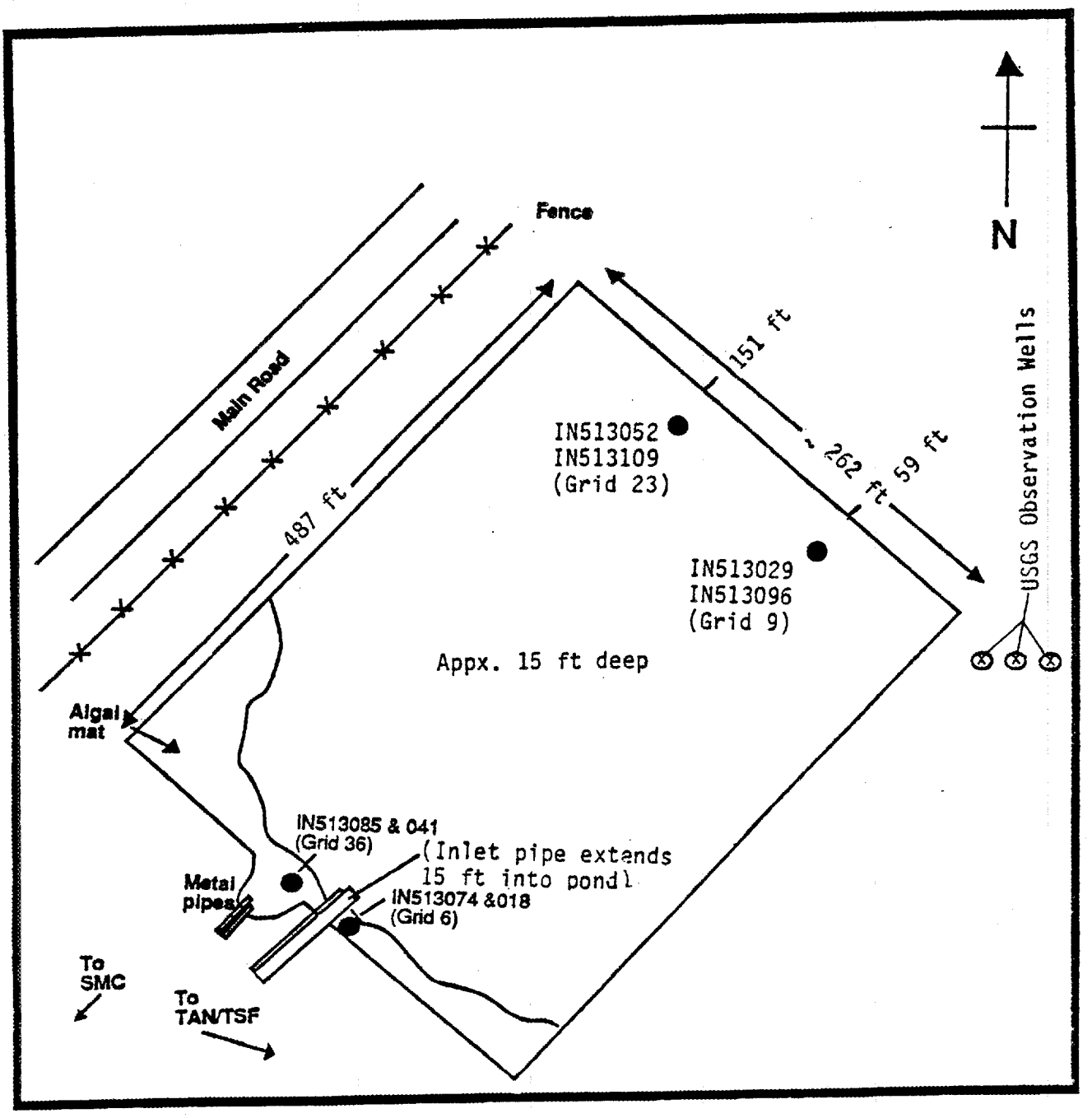


Figure 4.3m. TAN/LOFT Disposal Pond (Request 513)

Environmental Problem: 3
Request Number: 514

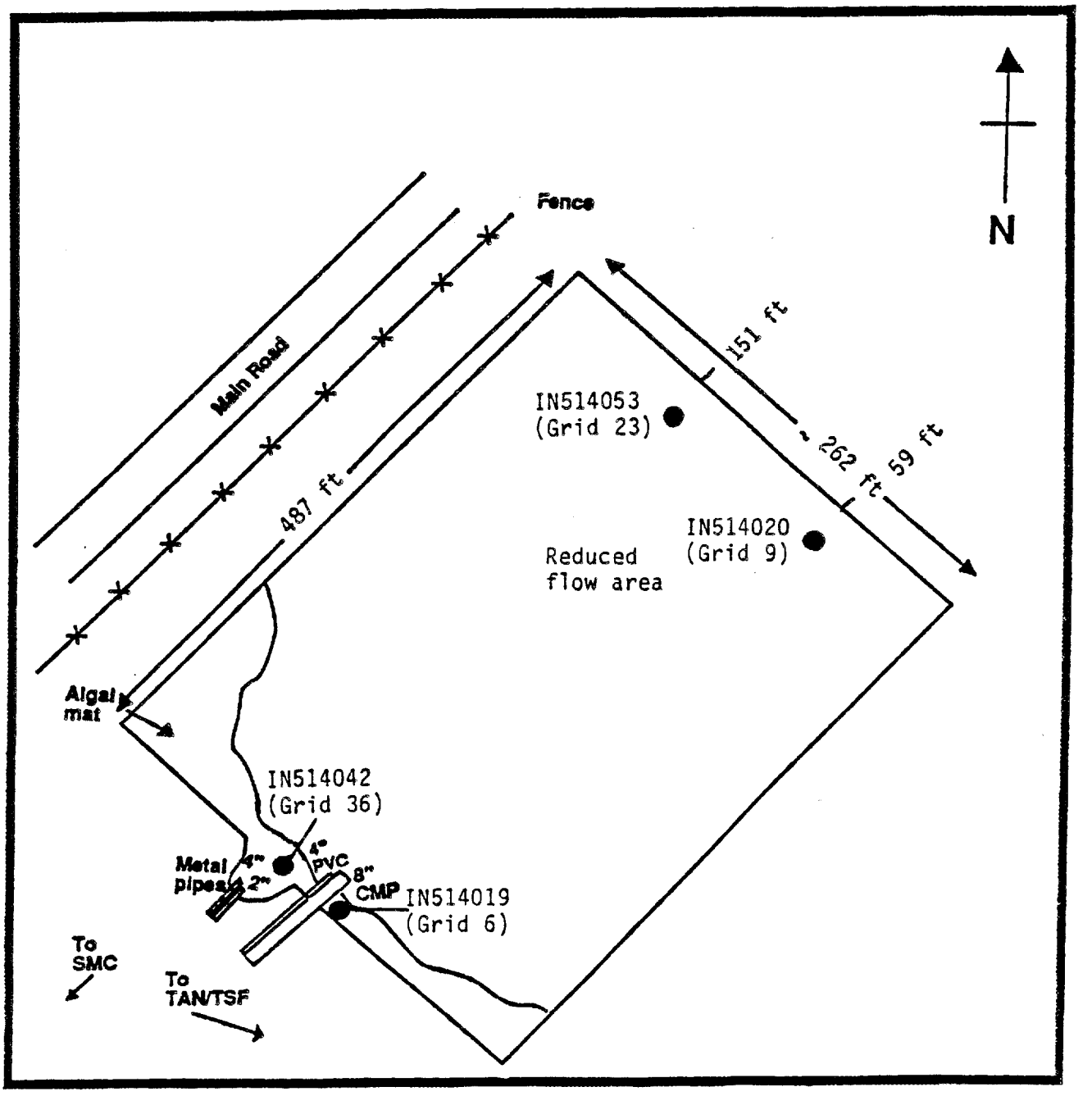


Figure 4.3n. TAN/LOFT Disposal Pond (Request 514)

Environmental Problem: 3
Request Number: 515

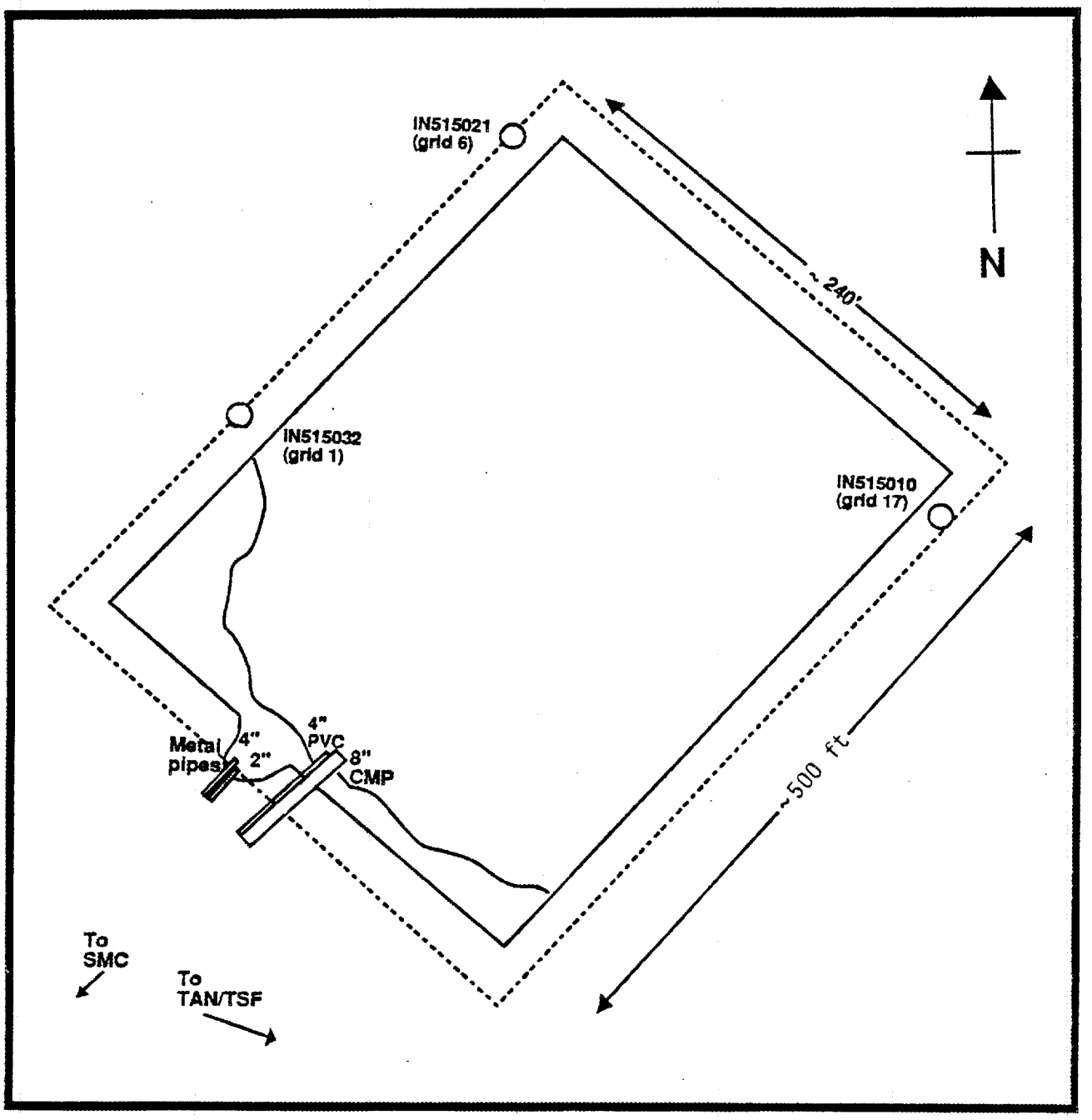


Figure 4.3o. TAN/LOFT Disposal Pond (Request 515)

Environmental Problem: 3
Request Number: 516

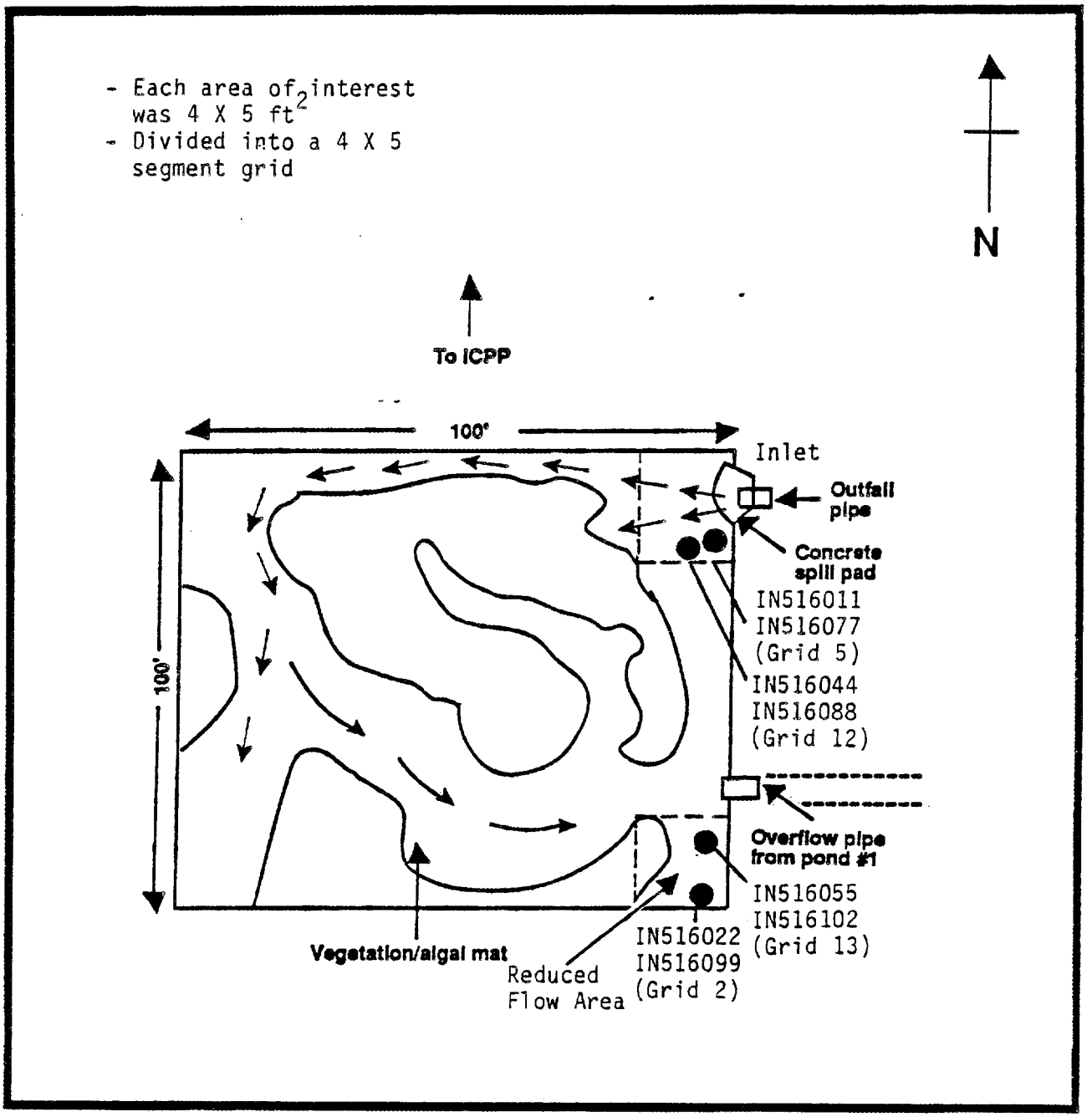


Figure 4.3p. ICPP Percolation Pond 2 (Request 516)

Environmental Problem: 3
Request Number: 517

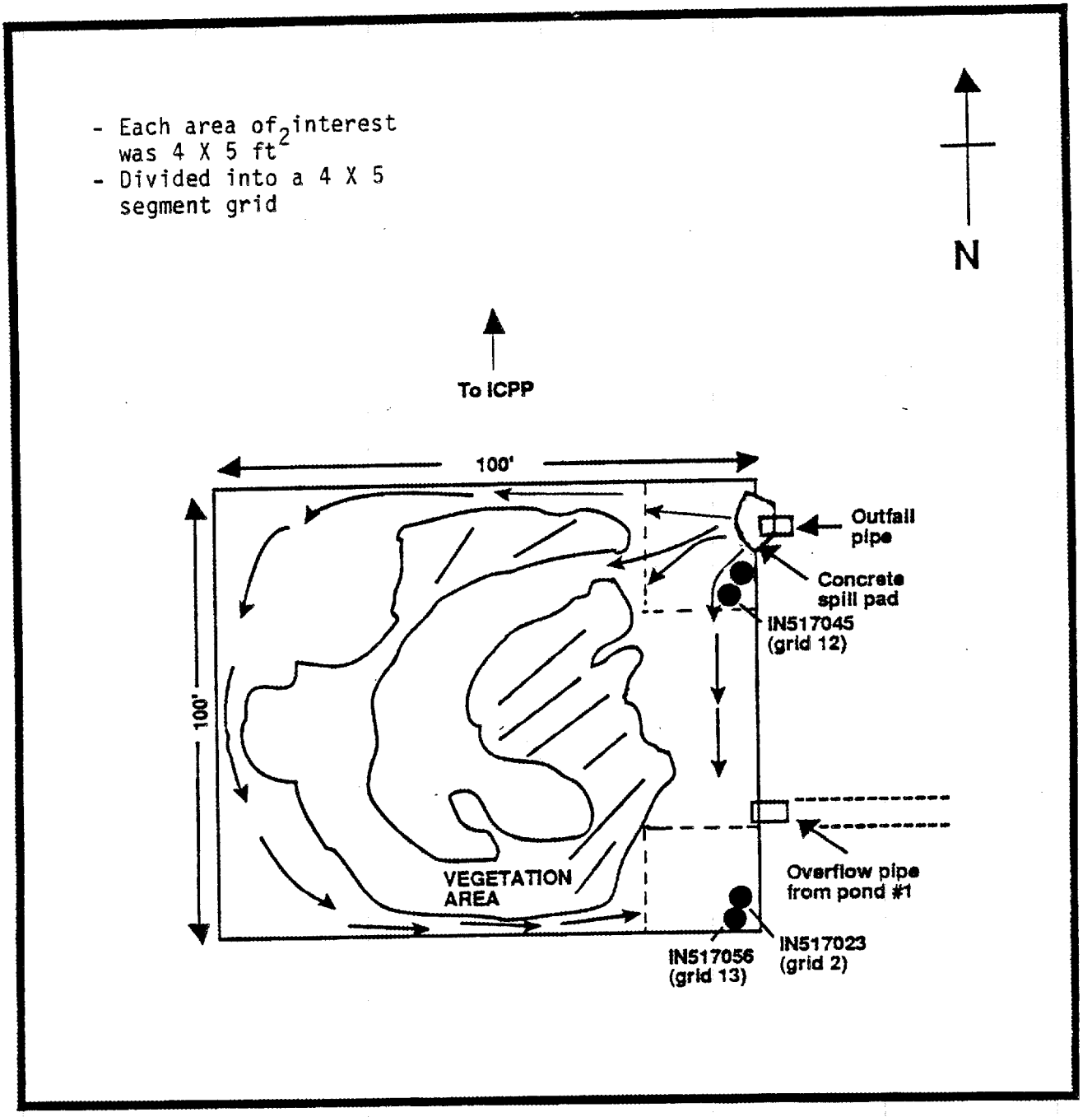


Figure 4.3q. ICPP Percolation Pond 2 (Request 517)

Environmental Problem: 3
Request Number: 518

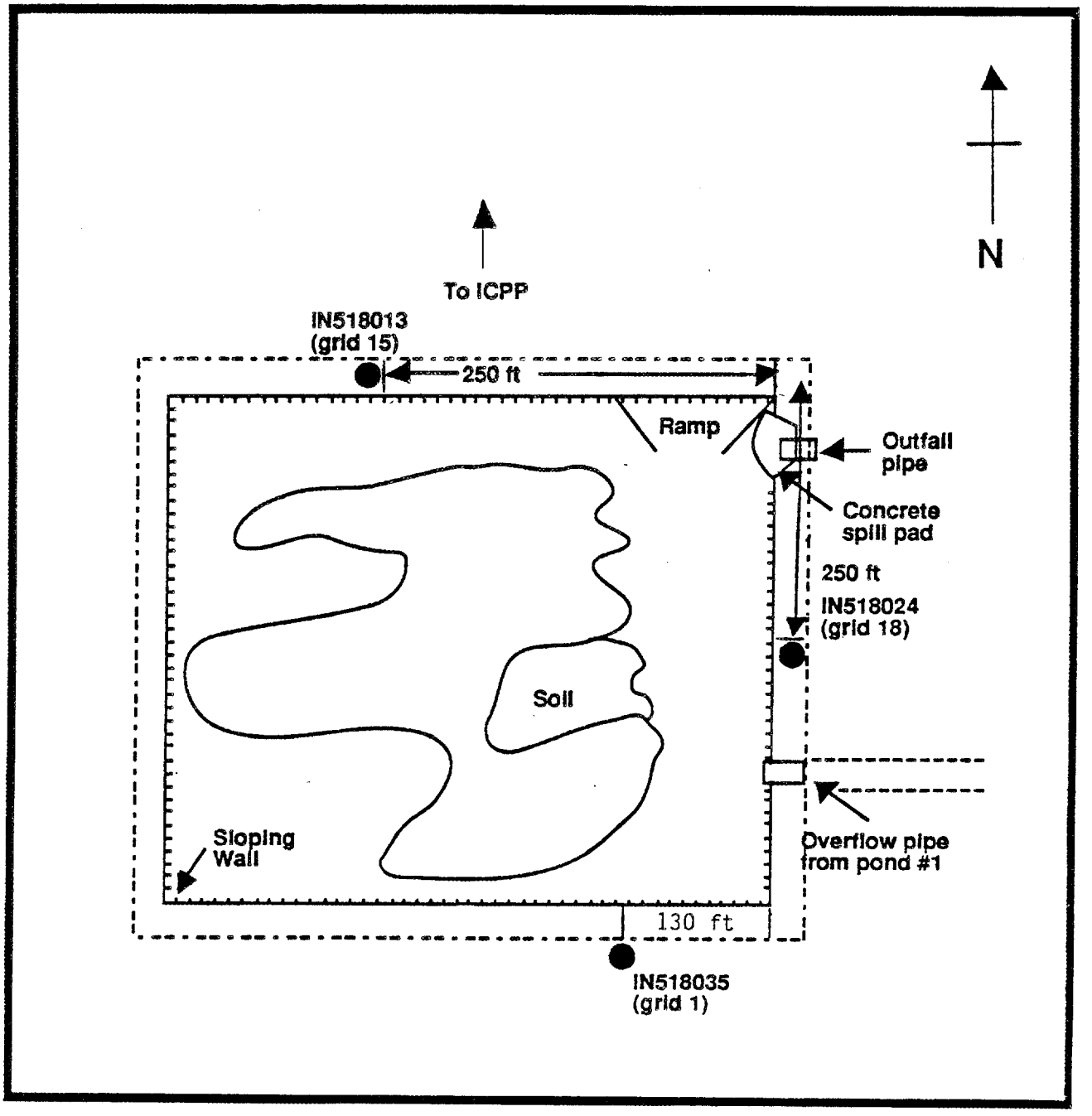


Figure 4.3r. ICPP Percolation Pond 2 (Request 518)

Environmental Problem: 3
Request Number: 519

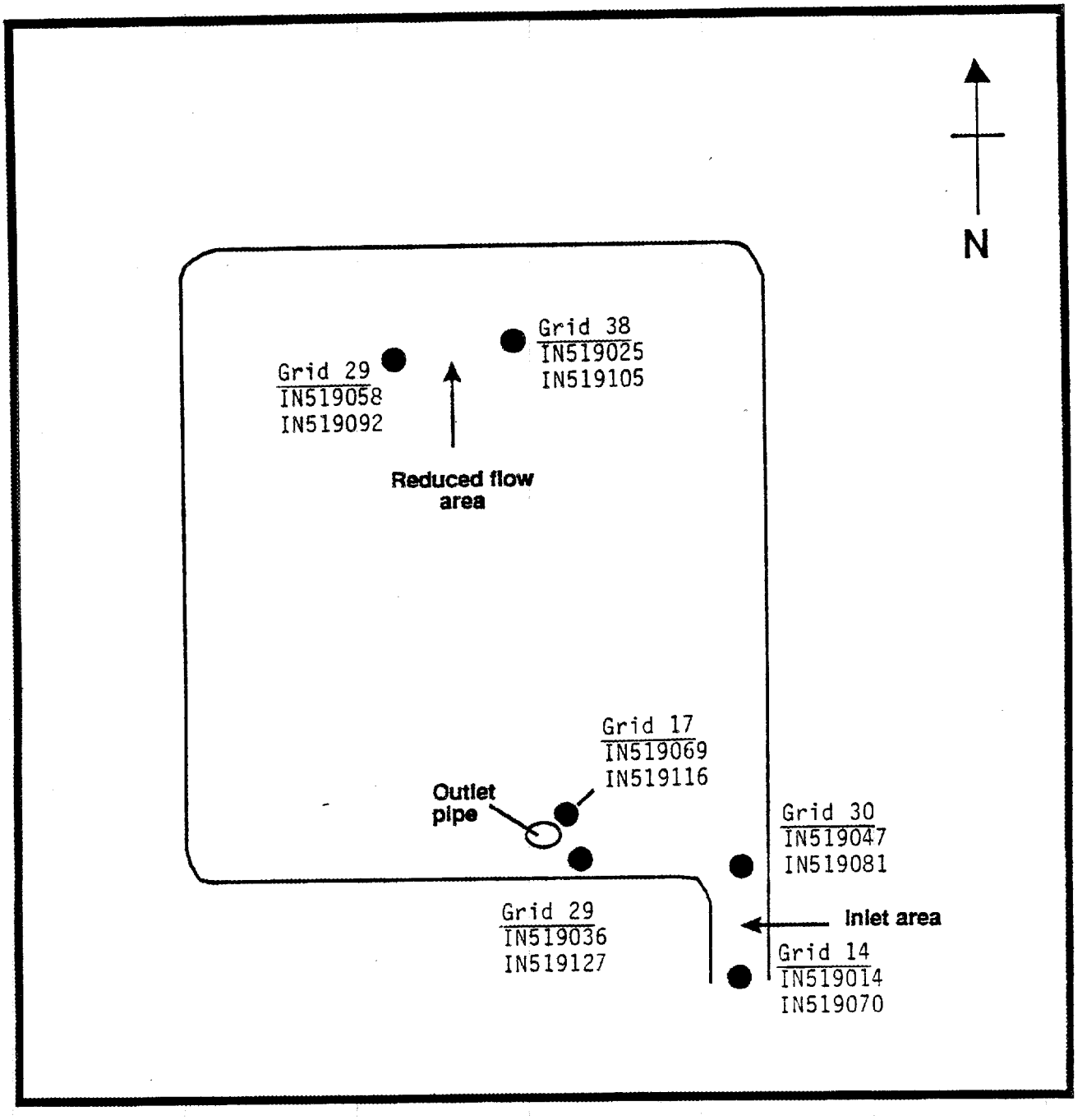


Figure 4.3s. ANL-W Disposal Pond (Request 519)

Environmental Problem: 3
Request Number: 520

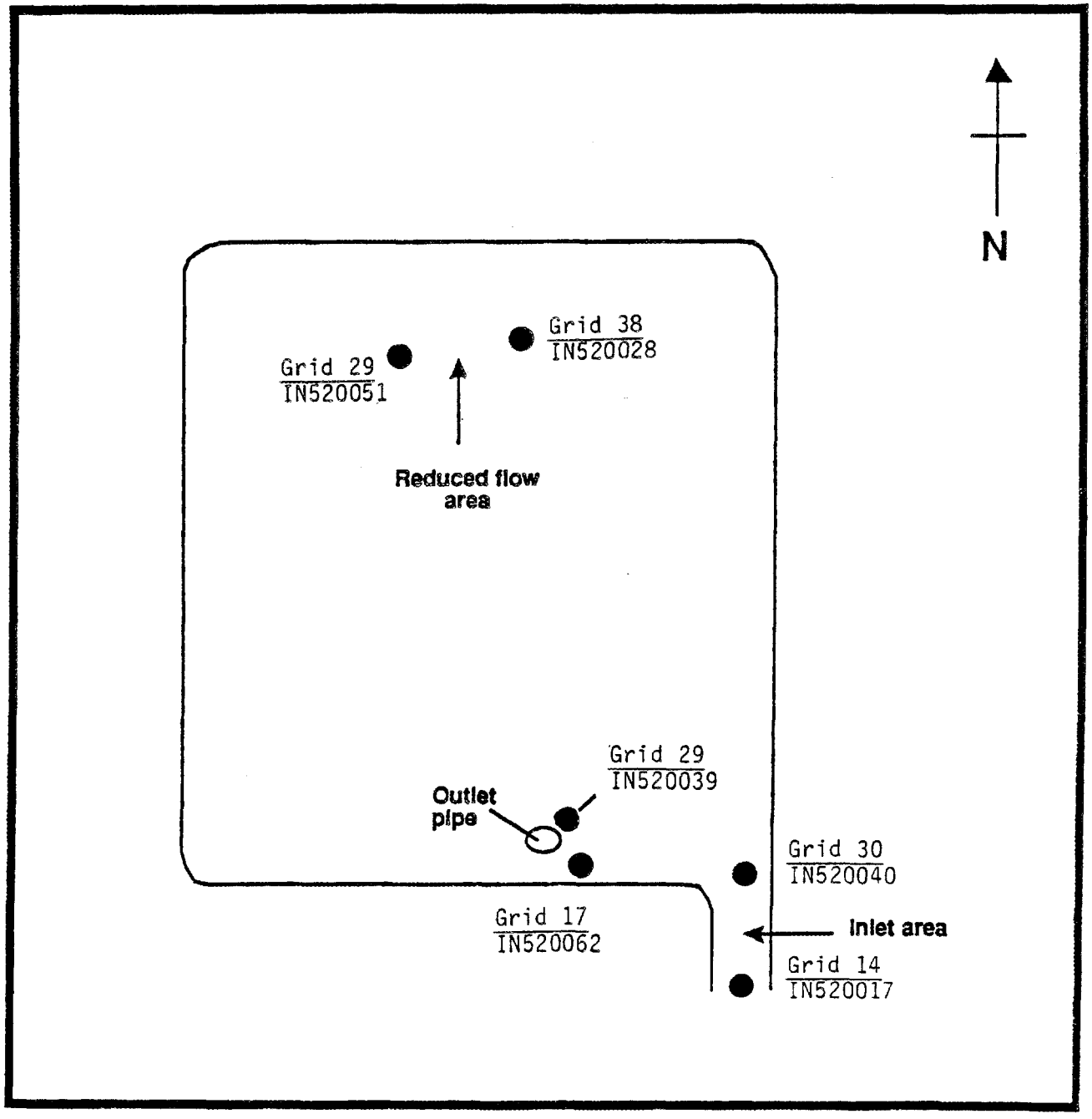


Figure 4.3t. ANL-W Disposal Pond Inlet (Request 520)

Environmental Problem: 3
Request Number: 521

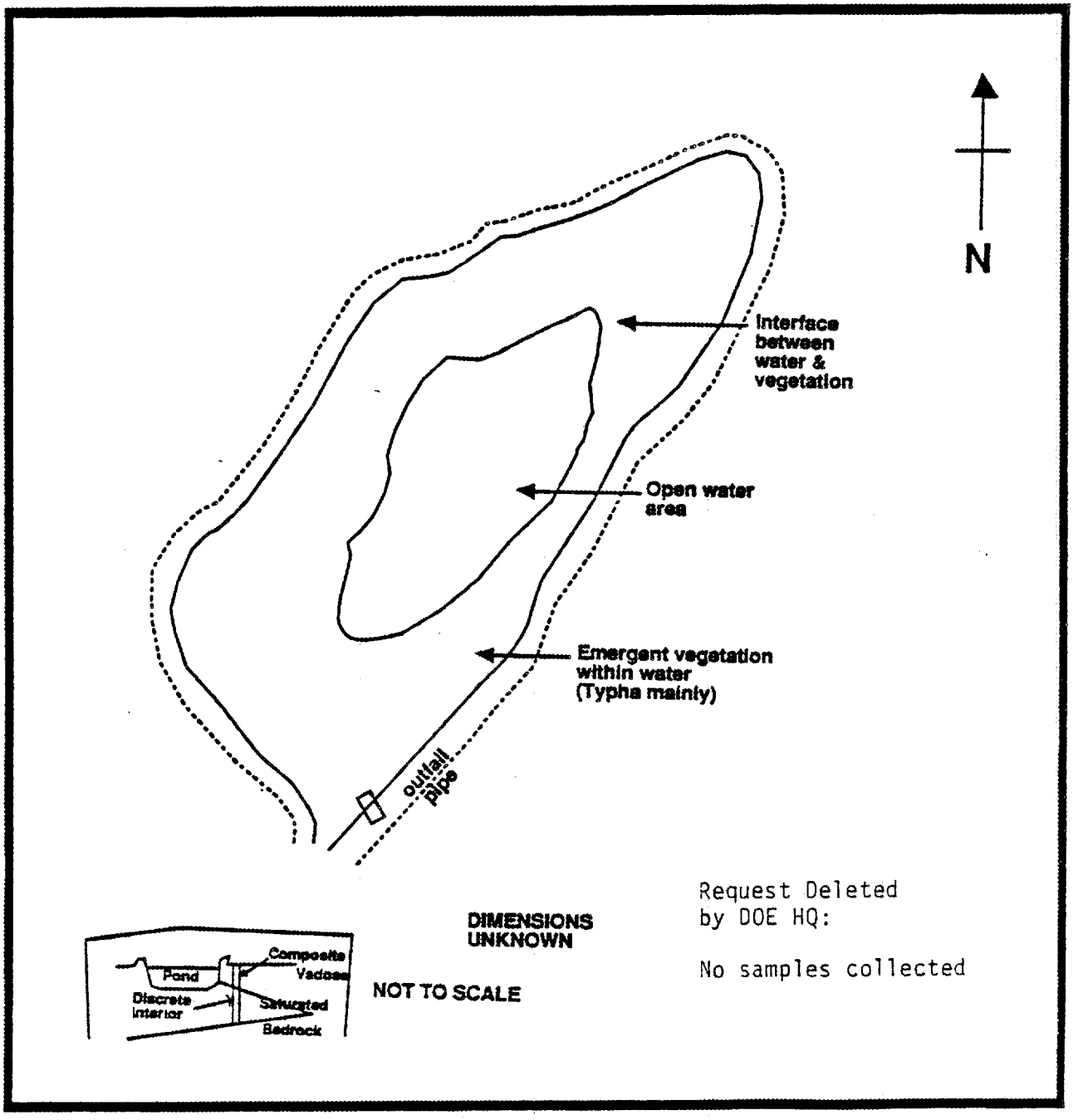


Figure 4.3u. ANL-W Disposal Pond (Request 521)

Environmental Problem: 3
Request Number: 522

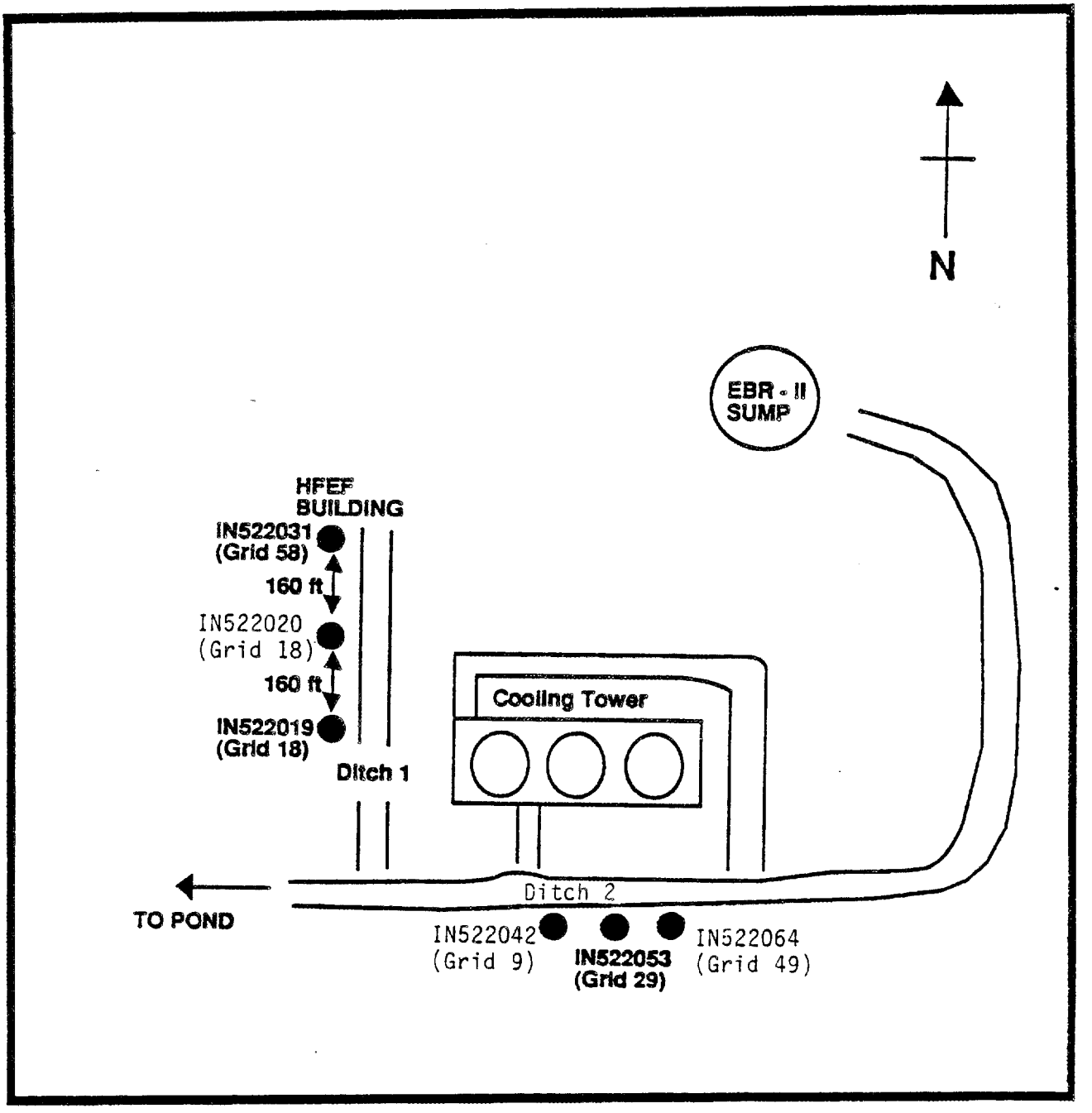


Figure 4.3v. ANL-W Ditches (Request 522)

TABLE 4.2.3 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 3

DRAFT DO NOT CITE

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN503 | TRA 1952 | WASTE POND | SOIL | 3 | 3 | GRAB | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 2 | 3 | 3 |
| IN506 | TRA NE CLD | WASTE POND | SOIL | 3 | 2 | GRAB | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 |
| IN509 | TRA CHEM | WASTE POND | SOIL | 3 | 3 | GRAB | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 2 | 3 | 3 |
| IN512 | TAN TSF | WASTE POND | SOIL | 3 | 2 | GRAB | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 3 |
| IN515 | TAN LOFT | WASTE POND | SOIL | 3 | 3 | GRAB | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 3 |
| IN518 | ICPP 2 | WASTE POND | SOIL | 3 | 2 | GRAB | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| IN521 | ANL-W | WASTE POND | SOIL | 3 | 0 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522 | ANL-W | DITCH | SOIL | 6 | 6 | GRAB | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 6 | 6 |
| | | MED TOTAL | | 27 | 21 | | 22 | 22 | 22 | 22 | 0 | 0 | 0 | 6 | 0 | 0 | 16 | 17 | 22 | 22 |
| IN502 | TRA 1952 | WASTE POND | SEDIMENT | 6 | 6 | GRAB | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 6 | 6 |
| IN505 | TRA NE CLD | WASTE POND | SEDIMENT | 6 | 6 | GRAB | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 6 | 6 | 6 |
| IN508 | TRA CHEM | WASTE POND | SEDIMENT | 6 | 4 | GRAB | 4 | 4 | 4 | 4 | 0 | 0 | 3 | 4 | 0 | 0 | 4 | 4 | 4 | 4 |
| IN511 | TAN TSF | WASTE POND | SEDIMENT | 6 | 4 | GRAB | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 4 | 4 |
| IN514 | TAN LOFT | WASTE POND | SEDIMENT | 6 | 4 | GRAB | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 5 | 5 |
| IN517 | ICPP 2 | WASTE POND | SEDIMENT | 6 | 4 | GRAB | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 4 | 4 |
| IN520 | ANL-W | WASTE POND | SEDIMENT | 6 | 6 | GRAB | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 6 | 6 |
| | | MED TOTAL | | 42 | 34 | | 34 | 34 | 34 | 34 | 0 | 0 | 3 | 4 | 0 | 0 | 29 | 33 | 35 | 35 |
| IN501 | TRA 1952 | WASTE POND | SUR WATER | 1 | 1 | QC FL | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN501 | TRA 1952 | WASTE POND | SUR WATER | 18 | 6 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 6 | 0 | 0 |
| IN501 | TRA 1952 | WASTE POND | SUR WATER | 6 | 6 | S COM | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 |
| IN502 | TRA 1952 | WASTE POND | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503 | TRA 1952 | WASTE POND | SUR WATER | 1 | 1 | QC RN | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN504 | TRA NE CLD | WASTE POND | SUR WATER | 18 | 6 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 | 0 |
| IN504 | TRA NE CLD | WASTE POND | SUR WATER | 6 | 6 | S COM | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 |
| IN506 | TRA NE CLD | WASTE POND | SUR WATER | 1 | 1 | QC RN | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| IN507 | TRA CHEM | WASTE POND | SUR WATER | 18 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 0 | 0 |
| IN507 | TRA CHEM | WASTE POND | SUR WATER | 6 | 4 | S COM | 4 | 4 | 4 | 4 | 0 | 0 | 3 | 4 | 0 | 0 | 0 | 0 | 4 | 4 |
| IN510 | TAN TSF | WASTE POND | SUR WATER | 18 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 0 |
| IN510 | TAN TSF | WASTE POND | SUR WATER | 6 | 4 | OTHER | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 |
| IN510 | TAN TSF | WASTE POND | SUR WATER | 1 | 1 | QC RN | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN513 | TAN LOFT | WASTE POND | SUR WATER | 1 | 1 | QC FL | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN513 | TAN LOFT | WASTE POND | SUR WATER | 18 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 0 | 0 |
| IN513 | TAN LOFT | WASTE POND | SUR WATER | 6 | 4 | OTHER | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 |
| IN516 | ICPP 2 | WASTE POND | SUR WATER | 18 | 4 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 |
| IN516 | ICPP 2 | WASTE POND | SUR WATER | 6 | 4 | OTHER | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 |
| IN516 | ICPP 2 | WASTE POND | SUR WATER | 1 | 0 | QC RN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517 | ICPP 2 | WASTE POND | SUR WATER | 1 | 0 | QC RN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

TABLE 4.2.3 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 3

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN519 | ANL-W | WASTE POND | SUR WATER | 18 | 6 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 | 0 |
| IN519 | ANL-W | WASTE POND | SUR WATER | 6 | 6 | OTHER | 6 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 |
| IN522 | ANL-W | DITCH | SUR WATER | 1 | 1 | QC RN | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| | | MED TOTAL | | 177 | 75 | | 36 | 38 | 40 | 40 | 0 | 0 | 3 | 5 | 0 | 0 | 25 | 36 | 40 | 40 |
| | | EP TOTAL | | 246 | 130 | | 92 | 94 | 96 | 96 | 0 | 0 | 6 | 15 | 0 | 0 | 70 | 86 | 97 | 97 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: / SDG NO: / TYPE: | IN501252A / IN501014D / FIELD BLANK | IN501252A / IN513018D / FIELD BLANK | IN501252B / IN402014I / FIELD BLANK | | | |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | | | 281 | | | |
| BARIUM | | | | 19 B | | | |
| BERYLLIUM | | | | 0.4 B | | | |
| CALCIUM | | | | 390 B | | | |
| CHROMIUM | | | 36 | | | | |
| IRON | | | | 215 | | | |
| MAGNESIUM | | | | 112 B | | | |
| MANGANESE | | | | 11 B | | | |
| MERCURY | | 0.2 | | | | | |
| SODIUM | | | | 308 B | | | |
| ZINC | | | | 15 B | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: / SDG NO: / TYPE: | IN501252C / LLL8771-A / FIELD BLANK | IN501252D / LLL8771-B / FIELD BLANK | IN501252I / LLL8771-B / FIELD BLANK | | | |
|---|---|---|---|---|---|---|---|
| AM-241 | | 1 | | | | | |
| CO-60 | | | 78 | | | | |
| CS-137 | | | 200 | | | | |
| SR-TOT | | | | 0.76 | | | |

| RADIOCHEMISTRY (UG/L) | SAMP NO: / SDG NO: / TYPE: | IN501252C / LLL8771-A / FIELD BLANK | | | | | |
|---|---|---|---|---|---|---|---|
| URANIUM-TOT | | 0.55 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - INLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN501036 | IN501047 | IN501092 | IN501105 | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.9 | 7.8 | 7.8 | 7.8 | | |
| TEMPERATURE (DEG C) | | 24 | 24 | 24 | 24 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN501036F | IN501047F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN403015J | IN403015J | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| CHLORIDE | | 6900 | 5400 | | | | |
| NITRATE-N | | 160 | 10 | | | | |
| SULFATE | | 24000 | 23000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501036D | IN501036D | IN501036E | IN501036E | IN501047D | IN501047D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN501014D | IN513018D | IN402014I | IN402014K | IN501014D | IN513018D |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | 224 | | | |
| BARIUM | | | | 31 B | | | |
| BERYLLIUM | | | | 1.5 B | | | |
| CADMIUM | | | | 1.5 B | | | |
| CALCIUM | | | | 18500 | | | |
| CHROMIUM | | | 93 | | | | 25 |
| COPPER | | | | 12 B | | | |
| IRON | | | | 222 | | | |
| MAGNESIUM | | | | 7110 | | | |
| MANGANESE | | | | 114 | | | |
| MERCURY | | 0.13 B | | | | 0.15 B | |
| NICKEL | | | | 13 B | | | |
| POTASSIUM | | | | | 1200 B | | |
| SODIUM | | | | 5030 | | | |
| VANADIUM | | | | 12 B | | | |
| ZINC | | | | 70 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501047E | IN501047E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN402014I | IN402014K | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| ALUMINUM | | 131 B | | | | | |
| BARIUM | | 28 B | | | | | |
| BERYLLIUM | | 1.2 B | | | | | |
| CADMIUM | | 1.5 B | | | | | |
| CALCIUM | | 17900 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - INLET
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501047E | IN501047E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN402014I | IN402014K | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| CHROMIUM | | | | | | | |
| COPPER | | 12 B | | | | | |
| IRON | | 73 B | | | | | |
| MAGNESIUM | | 6800 | | | | | |
| MANGANESE | | 58 | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 11 B | | | | | |
| POTASSIUM | | | 1100 B | | | | |
| SODIUM | | 4930 B | | | | | |
| VANADIUM | | 11 B | | | | | |
| ZINC | | 35 | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN501092A | IN501105A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401024B | IN401024B | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 9 BJ | 10 U | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN501036G | IN501036H | IN501036I | IN501036J | IN501047G | IN501047H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8771-A | LLL8771-A | LLL8771-B | LLL8770 | LLL8771-A | LLL8771-B |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| AM-241 | | 1.4 | | | | 1.3 | |
| CO-58 | | | 29 | | | | 18 |
| CO-60 | | | 1400 | | | | 1700 |
| CR-51 | | | 9700 | | | | 9900 |
| CS-134 | | | 13 | | | | 12 |
| CS-137 | | | 1500 | | | | 1400 |
| H-3 | | | | | 1200000 | | |
| SB-124 | | | 110 | | | | 110 |
| SR-TOT | | | | 1200 | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN501047I | IN501047J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8771-B | LLL8770 | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| AM-241 | | | | | | | |
| CO-58 | | | | | | | |
| CO-60 | | | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - INLET
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN501047I | IN501047J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8771-B | LLL8770 | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| CR-51 | | | | | | | |
| CS-134 | | | | | | | |
| CS-137 | | | | | | | |
| H-3 | | | 1200000 | | | | |
| SB-124 | | | | | | | |
| SR-TOT | | 1100 | | | | | |

| RADIOCHEMISTRY (UG/L) | SAMP NO: | IN501036G | IN501047G | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8771-A | LLL8771-A | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| URANIUM-TOT | | 2.3 | 1.9 | | | | |

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - OUTLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN501058 | | | | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.9 | | | | | |
| TEMPERATURE (DEG C) | | 24 | | | | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN501058F | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN403015J | | | | | |
| | TYPE: | S. COMPOSITE | | | | | |
| CHLORIDE | | 5600 | | | | | |
| NITRATE-N | | 760 | | | | | |
| SULFATE | | 24000 | | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501058D | IN501058D | IN501058E | IN501058E | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN501014D | IN513018D | IN402014I | IN402014K | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | | |
| ALUMINUM | | | | 610 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - OUTLET
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501058D | IN501058D | IN501058E | IN501058E | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN501014D | IN513018D | IN402014I | IN402014K | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | | |
| BARIUM | | | | 52 B | | | |
| BERYLLIUM | | | | 1.7 B | | | |
| CADMIUM | | | | 2.3 B | | | |
| CALCIUM | | | | 18000 | | | |
| CHROMIUM | | | 253 | | | | |
| COPPER | | | | 16 B | | | |
| IRON | | | | 931 | | | |
| MAGNESIUM | | | | 7440 | | | |
| MANGANESE | | | | 428 | | | |
| MERCURY | | 0.26 | | | | | |
| NICKEL | | | | 12 B | | | |
| POTASSIUM | | | | | 1100 B | | |
| SILVER | | | | 7.5 B | | | |
| SODIUM | | | | 4630 B | | | |
| VANADIUM | | | | 15 B | | | |
| ZINC | | | | 284 | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN501058G | IN501058H | IN501058I | IN501058J | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8771-A | LLL8771-B | LLL8771-B | LLL8770 | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | | |
| AM-241 | | 6.7 | | | | | |
| CO-58 | | | 31 | | | | |
| CO-60 | | | 3300 | | | | |
| CR-51 | | | 11000 | | | | |
| CS-134 | | | 32 | | | | |
| CS-137 | | | 4700 | | | | |
| H-3 | | | | | 1200000 | | |
| SB-124 | | | 120 | | | | |
| SR-TOT | | | | 1100 | | | |

| RADIOCHEMISTRY (UG/L) | SAMP NO: | IN501058G | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8771-A | | | | | |
| | TYPE: | S. COMPOSITE | | | | | |
| URANIUM-TOT | | 2.5 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN501025 | IN501069 | IN501081 | IN501127 | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.9 | 7.8 | 7.9 | 7.8 | | |
| TEMPERATURE (DEG C) | | 25 | 24 | 25 | 24 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN501025F | IN501069F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN403015J | IN403015J | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| CHLORIDE | | 5400 | 5600 | | | | |
| NITRATE-N | | 10 | 950 | | | | |
| SULFATE | | 23000 | 24000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501025D | IN501025D | IN501025E | IN501025E | IN501069D | IN501069D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN501014D | IN513018D | IN402014I | IN402014K | IN501014D | IN513018D |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | 124 B | | | |
| BARIUM | | | | 27 B | | | |
| BERYLLIUM | | | | 1 B | | | |
| CADMIUM | | | | 1.4 B | | | |
| CALCIUM | | | | 17700 | | | |
| CHROMIUM | | | 33 | | | | 26 |
| IRON | | | | 67 B | | | |
| MAGNESIUM | | | | 6740 | | | |
| MANGANESE | | | | 61 | | | |
| MERCURY | | 0.13 B | | | | 0.13 B | |
| NICKEL | | | | 13 B | | | |
| POTASSIUM | | | | | 1000 B | | |
| SODIUM | | | | 4860 B | | | |
| VANADIUM | | | | 11 B | | | |
| ZINC | | | | 50 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501069E | IN501069E |
|---|---|---|---|
| | SDG NO: | IN402014I | IN402014K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | 115 B | |
| BARIUM | | 27 B | |
| BERYLLIUM | | 1.3 B | |
| CADMIUM | | 1 U | |
| CALCIUM | | 17600 | |
| CHROMIUM | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501069E | IN501069E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN402014I | IN402014K | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| IRON | | 54 B | | | | | |
| MAGNESIUM | | 6690 | | | | | |
| MANGANESE | | 57 | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 8.9 B | | | | | |
| POTASSIUM | | | 950 B | | | | |
| SODIUM | | 4780 B | | | | | |
| VANADIUM | | 11 B | | | | | |
| ZINC | | 39 | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN501081A | IN501127A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401024B | IN401024B | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 10 U | 9 BJ | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN501025G | IN501025H | IN501025I | IN501025J | IN501069G | IN501069H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8771-A | LLL8771-A | LLL8771-B | LLL8770 | LLL8771-A | LLL8771-B |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| AM-241 | | 0.97 | | | | 1 | |
| CO-58 | | | 17 | | | | 15 |
| CO-60 | | | 1100 | | | | 1200 |
| CR-51 | | | 9200 | | | | 9700 |
| CS-134 | | | 13 | | | | |
| CS-137 | | | 1100 | | | | 1100 |
| H-3 | | | | | 1200000 | | |
| MN-54 | | | 14 | | | | |
| SB-124 | | | 110 | | | | 130 |
| SR-TOT | | | | 1000 | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN501069I | IN501069J |
|---|---|---|---|
| | SDG NO: | LLL8771-B | LLL8770 |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| AM-241 | | | |
| CO-58 | | | |
| CO-60 | | | |
| CR-51 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN501069I | IN501069J |
|---|---|---|---|
| | SDG NO: | LLL8771-B | LLL8770 |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| CS-134 | | | |
| CS-137 | | | 1200000 |
| H-3 | | | |
| MN-54 | | | |
| SB-124 | | 1100 | |
| SR-TOT | | | |

| RADIOCHEMISTRY (UG/L) | SAMP NO: | IN501025G | IN501069G |
|---|---|---|---|
| | SDG NO: | LLL8771-A | LLL8771-A |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| URANIUM-TOT | | 2.7 | 2.8 |

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND OUTLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN501014 | IN501070 | IN501116 |
|---|---|---|---|---|
| PH (UNITS) | | 7.8 | 7.8 | 7.9 |
| TEMPERATURE (DEG C) | | 24 | 24 | 24 |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN501014F |
|---|---|---|
| | SDG NO: | IN403015J |
| | TYPE: | S. COMPOSITE |
| CHLORIDE | | 5400 |
| NITRATE-N | | 30 |
| SULFATE | | 23000 |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501014D | IN501014D | IN501014E | IN501014E |
|---|---|---|---|---|---|
| | SDG NO: | IN501014D | IN513018D | IN402014I | IN402014K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | 115 B | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST HARM WASTE POND OUTLET
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN501014D | IN501014D | IN501014E | IN501014E |
|---|---|---|---|---|---|
| | SDG NO: | IN501014D | IN513018D | IN402014I | IN402014K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| BARIUM | | | | 27 B | |
| BERYLLIUM | | | | 1.3 B | |
| CALCIUM | | | | 17700 | |
| CHROMIUM | | | 30 | | |
| IRON | | | | 55 B | |
| MAGNESIUM | | | | 6680 | |
| MANGANESE | | | | 56 | |
| MERCURY | | 0.13 B | | | |
| NICKEL | | | | 11 B | |
| POTASSIUM | | | | | 1000 B |
| SODIUM | | | | 4780 B | |
| VANADIUM | | | | 11 B | |
| ZINC | | | | 27 | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN501070A | IN501116A |
|---|---|---|---|
| | SDG NO: | IN401024B | IN401024B |
| | TYPE: | GRAB | GRAB |
| ACETONE | | 7 BJ | 8 BJ |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN501014G | IN501014H | IN501014I | IN501014J |
|---|---|---|---|---|---|
| | SDG NO: | LLL8771-A | LLL8771-A | LLL8771-B | LLL8770 |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| AM-241 | | 1.8 | | | |
| CO-58 | | | 19 | | |
| CO-60 | | | 1200 | | |
| CR-51 | | | 9700 | | |
| CS-134 | | | 13 | | |
| CS-137 | | | 1100 | | |
| H-3 | | | | | 1300000 |
| MN-54 | | | 18 | | |
| SB-124 | | | 110 | | |
| SR-TOT | | | | 1000 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3
LEACHING PONDS

S&A REQUEST: 501
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND OUTLET
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (UG/L) | SAMP NO: IN501014G<br>SDG NO: LLL8771-A<br>TYPE: S. COMPOSITE |
|---|---|
| URANIUM-TOT | 2.2 |

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - INLET
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: IN502048E<br>SDG NO: IN502015E<br>TYPE: GRAB |
|---|---|
| CHLORIDE | 10 |
| SULFATE | 43 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: IN502048C<br>SDG NO: IN502015C<br>TYPE: GRAB | IN502048C<br>IN502060C<br>GRAB | IN502048D<br>IN502015D<br>GRAB | IN502048D<br>IN502015K<br>GRAB |
|---|---|---|---|---|
| ALUMINUM | | | 15400 E | |
| ANTIMONY | | | 196 N | |
| ARSENIC | | | 114 B | |
| BARIUM | | | 1440 | |
| BERYLLIUM | | | 9.9 | |
| CADMIUM | | | 31 | |
| CALCIUM | | 6400 N | 34400 | |
| CHROMIUM | | | 14100 | |
| COBALT | | | 12 B | |
| COPPER | | | 354 | |
| IRON | | | 28500 E | |
| LEAD | | | 445 | |
| MAGNESIUM | | | 15900 | |
| MANGANESE | 21 | | 2000 | |
| MERCURY | | | 214 E | |
| NICKEL | | | | 2700 |
| POTASSIUM | | | 37 B | |
| SELENIUM | | | 94 | |
| SILVER | | | 769 B | |
| SODIUM | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - INLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN502048C | IN502048C | IN502048D | IN502048D | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015C | IN502060C | IN502015D | IN502015K | | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | | |
| VANADIUM | | | | 85 | | | |
| ZINC | | | | 2530 | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN502048A | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | | | | | |
| | TYPE: | GRAB | | | | | |
| ACETONE | | 17 J | | | | | |
| METHYLENE CHLORIDE | | 150 | | | | | |
| 1,1,1-TRICHLOROETHANE | | 13 J | | | | | |
| 2-BUTANONE | | 33 J | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN502048F | IN502048G | IN502048H | IN502048I | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8781-A | LLL8781-B | LLL8781-B | LLL8781-B | | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | | |
| AM-241 | | 56000 | | | | | |
| CO-60 | | | 4E+07 | | | | |
| CS-134 | | | 180000 | | | | |
| CS-137 | | | 4E+07 | | | | |
| H-3 | | | | | 880000 | | |
| SR-TOT | | | | 3000000 | | | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN502048F | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8781-A | | | | | |
| | TYPE: | GRAB | | | | | |
| URANIUM-TOT | | 11000 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - OUTLET
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN502026E | IN502059E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015E | IN502015E | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 19 | 9 | | | | |
| NITRATE-N | | 0.75 N | 0.25 N | | | | |
| O-PHOSPHATE-P | | 0.75 U | 0.59 | | | | |
| SULFATE | | 1400 | 240 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN502026C | IN502026C | IN502026D | IN502026D | IN502059C | IN502059C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015C | IN502060C | IN502015D | IN502015K | IN502015C | IN502060C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 18000 E | | | |
| ANTIMONY | | | | 61 BN | | | |
| ARSENIC | | | | 63 U | | | |
| BARIUM | | | | 556 | | | |
| BERYLLIUM | | | | 21 | | | |
| CADMIUM | | | | 44 | | | |
| CALCIUM | | | | 38300 | | | 1500 N |
| CHROMIUM | | | 5300 N | 9080 | | | |
| COBALT | | | | 11 B | | | |
| COPPER | | | | 263 | | | |
| IRON | | | | 30200 E | | | |
| LEAD | | | | 332 | | | |
| MAGNESIUM | | | | 25300 | | | |
| MANGANESE | | | | 7220 | | | |
| MERCURY | | 34 | | | | 10 | |
| NICKEL | | | | 286 E | | | |
| POTASSIUM | | | | | 3000 B | | |
| SELENIUM | | | | 63 U | | | |
| SILVER | | | | 160 | | | |
| SODIUM | | | | 580 B | | | |
| VANADIUM | | | | 88 | | | |
| ZINC | | | | 5190 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN502059D | IN502059D |
|---|---|---|---|
| | SDG NO: | IN502015D | IN502015K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 15100 E | |
| ANTIMONY | | 156 N | |
| ARSENIC | | 71 B | |
| BARIUM | | 2620 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - OUTLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN502059D | IN502059D | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015D | IN502015K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| BERYLLIUM | | 8.9 | | | | | |
| CADMIUM | | 17 | | | | | |
| CALCIUM | | 42300 | | | | | |
| CHROMIUM | | 13000 | | | | | |
| COBALT | | 10 B | | | | | |
| COPPER | | 213 | | | | | |
| IRON | | 33800 E | | | | | |
| LEAD | | 428 | | | | | |
| MAGNESIUM | | 16600 | | | | | |
| MANGANESE | | 2500 | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 104 E | | | | | |
| POTASSIUM | | | 2700 B | | | | |
| SELENIUM | | 67 B | | | | | |
| SILVER | | 98 | | | | | |
| SODIUM | | 706 B | | | | | |
| VANADIUM | | 73 | | | | | |
| ZINC | | 1620 | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN502026A | IN502059A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | IN502015A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 200 | 120 | | | | |
| METHYLENE CHLORIDE | | 81 | 270 | | | | |
| TOLUENE | | 9 J | 5 J | | | | |
| 1,1,1-TRICHLOROETHANE | | 19 J | 14 J | | | | |
| 2-BUTANONE | | 58 U | 30 J | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN502026F | IN502026G | IN502026H | IN502026I | IN502059F | IN502059G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8781-A | LLL8781-A | LLL8781-B | LLL8781-B | LLL8781-A | LLL8781-B |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | 240000 | | | | 180000 | |
| CO-60 | | | 4E+07 | | | | 7000000 |
| CS-134 | | | 310000 | | | | 32000 |
| CS-137 | | | 6E+07 | | | | 1E+07 |
| H-3 | | | | | 1200000 | | |
| SR-TOT | | | | 4000000 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3
LEACHING PONDS

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - OUTLET
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN502059H | IN502059I |
|---|---|---|---|
| | SDG NO: | LLL8781-B | LLL8781-B |
| | TYPE: | GRAB | GRAB |
| AM-241 | | | |
| CO-60 | | | |
| CS-134 | | | |
| CS-137 | | | 980000 |
| H-3 | | 6300000 | |
| SR-TOT | | | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN502026F | IN502059F |
|---|---|---|---|
| | SDG NO: | LLL8781-A | LLL8781-A |
| | TYPE: | GRAB | GRAB |
| URANIUM-TOT | | 6300 | 3000 |

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN502037E | IN502060E |
|---|---|---|---|
| | SDG NO: | IN502015E | IN502015E |
| | TYPE: | GRAB | GRAB |
| CHLORIDE | | 82 | 110 |
| NITRATE-N | | 1.6 UN | 6.1 N |
| SULFATE | | 190 | 540 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN502037C | IN502037C | IN502037D | IN502037D | IN502060C | IN502060C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015C | IN502060C | IN502015D | IN502015K | IN502015C | IN502060C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 18900 E | | | |
| ANTIMONY | | | | 80 BN | | | |
| BARIUM | | | | 302 B | | | |
| BERYLLIUM | | | | 21 | | | |
| CADMIUM | | | | 48 | | | |
| CALCIUM | | | | 17200 | | | 3400 N |
| CHROMIUM | | | 3900 N | 5320 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN502037C IN502015C GRAB | IN502037C IN502060C GRAB | IN502037D IN502015D GRAB | IN502037D IN502015K GRAB | IN502060C IN502015C GRAB | IN502060C IN502060C GRAB |
|---|---|---|---|---|---|---|---|
| COBALT | | | | 17 B | | | |
| COPPER | | | | 252 | | | |
| IRON | | | | 34300 E | | | |
| LEAD | | | | 488 | | | |
| MAGNESIUM | | | | 16200 | | | |
| MANGANESE | | | | 4140 | | | |
| MERCURY | | 38 | | | | 53 | |
| NICKEL | | | | 1050 E | | | |
| POTASSIUM | | | | | 3100 B | | |
| SILVER | | | | 79 | | | |
| SODIUM | | | | 926 B | | | |
| VANADIUM | | | | 84 B | | | |
| ZINC | | | | 4520 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN502060D IN502015D GRAB | IN502060D IN502015K GRAB | | | | |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | 22800 E | | | | | |
| ANTIMONY | | 87 BN | | | | | |
| BARIUM | | 321 B | | | | | |
| BERYLLIUM | | 21 | | | | | |
| CADMIUM | | 56 | | | | | |
| CALCIUM | | 16100 | | | | | |
| CHROMIUM | | 5660 | | | | | |
| COBALT | | 20 B | | | | | |
| COPPER | | 277 | | | | | |
| IRON | | 38400 E | | | | | |
| LEAD | | 531 | | | | | |
| MAGNESIUM | | 17000 | | | | | |
| MANGANESE | | 3910 | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 1160 E | | | | | |
| POTASSIUM | | | 3900 B | | | | |
| SILVER | | 85 | | | | | |
| SODIUM | | 997 B | | | | | |
| VANADIUM | | 95 B | | | | | |
| ZINC | | 4980 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN502037A | IN502060A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | IN502015A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 160 | 81 | | | | |
| METHYLENE CHLORIDE | | 86 | 190 | | | | |
| TOLUENE | | 20 J | 16 J | | | | |
| 1,1,1-TRICHLOROETHANE | | 18 J | 21 | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN502037F | IN502037G | IN502037H | IN502037I | IN502060F | IN502060G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8781-A | LLL8781-A | LLL8781-B | LLL8781-B | LLL8781-A | LLL8781-B |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | 410000 | | | | 540000 | |
| CO-60 | | | 2E+08 | | | | 1E+08 |
| CS-134 | | | 4300000 | | | | 2900000 |
| CS-137 | | | 4E+08 | | | | 2E+08 |
| H-3 | | | | | 1500000 | | |
| SR-TOT | | | | 1E+07 | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN502060H | IN502060I |
|---|---|---|---|
| | SDG NO: | LLL8781-B | LLL8781-B |
| | TYPE: | GRAB | GRAB |
| AM-241 | | | |
| CO-60 | | | |
| CS-134 | | | |
| CS-137 | | | |
| H-3 | | | 1100000 |
| SR-TOT | | 8600000 | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN502037F | IN502060F |
|---|---|---|---|
| | SDG NO: | LLL8781-A | LLL8781-A |
| | TYPE: | GRAB | GRAB |
| URANIUM-TOT | | 20000 | 21000 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND INLET
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN502015E |
|---|---|---|
| | SDG NO: | IN502015E |
| | TYPE: | GRAB |
| CHLORIDE | | 11 |
| FLUORIDE | | 1.1 |
| NITRATE-N | | 0.56 N |
| SULFATE | | 33 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN502015C | IN502015C | IN502015D | IN502015D |
|---|---|---|---|---|---|
| | SDG NO: | IN502015C | IN502060C | IN502015D | IN502015K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 27700 E | |
| ANTIMONY | | | | 205 N | |
| ARSENIC | | | | 111 B | |
| BARIUM | | | | 1910 | |
| BERYLLIUM | | | | 6.5 | |
| CADMIUM | | | | 13 | |
| CALCIUM | | | | 25600 | |
| CHROMIUM | | | 6600 N | 16500 | |
| COBALT | | | | 14 B | |
| COPPER | | | | 170 | |
| IRON | | | | 32600 E | |
| LEAD | | | | 245 | |
| MAGNESIUM | | | | 14800 | |
| MANGANESE | | | | 2680 | |
| MERCURY | | 3.6 | | | |
| NICKEL | | | | 111 E | |
| POTASSIUM | | | | | 4700 |
| SELENIUM | | | | 61 B | |
| SILVER | | | | 142 | |
| SODIUM | | | | 1190 B | |
| VANADIUM | | | | 103 | |
| ZINC | | | | 1130 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN502015A |
|---|---|---|
| | SDG NO: | IN502015A |
| | TYPE: | GRAB |
| ACETONE | | 150 |
| METHYLENE CHLORIDE | | 480 |
| TOLUENE | | 10 J |
| 1,1,1-TRICHLOROETHANE | | 11 J |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 502
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND INLET
MEDIUM: SEDIMENT

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN502015A | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | | | | | |
| | TYPE: | GRAB | | | | | |
| 2-BUTANONE | | 51 | | | | | |
| * CG HYDROCARBON(20.72) | | 30 J | | | | | |
| * HYDROCARBON(21.15) | | 40 J | | | | | |
| * SUBS CYDOHEXANE(18.37) | | 47 J | | | | | |
| * SUBS CYDOHEXANE(18.80) | | 22 J | | | | | |
| * SUBS CYDOHEXANE(21.43) | | 22 J | | | | | |
| * SUBS CYDOHEXANE(21.60) | | 24 J | | | | | |
| * SUBS CYDOHEXANE(22.22) | | 110 J | | | | | |
| * UNKNOWN(21.72) | | 26 J | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN502015F | IN502015G | IN502015H | IN502015I | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8781-A | LLL8781-A | LLL8781-B | LLL8781-B | | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | | |
| AM-241 | | 76000 | | | | | |
| CO-60 | | | 1E+07 | | | | |
| CS-134 | | | 100000 | | | | |
| CS-137 | | | 2E+07 | | | | |
| H-3 | | | | | 1200000 | | |
| SR-TOT | | | | 2000000 | | | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN502015F | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8781-A | | | | | |
| | TYPE: | GRAB | | | | | |
| URANIUM-TOT | | 4000 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 503
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN503016 | IN503027 | IN503038 | | | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | | 54 | 131 | | | |
| PH (UNITS) | | 7.4 | 6.5 | 7.1 | | | |
| RADS (CPM) | | 1500 | 1500 | 1500 | | | |
| TEMPERATURE (DEG C) | | 14 | 14 | 14 | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN503016E | IN503027E | IN503038E | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016E | IN503016E | IN503016E | | | |
| | TYPE: | GRAB | GRAB | GRAB | | | |
| CHLORIDE | | 3.1 | 1 | 2.2 | | | |
| FLUORIDE | | 2 | 1.5 | 1 | | | |
| NITRATE-N | | 0.38 N | 0.41 N | 0.45 N | | | |
| O-PHOSPHATE-P | | 0.33 U | 0.33 U | 0.82 | | | |
| SULFATE | | 190 | 6.9 | 22 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN503016C | IN503016C | IN503016D | IN503016D | IN503027C | IN503027C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016C | IN509034C | IN503016D | IN503016K | IN503016C | IN509034C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 9790 | | | |
| ANTIMONY | | | | 4.5 BN | | | |
| BARIUM | | | | 179 | | | |
| BERYLLIUM | | | | 1.3 E | | | |
| CADMIUM | | | | 0.28 U | | | |
| CALCIUM | | | | 19800 | | | |
| CHROMIUM | | | 20 | | | | 24 |
| COBALT | | | | 5.7 B | | | |
| COPPER | | | | 18 | | | |
| IRON | | | | 18000 | | | |
| LEAD | | | | 7 U | | | |
| MAGNESIUM | | | | 5310 E | | | |
| MANGANESE | | | | 252 E | | | |
| MERCURY | | 0.05 | | | | 0.05 B | |
| NICKEL | | | | 23 | | | |
| POTASSIUM | | | | | 1900 | | |
| SILVER | | | | 0.7 U | | | |
| SODIUM | | | | 455 B | | | |
| VANADIUM | | | | 39 E | | | |
| ZINC | | | | 53 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 503
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN503027D | IN503027D | IN503038C | IN503038C | IN503038D | IN503038D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K | IN503016C | IN509034C | IN503016D | IN503016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 26400 | | | | 20000 | |
| ANTIMONY | | 6.7 BN | | | | 5.1 BN | |
| BARIUM | | 378 | | | | 271 | |
| BERYLLIUM | | 2.2 E | | | | 1.9 E | |
| CADMIUM | | 0.33 U | | | | 0.4 B | |
| CALCIUM | | 33000 | | | | 61400 | |
| CHROMIUM | | | | | 38 | | |
| COBALT | | 12 | | | | 12 | |
| COPPER | | 30 | | | | 27 | |
| IRON | | 31800 | | | | 27000 | |
| LEAD | | 16 B | | | | 8.2 U | |
| MAGNESIUM | | 12800 E | | | | 12500 E | |
| MANGANESE | | 648 E | | | | 594 E | |
| MERCURY | | | | 0.09 | | | |
| NICKEL | | 44 | | | | 39 | |
| POTASSIUM | | | 3900 | | | | 2000 |
| SILVER | | 1.3 B | | | | 1 B | |
| SODIUM | | 1110 | | | | 1600 | |
| VANADIUM | | 70 E | | | | 46 E | |
| ZINC | | 109 | | | | 66 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN503027A | IN503038A |
|---|---|---|---|
| | SDG NO: | IN503027A | IN503027A |
| | TYPE: | GRAB | GRAB |
| BENZENE | | 13 U | 150 |
| CHLOROBENZENE | | 13 U | 140 |
| CHLOROFORM | | 13 U | 3 J |
| METHYLENE CHLORIDE | | 6 BJ | 12 U |
| TOLUENE | | 13 U | 160 |
| TRICHLOROETHENE | | 13 U | 170 |
| 1,1-DICHLOROETHENE | | 13 U | 420 |
| 1,1,1-TRICHLOROETHANE | | 130 | 25 |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN503016F | IN503016G | IN503016H | IN503016I | IN503027F | IN503027G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9123 | LLL9123 | LLL9123 | LLL9123 | LLL9123 | LLL9123 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | 20 | | | | 11 | |
| CO-60 | | | 2000 | | | | 2100 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 503
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND
MEDIUM: SOIL

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: SDG NO: TYPE: | IN503016F LLL9123 GRAB | IN503016G LLL9123 GRAB | IN503016H LLL9123 GRAB | IN503016I LLL9123 GRAB | IN503027F LLL9123 GRAB | IN503027G LLL9123 GRAB |
|---|---|---|---|---|---|---|---|
| CS-137 | | | 940 | | | | 30 |
| H-3 | | | | | 350000 | | |
| K-40 | | | 17000 | | | | 16000 |
| SR-TOT | | | | 13000 | | | |
| URANIUM-TOT | | 1200 | | | | 1000 | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: SDG NO: TYPE: | IN503027H LLL9123 GRAB | IN503027I LLL9123 GRAB | IN503038F LLL9123 GRAB | IN503038G LLL9123 GRAB | IN503038H LLL9123 GRAB | IN503038I LLL9123 GRAB |
|---|---|---|---|---|---|---|---|
| AM-241 | | | | 98 | | | |
| CO-60 | | | | | 2900 | | |
| CS-137 | | | | | 30 | | |
| H-3 | | | 280000 | | | | 32000 |
| K-40 | | | | | 11000 | | |
| SR-TOT | | 11000 | | | | 14000 | |
| URANIUM-TOT | | | | 980 | | | |

S&A REQUEST: 503
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: SDG NO: TYPE: | IN503050F IN503050F RINSATE | IN503050G IN503050G RINSATE | IN503050G IN503050K RINSATE | | | |
|---|---|---|---|---|---|---|---|
| CALCIUM | | | 105 B | | | | |
| IRON | | | 26 B | | | | |
| MAGNESIUM | | | 19 B | | | | |
| MERCURY | | 0.04 BN | | | | | |
| POTASSIUM | | | | 150 B | | | |
| ZINC | | | 33 | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 503
LOCATION: TRA 1952 NORTHERNMOST WARM WASTE POND
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN503050I | IN503050K | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9123 | LLL9123 | | | | |
| | TYPE: | RINSATE | RINSATE | | | | |
| AM-241 | | 0.032 | | | | | |
| H-3 | | 17000 | | | | | |
| SR-TOT | | | 1 | | | | |
| URANIUM-TOT | | 0.79 | | | | | |

S&A REQUEST: 504
LOCATION: TRA NORTHEASTERN COLD WASTE POND - REDUCED FLOW AREA 2
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN504028 | IN504051 | IN504095 | IN504108 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.83 | 0.83 | 0.83 | 0.83 | | |
| DO (PPM) | | 3.1 | 3.1 | 3.1 | 3.1 | | |
| PH (UNITS) | | 7 | 7 | 7 | 7 | | |
| TEMPERATURE (DEG C) | | 31 | 31 | 31 | 31 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN504028C | IN504051C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011J | IN409011J | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| CHLORIDE | | 11000 | 11000 | | | | |
| NITRATE-N | | 994 | 1150 | | | | |
| SULFATE | | 20000 | 21000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN504028A | IN504028A | IN504028B | IN504028B | IN504051A | IN504051A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN504017A | IN522075F | IN409011I | IN409011K | IN504017A | IN522075F |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | 327 | | | |
| BARIUM | | | | 54 B | | | |
| BERYLLIUM | | | | 2.9 B | | | |
| CALCIUM | | | | 55800 | | | |
| CHROMIUM | | | 6.2 B | | | | 3.3 B |
| COPPER | | | | 11 B | | | |
| IRON | | | | 122 | | | |
| MAGNESIUM | | | | 20300 E | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 504
LOCATION: TRA NORTHEASTERN COLD WASTE POND - REDUCED FLOW AREA 2
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN504028A | IN504028A | IN504028B | IN504028B | IN504051A | IN504051A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN504017A | IN522075F | IN409011I | IN409011K | IN504017A | IN522075F |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| MANGANESE | | | | 5.4 B | | | |
| MERCURY | | 0.03 B | | | | 0.03 B | |
| POTASSIUM | | | | | 1900 B | | |
| SODIUM | | | | 10300 E | | | |
| VANADIUM | | | | 14 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN504051B | IN504051B |
|---|---|---|---|
| | SDG NO: | IN409011I | IN409011K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | 251 | |
| BARIUM | | 62 B | |
| BERYLLIUM | | 3 B | |
| CALCIUM | | 55200 | |
| CHROMIUM | | | |
| COPPER | | 10 U | |
| IRON | | 20 B | |
| MAGNESIUM | | 20000 E | |
| MANGANESE | | 5 U | |
| MERCURY | | | |
| POTASSIUM | | | 1600 B |
| SODIUM | | 10300 E | |
| VANADIUM | | 14 B | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN504095A | IN504108A |
|---|---|---|---|
| | SDG NO: | IN409011A | IN409011A |
| | TYPE: | GRAB | GRAB |
| ACETONE | | 5 J | 10 U |
| METHYLENE CHLORIDE | | 5 U | 1 J |
| TOLUENE | | 1 J | 1 J |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN504028D | IN504028E | IN504028F | IN504051D | IN504051E | IN504051F |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8583 | LLL8583 | LLL8584 | LLL8583 | LLL8583 | LLL8584 |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| CS-137 | | | 3.6 | | | 17 | |
| GROSS ALPHA | | 0 | | | 5 | | |
| GROSS BETA | | 40 | | | 0 | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 504
LOCATION: TRA NORTHEASTERN COLD WASTE POND - REDUCED FLOW AREA 2
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN504028D | IN504028E | IN504028F | IN504051D | IN504051E | IN504051F |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8583 | LLL8583 | LLL8584 | LLL8583 | LLL8583 | LLL8584 |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| H-3 | | | | -1000 | | | 280 U |

S&A REQUEST: 504
LOCATION: TRA NORTHEASTERN COLD WASTE POND INLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN504017 | IN504040 | IN504073 | IN504084 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.4 | 0.4 | 0.4 | 0.4 | | |
| DO (PPM) | | 7.4 | 7.4 | 7.4 | 7.4 | | |
| PH (UNITS) | | 6.7 | 6.7 | 6.7 | 6.7 | | |
| TEMPERATURE (DEG C) | | 20 | 20 | 20 | 20 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN504017C | IN504040C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011J | IN409011J | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| CHLORIDE | | 11000 | 11000 | | | | |
| NITRATE-N | | 1200 | 1310 | | | | |
| SULFATE | | 20000 | 20000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN504017A | IN504017A | IN504017B | IN504017B | IN504040A | IN504040A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN504017A | IN522075F | IN409011I | IN409011K | IN504017A | IN522075F |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | 288 | | | |
| BARIUM | | | | 53 B | | | |
| BERYLLIUM | | | | 2.8 B | | | |
| CALCIUM | | | | 56600 | | | |
| CHROMIUM | | | 3 B | | | | 3.3 B |
| IRON | | | | 35 B | | | |
| MAGNESIUM | | | | 20500 E | | | |
| MERCURY | | 0.03 B | | | | 0.03 B | |
| POTASSIUM | | | | | 1900 B | | |
| SODIUM | | | | 10700 E | | | |
| VANADIUM | | | | 14 B | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 504
LOCATION: TRA NORTHEASTERN COLD WASTE POND INLET
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN504040B | IN504040B | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011I | IN409011K | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| ALUMINUM | | 244 | | | | | |
| BARIUM | | 51 B | | | | | |
| BERYLLIUM | | 2.7 B | | | | | |
| CALCIUM | | 53800 | | | | | |
| CHROMIUM | | | | | | | |
| IRON | | 20 U | | | | | |
| MAGNESIUM | | 19400 E | | | | | |
| MERCURY | | | | | | | |
| POTASSIUM | | | 1700 B | | | | |
| SODIUM | | 9910 E | | | | | |
| VANADIUM | | 13 B | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN504073A | IN504084A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011A | IN409011A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| TOLUENE | | 1 J | 1 J | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN504017D | IN504017F | IN504040D | IN504040F | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8583 | LLL8584 | LLL8583 | LLL8584 | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | | |
| GROSS ALPHA | | 5 | | 0.9 | | | |
| GROSS BETA | | 52 | | 29 | | | |
| H-3 | | | 140 | | -220 | | |

S&A REQUEST: 504
LOCATION: TRA NORTHEASTERN COLD WASTE POND REDUCED AREA 1
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN504039 | IN504062 | IN504119 | IN504120 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.35 | 0.35 | 0.35 | 0.35 | | |
| DO (PPM) | | 7.1 | 7.1 | 7.1 | 7.1 | | |
| PH (UNITS) | | 6.8 | 6.8 | 6.8 | 6.8 | | |
| TEMPERATURE (DEG C) | | 20 | 20 | 20 | 20 | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 504
LOCATION: TRA NORTHEASTERN COLD WASTE POND REDUCED AREA 1
MEDIUM: SURFACE WATER

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN504039C | IN504062C |
|---|---|---|---|
| | SDG NO: | IN409011J | IN409011J |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| CHLORIDE | | 11000 | 11000 |
| NITRATE-N | | 1110 | 1060 |
| SULFATE | | 21000 | 21000 |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN504039A | IN504039A | IN504039B | IN504039B | IN504062A | IN504062A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN504017A | IN522075F | IN409011I | IN409011K | IN504017A | IN522075F |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | 271 | | | |
| BARIUM | | | | 53 B | | | |
| BERYLLIUM | | | | 2.8 B | | | |
| CALCIUM | | | | 55900 | | | |
| CHROMIUM | | | 6.3 B | | | | 5.4 B |
| IRON | | | | 32 B | | | |
| MAGNESIUM | | | | 20200 E | | | |
| MERCURY | | 0.02 B | | | | 0.03 B | |
| POTASSIUM | | | | | 1800 B | | |
| SODIUM | | | | 10400 E | | | |
| VANADIUM | | | | 14 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN504062B | IN504062B |
|---|---|---|---|
| | SDG NO: | IN409011I | IN409011K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | 286 | |
| BARIUM | | 55 B | |
| BERYLLIUM | | 2.7 B | |
| CALCIUM | | 55600 | |
| CHROMIUM | | | |
| IRON | | 66 B | |
| MAGNESIUM | | 20200 E | |
| MERCURY | | | |
| POTASSIUM | | | 1700 B |
| SODIUM | | 10200 E | |
| VANADIUM | | 14 B | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 504
LOCATION: TRA NORTHEASTERN COLD WASTE POND REDUCED AREA 1
MEDIUM: SURFACE WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN504119A | IN504120A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011A | IN409011A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| TOLUENE | | 1 J | 1 J | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN504039D | IN504039E | IN504039F | IN504062D | IN504062E | IN504062F |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8583 | LLL8583 | LLL8584 | LLL8583 | LLL8583 | LLL8584 |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| CS-137 | | | 11 | | | 4.1 | |
| GROSS ALPHA | | 1.9 | | | 12 | | |
| GROSS BETA | | 25 | | | 61 | | |
| H-3 | | | | -590 | | | 10 |

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN505029 | IN505052 | | | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 6.8 | 6.8 | | | | |
| TEMPERATURE (DEG C) | | 23 | 23 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN505029D | IN505052D | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018D | IN505018D | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 3 | 3.1 | | | | |
| NITRATE-N | | 0.27 | 0.23 U | | | | |
| O-PHOSPHATE-P | | 4.2 | 5.2 | | | | |
| SULFATE | | 9.1 | 4.3 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505029B | IN505029B | IN505029C | IN505029C | IN505052B | IN505052B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN508055C | IN505018C | IN505018K | IN505018B | IN508055C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 5980 | | | |
| BARIUM | | | | 90 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505029B | IN505029B | IN505029C | IN505029C | IN505052B | IN505052B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN508055C | IN505018C | IN505018K | IN505018B | IN508055C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| BERYLLIUM | | | | 1.1 B | | | |
| CADMIUM | | | | 0.32 B | | | |
| CALCIUM | | | | 12700 | | | |
| CHROMIUM | | | 16 | | | | 95 |
| COBALT | | | | 6.4 B | | | |
| COPPER | | | | 42 | | | |
| IRON | | | | 13500 | | | |
| LEAD | | | | 25 B | | | |
| MAGNESIUM | | | | 6400 | | | |
| MANGANESE | | | | 171 E | | | |
| MERCURY | | 0.66 | | | | 0.52 | |
| NICKEL | | | | 23 | | | |
| POTASSIUM | | | | | 960 B | | |
| SELENIUM | | | | 11 U | | | |
| SILVER | | | | 1.9 B | | | |
| SODIUM | | | | 197 B | | | |
| VANADIUM | | | | 30 E | | | |
| ZINC | | | | 71 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505052C | IN505052C |
|---|---|---|---|
| | SDG NO: | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 5980 | |
| BARIUM | | 129 | |
| BERYLLIUM | | 1.4 B | |
| CADMIUM | | 0.47 B | |
| CALCIUM | | 25800 | |
| CHROMIUM | | | |
| COBALT | | 5.5 B | |
| COPPER | | 87 | |
| IRON | | 12000 | |
| LEAD | | 108 | |
| MAGNESIUM | | 15300 | |
| MANGANESE | | 147 E | |
| MERCURY | | | |
| NICKEL | | 19 | |
| POTASSIUM | | | 1300 B |
| SELENIUM | | 16 B | |
| SILVER | | 6.1 | |
| SODIUM | | 319 B | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505052C | IN505052C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018C | IN505018K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| VANADIUM | | 44 E | | | | | |
| ZINC | | 119 | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN505029A | IN505052A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012A | IN505052A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 27 | 13 U | | | | |
| METHYLENE CHLORIDE | | 7 B | 7 U | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN505029E | IN505029F | IN505029G | IN505052E | IN505052F | IN505052G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8623 | LLL8623 | LLL8623 | LLL8623 | LLL8623 | LLL8623 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | 1700 | | | 240 | |
| CS-134 | | | 350 | | | 330 | |
| CS-137 | | | 10000 | | | 9100 | |
| EU-155 | | | 230 | | | | |
| GROSS ALPHA | | 3700 | | | 4100 | | |
| GROSS BETA | | 29000 | | | 42000 | | |
| H-3 | | | | 1100 | | | 500 |
| K-40 | | | 19000 | | | 18000 | |

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND INLET
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN505018 | IN505041 | | | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 6.9 | 6.8 | | | | |
| TEMPERATURE (DEG C) | | 21 | 22 | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND INLET
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN505018D | IN505041D | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018D | IN505018D | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 2.2 | 8.8 | | | | |
| FLUORIDE | | 1 U | 2.1 | | | | |
| NITRATE-N | | 4.3 | 0.23 U | | | | |
| O-PHOSPHATE-P | | 3.2 | 12 | | | | |
| SULFATE | | 8.6 | 31 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505018B | IN505018B | IN505018C | IN505018C | IN505041B | IN505041B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN508055C | IN505018C | IN505018K | IN505018B | IN508055C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 6240 | | | |
| BARIUM | | | | 109 | | | |
| BERYLLIUM | | | | 1.4 B | | | |
| CADMIUM | | | | 0.73 B | | | |
| CALCIUM | | | | 13800 | | | |
| CHROMIUM | | | 44 | | | | 65 |
| COBALT | | | | 5.5 B | | | |
| COPPER | | | | 58 | | | |
| IRON | | | | 13100 | | | |
| LEAD | | | | 41 B | | | |
| MAGNESIUM | | | | 7540 | | | |
| MANGANESE | | | | 221 E | | | |
| MERCURY | | 0.55 | | | | 1.2 | |
| NICKEL | | | | 22 | | | |
| POTASSIUM | | | | | 1200 B | | |
| SILVER | | | | 3.6 | | | |
| SODIUM | | | | 206 B | | | |
| VANADIUM | | | | 28 E | | | |
| ZINC | | | | 100 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505041C | IN505041C |
|---|---|---|---|
| | SDG NO: | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 16200 | |
| BARIUM | | 202 | |
| BERYLLIUM | | 3 | |
| CADMIUM | | 0.7 B | |
| CALCIUM | | 150000 | |
| CHROMIUM | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND INLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505041C | IN505041C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018C | IN505018K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| COBALT | | 11 B | | | | | |
| COPPER | | 79 | | | | | |
| IRON | | 29000 | | | | | |
| LEAD | | 60 B | | | | | |
| MAGNESIUM | | 29100 | | | | | |
| MANGANESE | | 596 E | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 40 | | | | | |
| POTASSIUM | | | 1800 B | | | | |
| SILVER | | 3.9 B | | | | | |
| SODIUM | | 713 B | | | | | |
| VANADIUM | | 66 E | | | | | |
| ZINC | | 157 | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN505018A | IN505041A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012A | IN301012A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 19 | 18 U | | | | |
| METHYLENE CHLORIDE | | 3 BJ | 2 BJ | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN505018E | IN505018F | IN505018G | IN505041E | IN505041F | IN505041G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8623 | LLL8623 | LLL8623 | LLL8623 | LLL8623 | LLL8623 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | 24000 | | | 2700 | |
| CS-134 | | | 1500 | | | 1600 | |
| CS-137 | | | 43000 | | | 47000 | |
| EU-154 | | | 1900 | | | 2100 | |
| EU-155 | | | 840 | | | 1200 | |
| GROSS ALPHA | | 8400 | | | 13000 | | |
| GROSS BETA | | 200000 | | | 380000 | | |
| H-3 | | | | 650 | | | 900 |
| K-40 | | | 17000 | | | 17000 | |
| MN-54 | | | 190 | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND STILL AREA
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN505030 | IN505063 | | | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 6.9 | 7 | | | | |
| TEMPERATURE (DEG C) | | 22 | 21 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN505030D | IN505063D | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018D | IN505018D | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 6 | 11 | | | | |
| FLUORIDE | | 1.5 | 2.5 | | | | |
| NITRATE-N | | 1.1 | 0.23 U | | | | |
| O-PHOSPHATE-P | | 6.8 | 12 | | | | |
| SULFATE | | 7.1 | 7.8 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505030B | IN505030B | IN505030C | IN505030C | IN505063B | IN505063B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN508055C | IN505018C | IN505018K | IN505018B | IN508055C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 6240 | | | |
| BARIUM | | | | 117 | | | |
| BERYLLIUM | | | | 1.2 | | | |
| CADMIUM | | | | 0.27 B | | | |
| CALCIUM | | | | 20100 | | | |
| CHROMIUM | | | 29 | | | | 37 |
| COBALT | | | | 4.5 B | | | |
| COPPER | | | | 40 | | | |
| IRON | | | | 12100 | | | |
| LEAD | | | | 23 B | | | |
| MAGNESIUM | | | | 10400 | | | |
| MANGANESE | | | | 154 E | | | |
| MERCURY | | 0.24 | | | | 0.35 | |
| NICKEL | | | | 18 | | | |
| POTASSIUM | | | | | 1.3 | | |
| SILVER | | | | 1.8 B | | | |
| SODIUM | | | | 264 B | | | |
| VANADIUM | | | | 36 E | | | |
| ZINC | | | | 74 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND STILL AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN505063C | IN505063C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018C | IN505018K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ALUMINUM | | 5210 | | | | | |
| BARIUM | | 89 | | | | | |
| BERYLLIUM | | 1.4 | | | | | |
| CADMIUM | | 1.2 | | | | | |
| CALCIUM | | 56600 | | | | | |
| CHROMIUM | | | | | | | |
| COBALT | | 4.4 B | | | | | |
| COPPER | | 59 | | | | | |
| IRON | | 12300 | | | | | |
| LEAD | | 36 B | | | | | |
| MAGNESIUM | | 11900 | | | | | |
| MANGANESE | | 149 E | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 20 | | | | | |
| POTASSIUM | | | 970 B | | | | |
| SILVER | | 3.3 | | | | | |
| SODIUM | | 321 B | | | | | |
| VANADIUM | | 34 E | | | | | |
| ZINC | | 97 | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN505030A | IN505063A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012A | IN505052A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 17 U | 50 | | | | |
| METHYLENE CHLORIDE | | 3 BJ | 15 U | | | | |
| * THIOBISMETHANE( 6.00) | | | 130 J | | | | |
| * UNKNOWN( 6.00) | | 11 J | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN505030E | IN505030F | IN505030G | IN505063E | IN505063F | IN505063G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8623 | LLL8623 | LLL8623 | LLL8623 | LLL8623 | LLL8623 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | 320 | | | 2000 | |
| CS-134 | | | 540 | | | 690 | |
| CS-137 | | | 14000 | | | 20000 | |
| EU-154 | | | | | | 860 | |
| EU-155 | | | 330 | | | 470 | |
| GROSS ALPHA | | 3600 | | | 3200 | | |
| GROSS BETA | | 40000 | | | 74000 | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 505
LOCATION: TRA NORTHEASTERN COLD WASTE POND STILL AREA
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN505030E | IN505030F | IN505030G | IN505063E | IN505063F | IN505063G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8623 | LLL8623 | LLL8623 | LLL8623 | LLL8623 | LLL8623 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| H-3 | | | | 1200 | | | 200 |
| K-40 | | | 18000 | | | 19000 | |

S&A REQUEST: 506
LOCATION: TRA NORTHEASTERN COLD WASTE POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN506020 | IN506031 | | | | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0.7 | 24 | | | | |
| PH (UNITS) | | 7.8 | 7.5 | | | | |
| RADS (CPM) | | 250 | 250 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN506020D | IN506031D | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN506020D | IN506020D | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 2.5 | 4.2 | | | | |
| FLUORIDE | | 2 | 1.8 | | | | |
| NITRATE-N | | 0.54 N | 0.79 N | | | | |
| SULFATE | | 16 | 29 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN506020B | IN506020B | IN506020C | IN506020C | IN506031B | IN506031B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016C | IN509034C | IN503016D | IN503016K | IN503016C | IN509034C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 14100 | | | |
| ANTIMONY | | | | 5.7 BN | | | |
| ARSENIC | | | | 8.5 U | | | |
| BARIUM | | | | 191 | | | |
| BERYLLIUM | | | | 1.4 E | | | |
| CADMIUM | | | | 0.28 U | | | |
| CALCIUM | | | | 6880 | | | |
| CHROMIUM | | | 28 | | | | 74 |
| COBALT | | | | 7.9 | | | |
| COPPER | | | | 27 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 506
LOCATION: TRA NORTHEASTERN COLD WASTE POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN506020B | IN506020B | IN506020C | IN506020C | IN506031B | IN506031B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016C | IN509034C | IN503016D | IN503016K | IN503016C | IN509034C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| IRON | | | | 22500 | | | |
| LEAD | | | | 12 B | | | |
| MAGNESIUM | | | | 7250 E | | | |
| MANGANESE | | | | 429 E | | | |
| MERCURY | | 0.04 | | | | 0.04 B | |
| NICKEL | | | | 32 | | | |
| POTASSIUM | | | | | 2100 | | |
| SILVER | | | | 0.71 U | | | |
| SODIUM | | | | 306 B | | | |
| VANADIUM | | | | 45 E | | | |
| ZINC | | | | 84 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN506031C | IN506031C |
|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 23800 | |
| ANTIMONY | | 5.3 UN | |
| ARSENIC | | 11 B | |
| BARIUM | | 283 | |
| BERYLLIUM | | 2.1 E | |
| CADMIUM | | 0.44 B | |
| CALCIUM | | 8610 | |
| CHROMIUM | | | |
| COBALT | | 13 | |
| COPPER | | 42 | |
| IRON | | 32700 | |
| LEAD | | 26 B | |
| MAGNESIUM | | 11600 E | |
| MANGANESE | | 728 E | |
| MERCURY | | | |
| NICKEL | | 49 | |
| POTASSIUM | | | 3400 |
| SILVER | | 1 B | |
| SODIUM | | 362 B | |
| VANADIUM | | 67 E | |
| ZINC | | 142 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 506
LOCATION: TRA NORTHEASTERN COLD WASTE POND
MEDIUM: SOIL

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN506020A | IN506031A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN506020A | IN506020A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| TOLUENE | | 7 | 7 U | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN506020E | IN506020F | IN506020G | IN506031E | IN506031F | IN506031G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9100 | LLL9100 | LLL9100 | LLL9105 | LLL9105 | LLL9105 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| GROSS ALPHA | | 4800 | | | 5600 | | |
| GROSS BETA | | 6400 | | | 7500 | | |
| H-3 | | | | 1600 | | | 1000 |
| K-40 | | | 21000 | | | 20000 | |

S&A REQUEST: 506
LOCATION: TRA NORTHEASTERN COLD WASTE POND
MEDIUM: SURFACE WATER

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN506053G |
|---|---|---|
| | SDG NO: | IN506053G |
| | TYPE: | RINSATE |
| CHLORIDE | | 33000 |
| NITRATE-N | | 1310 N |
| SULFATE | | 14000 |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN506053E | IN506053E | IN506053F | IN506053F |
|---|---|---|---|---|---|
| | SDG NO: | IN503050F | IN506053E | IN503050G | IN503050K |
| | TYPE: | RINSATE | RINSATE | RINSATE | RINSATE |
| ALUMINUM | | | | 314 | |
| BARIUM | | | | 5.4 B | |
| CALCIUM | | | | 501 B | |
| CHROMIUM | | | 1.6 B | | |
| IRON | | | | 214 | |
| MAGNESIUM | | | | 150 B | |
| MANGANESE | | | | 4 B | |
| MERCURY | | 0.04 BN | | | |
| POTASSIUM | | | | | 100 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 506
LOCATION: TRA NORTHEASTERN COLD WASTE POND
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN506053E | IN506053E | IN506053F | IN506053F | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503050F | IN506053E | IN503050G | IN503050K | | |
| | TYPE: | RINSATE | RINSATE | RINSATE | RINSATE | | |
| ZINC | | | | 58 | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN506053A | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN506053A | | | | | |
| | TYPE: | RINSATE | | | | | |
| BROMOFORM | | 2 J | | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN506053H | IN506053J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9100 | LLL9100 | | | | |
| | TYPE: | RINSATE | RINSATE | | | | |
| GROSS ALPHA | | 0 | | | | | |
| GROSS BETA | | 12 | | | | | |
| H-3 | | | 1300 | | | | |

S&A REQUEST: 507
LOCATION: TRA CHEMICAL/CORROSIVE POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN507021 | IN507054 | IN507098 | IN507101 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 5.1 | 5 | 4.3 | 4.7 | | |
| PH (UNITS) | | 8.5 | 8.3 | 8.3 | 8.6 | | |
| TEMPERATURE (DEG C) | | 26 | 26 | 25 | 25 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN507021F | IN507054F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN507010F | IN507010F | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| CHLORIDE | | 8800 | 8100 | | | | |
| FLUORIDE | | 2600 | 2400 | | | | |
| SULFATE | | 1500000 N | 2400000 N | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 507
LOCATION: TRA CHEMICAL/CORROSIVE POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: IN507021D<br>SDG NO: IN507010D<br>TYPE: S. COMPOSITE | IN507021D<br>IN522075F<br>S. COMPOSITE | IN507021E<br>IN411015I<br>S. COMPOSITE | IN507021E<br>IN411015K<br>S. COMPOSITE | IN507054D<br>IN507010D<br>S. COMPOSITE | IN507054D<br>IN522075F<br>S. COMPOSITE |
|---|---|---|---|---|---|---|
| ALUMINUM | | | 1110 | | | |
| BARIUM | | | 893 | | | |
| BERYLLIUM | | | 6 | | | |
| CALCIUM | | | 265000 | | | 44 |
| CHROMIUM | | 90 | | | | |
| COPPER | | | 12 B | | | |
| IRON | | | 817 | | | |
| LEAD | | | 50 U | | | |
| MAGNESIUM | | | 69300 E | | | |
| MANGANESE | | | 8.9 B | | 7.4 | |
| MERCURY | 13 | | | | | |
| NICKEL | | | 15 B | | | |
| POTASSIUM | | | | 7400 | | |
| SODIUM | | | 736000 | | | |
| VANADIUM | | | 30 B | | | |
| ZINC | | | 11 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: IN507054E<br>SDG NO: IN411015I<br>TYPE: S. COMPOSITE | IN507054E<br>IN411015K<br>S. COMPOSITE |
|---|---|---|
| ALUMINUM | 1050 | |
| BARIUM | 955 | |
| BERYLLIUM | 5.7 | |
| CALCIUM | 216000 | |
| CHROMIUM | | |
| COPPER | 14 B | |
| IRON | 762 | |
| LEAD | 59 B | |
| MAGNESIUM | 57000 E | |
| MANGANESE | 8.5 B | |
| MERCURY | | |
| NICKEL | 14 B | |
| POTASSIUM | | 5700 |
| SODIUM | 634000 | |
| VANADIUM | 29 B | |
| ZINC | 16 B | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 507
LOCATION: TRA CHEMICAL/CORROSIVE POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| PCBS & OTHER EXTRACTABLES (UG/L) | SAMP NO: | IN507021B | IN507054B | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN507010A | IN507010A | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| AROCLOR-1260 | | 0.68 J | 0.98 J | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN507098A | IN507101A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011A | IN409011A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 10 U | 5 J | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN507021G | IN507021H | IN507054E | IN507054G | IN507054H | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8687 | LLL8687 | LLL8687 | LLL8687 | LLL8687 | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | |
| CO-60 | | 2.1 | | 4 U | | | |
| CS-137 | | 3 U | | 0.1 | | | |
| GROSS ALPHA | | 8 | | | 4 | | |
| GROSS BETA | | 21 | | | 35 | | |
| H-3 | | | 260 | | | 0 | |

S&A REQUEST: 507
LOCATION: TRA CHEMICAL/CORROSIVE POND INLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN507010 | IN507043 | IN507076 | IN507087 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.27 | 0.21 | 1.6 | 0.48 | | |
| PH (UNITS) | | 5.7 | 3.7 | 7.6 | 4.4 | | |
| TEMPERATURE (DEG C) | | 26 | 20 | 27 | 23 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN507010F | IN507043F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN507010F | IN507010F | | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | | | | |
| CHLORIDE | | 5300 | 4500 | | | | |
| NITRATE-N | | 565 N | 497 N | | | | |
| SULFATE | | 380000 N | 60000 N | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 507
LOCATION: TRA CHEMICAL/CORROSIVE POND INLET
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN507010D | IN507010D | IN507010E | IN507010E | IN507043D | IN507043D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN507010D | IN522075F | IN411015I | IN411015K | IN507010D | IN522075F |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | 680 | | | |
| BARIUM | | | | 177 B | | | |
| BERYLLIUM | | | | 3.8 B | | | |
| CALCIUM | | | | 104000 | | | 3 B |
| CHROMIUM | | | 4.6 B | | | | |
| IRON | | | | 122 | | | |
| MAGNESIUM | | | | 4910 BE | | | |
| MERCURY | | 3.4 | | | | 0.4 | |
| POTASSIUM | | | | | 890 B | | |
| SODIUM | | | | 55000 | | | |
| VANADIUM | | | | 5.2 B | | | |
| ZINC | | | | 16 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN507043E | IN507043E |
|---|---|---|---|
| | SDG NO: | IN411015I | IN411015K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | 179 B | |
| BARIUM | | 41 B | |
| BERYLLIUM | | 1.6 B | |
| CALCIUM | | 23200 | |
| CHROMIUM | | | |
| IRON | | 38 B | |
| MAGNESIUM | | 669 BE | |
| MERCURY | | | |
| POTASSIUM | | | 200 B |
| SODIUM | | 9090 | |
| VANADIUM | | 4 U | |
| ZINC | | 9.9 B | |

| PCBS & OTHER EXTRACTABLES (UG/L) | SAMP NO: | IN507010A | IN507043B |
|---|---|---|---|
| | SDG NO: | IN507010A | IN507010A |
| | TYPE: | S. COMPOSITE | S. COMPOSITE |
| AROCLOR-1260 | | 0.58 J | 1 U |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 507
LOCATION: TRA CHEMICAL/CORROSIVE POND INLET
MEDIUM: SURFACE WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN507076A | IN507087A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN409011A | IN409011A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| METHYLENE CHLORIDE | | 1 J | 1 J | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN507010G | IN507010H | IN507043G | IN507043H | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8687 | LLL8687 | LLL8687 | LLL8687 | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | | |
| CO-60 | | 5.6 | | 1.8 | | | |
| CS-137 | | 0.5 | | 1 | | | |
| GROSS ALPHA | | 0 | | 7 | | | |
| GROSS BETA | | 38 | | 4 | | | |
| H-3 | | | 0 | | 10 | | |

S&A REQUEST: 508
LOCATION: TRA CHEMICAL/CORROSIVE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN508022E | IN508055E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011E | IN508011E | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 28 | 18 | | | | |
| FLUORIDE | | 42 | 32 | | | | |
| SULFATE | | 9200 | 9200 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN508022C | IN508022C | IN508022D | IN508022D | IN508055C | IN508055C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011C | IN508055C | IN301012D | IN301012K | IN508011C | IN508055C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 1430 | | | |
| BARIUM | | | | 8520 N | | | |
| BERYLLIUM | | | | 0.92 B | | | |
| CADMIUM | | | | 0.39 B | | | |
| CALCIUM | | | | 8940 * | | | |
| CHROMIUM | | | 9.8 | | | | 2.6 |
| COBALT | | | | 3.8 B | | | |
| COPPER | | | | 4.5 B | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 508
LOCATION: TRA CHEMICAL/CORROSIVE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN508022C | IN508022C | IN508022D | IN508022D | IN508055C | IN508055C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011C | IN508055C | IN301012D | IN301012K | IN508011C | IN508055C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| IRON | | | | 880 | | | |
| LEAD | | | | 100 | | | |
| MAGNESIUM | | | | 3500 | | | |
| MANGANESE | | | | 6.9 | | | |
| MERCURY | | 91 | | | | 34 | |
| NICKEL | | | | 13 B | | | |
| POTASSIUM | | | | | 1400 B | | |
| SODIUM | | | | 4510 | | | |
| VANADIUM | | | | 11 B | | | |
| ZINC | | | | 3.2 B | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN508055D | IN508055D |
|---|---|---|---|
| | SDG NO: | IN301012D | IN301012K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 1480 | |
| BARIUM | | 1990 N | |
| BERYLLIUM | | 0.36 B | |
| CADMIUM | | 0.37 U | |
| CALCIUM | | 5160 * | |
| CHROMIUM | | | |
| COBALT | | 0.74 U | |
| COPPER | | 4.2 B | |
| IRON | | 990 | |
| LEAD | | 22 B | |
| MAGNESIUM | | 1070 B | |
| MANGANESE | | 9.1 | |
| MERCURY | | | |
| NICKEL | | 7.9 B | |
| POTASSIUM | | | 1300 B |
| SODIUM | | 2250 | |
| VANADIUM | | 9.3 B | |
| ZINC | | 5.5 B | |

| PCBS & OTHER EXTRACTABLES (UG/KG) | SAMP NO: | IN508022A | IN508055A |
|---|---|---|---|
| | SDG NO: | IN507010A | IN507010A |
| | TYPE: | GRAB | GRAB |
| AROCLOR-1260 | | 270 | 210 U |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 508
LOCATION: TRA CHEMICAL/CORROSIVE POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN508022A | IN508055A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012A | IN505052A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 8 BJ | 13 J | | | | |
| METHYLENE CHLORIDE | | 2 BJ | 7 U | | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.32) | | 12 BJ | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN508022F | IN508022G | IN508022H | IN508055F | IN508055G | IN508055H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8688 | LLL8688 | LLL8688 | LLL8688 | LLL8688 | LLL8688 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| GROSS ALPHA | | 1300 | | | 690 | | |
| GROSS BETA | | 420 | | | 0 | | |
| H-3 | | | | 800 | | | 900 |
| K-40 | | | 14000 | | | 16000 | |

S&A REQUEST: 508
LOCATION: TRA CHEMICAL/CORROSIVE POND INLET
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN508011E | IN508044E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011E | IN508011E | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 27 | 19 | | | | |
| FLUORIDE | | 5.8 | 2.8 | | | | |
| NITRATE-N | | 9 | 5.9 | | | | |
| SULFATE | | 5000 | 1700 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN508011C | IN508011C | IN508011D | IN508011D | IN508044C | IN508044C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011C | IN508055C | IN301012D | IN301012K | IN508011C | IN508055C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 893 | | | |
| BARIUM | | | | 2860 N | | | |
| BERYLLIUM | | | | 0.4 B | | | |
| CALCIUM | | | | 5270 * | | | |
| CHROMIUM | | | 2.9 | | | | 1.9 |
| COBALT | | | | 1.2 B | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 508
LOCATION: TRA CHEMICAL/CORROSIVE POND INLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN508011C | IN508011C | IN508011D | IN508011D | IN508044C | IN508044C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011C | IN508055C | IN301012D | IN301012K | IN508011C | IN508055C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| COPPER | | | | 2.8 B | | | |
| IRON | | | | 1440 | | | |
| LEAD | | | | 44 | | | |
| MAGNESIUM | | | | 466 B | | | |
| MANGANESE | | | | 7 | | | |
| MERCURY | | 43 | | | | 31 | |
| NICKEL | | | | 7.6 B | | | |
| POTASSIUM | | | | | 750 B | | |
| SODIUM | | | | 1090 | | | |
| VANADIUM | | | | 5.5 B | | | |
| ZINC | | | | 4.9 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN508044D | IN508044D |
|---|---|---|---|
| | SDG NO: | IN301012D | IN301012K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 1170 | |
| BARIUM | | 1460 N | |
| BERYLLIUM | | 0.1 B | |
| CALCIUM | | 711 B* | |
| CHROMIUM | | | |
| COBALT | | 0.42 U | |
| COPPER | | 2.7 B | |
| IRON | | 2080 | |
| LEAD | | 18 B | |
| MAGNESIUM | | 388 B | |
| MANGANESE | | 8.6 | |
| MERCURY | | | |
| NICKEL | | 5.8 B | |
| POTASSIUM | | | 790 B |
| SODIUM | | 558 B | |
| VANADIUM | | 8.7 B | |
| ZINC | | 3.9 B | |

| PCBS & OTHER EXTRACTABLES (UG/KG) | SAMP NO: | IN508011A | IN508044A |
|---|---|---|---|
| | SDG NO: | IN507010A | IN507010A |
| | TYPE: | GRAB | GRAB |
| AROCLOR-1260 | | 1800 | 450 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 508
LOCATION: TRA CHEMICAL/CORROSIVE POND INLET
MEDIUM: SEDIMENT

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN508011A | IN508044A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012A | IN505052A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 5 BJ | 37 | | | | |
| METHYLENE CHLORIDE | | 3 BJ | 6 J | | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.29) | | 21 BJ | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN508011F | IN508011G | IN508011H | IN508044F | IN508044G | IN508044H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8688 | LLL8688 | LLL8688 | LLL8688 | LLL8688 | LLL8688 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| GROSS ALPHA | | 2900 | | | 2400 | | |
| GROSS BETA | | 1600 | | | 1400 | | |
| H-3 | | | | 100 | | | 1000 |
| K-40 | | | 16000 | | | 16000 | |

S&A REQUEST: 509
LOCATION: TRA CHEMICAL/CORROSIVE POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN509012 | IN509023 | IN509034 | | | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0.6 | 0 | 0.6 | | | |
| PH (UNITS) | | 6 | 7.4 | 7.9 | | | |
| RADS (CPM) | | 110 | 120 | 110 | | | |
| TEMPERATURE (DEG C) | | 22 | 16 | 14 | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN509012E | IN509023E | IN509034E | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN506020D | IN506020D | IN503016E | | | |
| | TYPE: | GRAB | GRAB | GRAB | | | |
| CHLORIDE | | 13 | 4 | 13 | | | |
| FLUORIDE | | 4.4 | 3.3 | 7.9 | | | |
| NITRATE-N | | 2 N | 1.5 N | 1.7 N | | | |
| SULFATE | | 3100 | 580 | 4500 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 509
LOCATION: TRA CHEMICAL/CORROSIVE POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN509012C | IN509012C | IN509012D | IN509012D | IN509023C | IN509023C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN509012 | IN509012C | IN503016D | IN503016K | IN503016C | IN509034C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 34400 | | | |
| ANTIMONY | | | | 7.1 BN | | | |
| ARSENIC | | | | 10 U | | | |
| BARIUM | | | | 547 | | | |
| BERYLLIUM | | | | 2.8 E | | | |
| CADMIUM | | | | 0.35 U | | | |
| CALCIUM | | | | 24300 | | | |
| CHROMIUM | | 55 | | | | | 28 |
| COBALT | | | | 18 | | | |
| COPPER | | | | 52 | | | |
| IRON | | | | 46300 | | | |
| LEAD | | | | 34 B | | | |
| MAGNESIUM | | | | 18500 E | | | |
| MANGANESE | | | | 1080 E | | | |
| MERCURY | | | 0.18 | | | 0.05 | |
| NICKEL | | | | 59 | | | |
| POTASSIUM | | | | | 8300 | | |
| SILVER | | | | 1.9 | | | |
| SODIUM | | | | 1240 | | | |
| VANADIUM | | | | 95 E | | | |
| ZINC | | | | 197 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN509023D | IN509023D | IN509034C | IN509034C | IN509034D | IN509034D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K | IN503016C | IN509034C | IN503016D | IN503016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 8920 | | | | 25000 | |
| ANTIMONY | | 5.2 BN | | | | 5.3 UN | |
| ARSENIC | | 8.4 U | | | | 11 B | |
| BARIUM | | 178 | | | | 325 | |
| BERYLLIUM | | 1.2 E | | | | 2.4 E | |
| CADMIUM | | 0.28 U | | | | 0.44 B | |
| CALCIUM | | 12600 | | | | 43400 | |
| CHROMIUM | | | | | 48 | | |
| COBALT | | 4.9 B | | | | 12 | |
| COPPER | | 17 | | | | 39 | |
| IRON | | 16100 | | | | 32800 | |
| LEAD | | 7 U | | | | 26 B | |
| MAGNESIUM | | 4580 E | | | | 11900 E | |
| MANGANESE | | 209 E | | | | 631 E | |
| MERCURY | | | | 0.07 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 509
LOCATION: TRA CHEMICAL/CORROSIVE POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN509023D | IN509023D | IN509034C | IN509034C | IN509034D | IN509034D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K | IN503016C | IN509034C | IN503016D | IN503016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| NICKEL | | 20 | | | | 46 | |
| POTASSIUM | | | 1700 | | | | 4700 |
| SILVER | | 0.7 U | | | | 1.3 B | |
| SODIUM | | 537 B | | | | 1520 | |
| VANADIUM | | 39 E | | | | 79 E | |
| ZINC | | 50 | | | | 151 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN509012A | IN509034A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503027A | IN503027A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| METHYLENE CHLORIDE | | 20 B | 12 BJ | | | | |
| TOLUENE | | 4 J | 13 U | | | | |
| 1,1,1-TRICHLOROETHANE | | 53 | 39 | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN509012F | IN509012G | IN509012H | IN509023F | IN509023G | IN509023H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9105 | LLL9105 | LLL9105 | LLL9111 | LLL9111 | LLL9111 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| GROSS ALPHA | | 8500 | | | 6100 | | |
| GROSS BETA | | 11000 | | | 6700 | | |
| H-3 | | | | 1200 | | | 1200 |
| K-40 | | | 24000 | | | 10000 | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN509034F | IN509034G | IN509034H | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9111 | LLL9111 | LLL9111 | | | |
| | TYPE: | GRAB | GRAB | GRAB | | | |
| GROSS ALPHA | | 7800 | | | | | |
| GROSS BETA | | 8500 | | | | | |
| H-3 | | | | 38000 | | | |
| K-40 | | | 22000 | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3
LEACHING PONDS

S&A REQUEST: 510
LOCATION: TAN/TSF DISPOSAL POND
MEDIUM: SURFACE WATER

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN510253C | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510253C | | | | | |
| | TYPE: | RINSATE | | | | | |
| NITRATE-N | | 3050 N | | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN510253A | IN510253A | IN510253B | IN510253B | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015A | IN513018D | IN401013I | IN401013K | | |
| | TYPE: | RINSATE | RINSATE | RINSATE | RINSATE | | |
| ALUMINUM | | | | 304 | | | |
| BARIUM | | | | 12 B | | | |
| CALCIUM | | | | 1330 B | | | |
| CHROMIUM | | | 31 | | | | |
| COPPER | | | | 78 | | | |
| IRON | | | | 300 | | | |
| MAGNESIUM | | | | 208 B | | | |
| MANGANESE | | | | 9.7 B | | | |
| MERCURY | | 0.08 B | | | | | |
| NICKEL | | | | 14 B | | | |
| POTASSIUM | | | | | 400 B | | |
| ZINC | | | | 358 | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN510253D | IN510253F | IN510253G | IN510253H | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8667 | LLL8667 | LLL8667 | LLL8667 | | |
| | TYPE: | RINSATE | RINSATE | RINSATE | RINSATE | | |
| AM-241 | | | | -0.03 | | | |
| GROSS ALPHA | | 33 | | | | | |
| GROSS BETA | | 39 | | | 21000 | | |
| H-3 | | | 4.2 | | | | |
| SR-TOT | | | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 LEACHING PONDS

DRAFT DO NOT CITE

S&A REQUEST: 510
LOCATION: TAN/TSF DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN510026 | IN510059 | IN510093 | IN510106 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.58 | 0.58 | 0.58 | 0.58 | | |
| PH (UNITS) | | 8.7 | 8.7 | 8.7 | 8.7 | | |
| TEMPERATURE (DEG C) | | 18 | 18 | 18 | 18 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN510026C | IN510059C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510026C | IN510048C | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| CHLORIDE | | 86000 | 69000 | | | | |
| NITRATE-N | | 497 N | 316 | | | | |
| SULFATE | | 43000 N | 39000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN510026A | IN510026A | IN510026B | IN510026B | IN510059A | IN510059A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015A | IN513018D | IN401013I | IN401013K | IN510015A | IN513018D |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | | 791 | | | |
| BARIUM | | | | 90 B | | | |
| BERYLLIUM | | | | 2.5 B | | | |
| CALCIUM | | | | 56700 | | | |
| CHROMIUM | | | 2 B | | | | 3.4 B |
| COPPER | | | | 13 B | | | |
| IRON | | | | 616 | | | |
| MAGNESIUM | | | | 17200 | | | |
| MANGANESE | | | | 28 | | | |
| MERCURY | | 0.42 | | | | 0.14 B | |
| NICKEL | | | | 15 B | | | |
| POTASSIUM | | | | | 5600 | | |
| SODIUM | | | | 50600 | | | |
| VANADIUM | | | | 17 B | | | |
| ZINC | | | | 124 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN510059B | IN510059B | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013I | IN401013K | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| ALUMINUM | | 1140 | | | | | |
| BARIUM | | 114 B | | | | | |
| BERYLLIUM | | 2.8 B | | | | | |
| CALCIUM | | 66800 | | | | | |
| CHROMIUM | | | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3
LEACHING PONDS

S&A REQUEST: 510
LOCATION: TAN/TSF DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN510059B | IN510059B | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013I | IN401013K | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| COPPER | | 19 B | | | | | |
| IRON | | 1010 | | | | | |
| MAGNESIUM | | 17000 | | | | | |
| MANGANESE | | 53 | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 6 U | | | | | |
| POTASSIUM | | | 5500 | | | | |
| SODIUM | | 46900 | | | | | |
| VANADIUM | | 21 B | | | | | |
| ZINC | | 90 | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN510093A | IN510106A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013A | IN401013A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 10 U | 11 | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN510026D | IN510026E | IN510026F | IN510026G | IN510026H | IN510059D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8666 | LLL8666 | LLL8666 | LLL8667 | LLL8667 | LLL8666 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | | 7 U | | -0.05 | | |
| CO-60 | | | 10 | | | | 18 |
| CS-137 | | 8 | | | | | 30 |
| GROSS ALPHA | | 79 | | | | -160 | |
| GROSS BETA | | | | 12 | | | |
| H-3 | | | | | | | |
| SR-TOT | | | | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN510059E | IN510059F | IN510059G | IN510059H |
|---|---|---|---|---|---|
| | SDG NO: | LLL8666 | LLL8666 | LLL8667 | LLL8667 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | 5.9 | | 0.07 | |
| CO-60 | | 8 U | | | |
| CS-137 | | | | | |
| GROSS ALPHA | | | | | -90 |
| GROSS BETA | | | | | |
| H-3 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 510
LOCATION: TAN/TSF DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN510059E | IN510059F | IN510059G | IN510059H | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8666 | LLL8666 | LLL8667 | LLL8667 | | |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | | |
| SR-TOT | | | 9.2 | | | | |

S&A REQUEST: 510
LOCATION: TAN/TSF DISPOSAL POND INLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN510015 | IN510048 | IN510071 | IN510082 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.76 | 0.76 | 0.76 | 0.76 | | |
| PH (UNITS) | | 9.3 | 9.5 | 9.3 | 9.5 | | |
| TEMPERATURE (DEG C) | | 18 | 18 | 18 | 18 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN510015C | IN510048C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015C | IN510048C | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| CHLORIDE | | 130000 N | 140000 | | | | |
| FLUORIDE | | 1000 | 1000 | | | | |
| NITRATE-N | | 768 * | 249 | | | | |
| SULFATE | | 39000 | 44000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN510015A | IN510015A | IN510015B | IN510015B | IN510048A | IN510048A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015A | IN513018D | IN401013I | IN401013K | IN510015A | IN513018D |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | | 3850 | | | |
| BARIUM | | | | 72 B | | | |
| BERYLLIUM | | | | 3.3 B | | | |
| CADMIUM | | | | 1 U | | | |
| CALCIUM | | | | 51400 | | | |
| CHROMIUM | | | 5.8 B | | | | 19 |
| COBALT | | | | 2 U | | | |
| COPPER | | | | 12 B | | | |
| IRON | | | | 3720 | | | |
| MAGNESIUM | | | | 19100 | | | |
| MANGANESE | | | | 72 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 510
LOCATION: TAN/TSF DISPOSAL POND INLET
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN510015A | IN510015A | IN510015B | IN510015B | IN510048A | IN510048A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015A | IN513018D | IN401013I | IN401013K | IN510015A | IN513018D |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| MERCURY | | 0.02 B | | | | 0.04 B | |
| NICKEL | | | | 11 B | | | |
| POTASSIUM | | | | | 6700 | | |
| SILVER | | | | 6 U | | | |
| SODIUM | | | | 99500 | | | |
| VANADIUM | | | | 22 B | | | |
| ZINC | | | | 57 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN510048B | IN510048B |
|---|---|---|---|
| | SDG NO: | IN401013I | IN401013K |
| | TYPE: | OTHER | OTHER |
| ALUMINUM | | 15500 | |
| BARIUM | | 241 | |
| BERYLLIUM | | 4.4 B | |
| CADMIUM | | 1.1 B | |
| CALCIUM | | 70600 | |
| CHROMIUM | | | |
| COBALT | | 6 B | |
| COPPER | | 102 | |
| IRON | | 17600 | |
| MAGNESIUM | | 24900 | |
| MANGANESE | | 217 | |
| MERCURY | | | |
| NICKEL | | 29 B | |
| POTASSIUM | | | 11000 |
| SILVER | | 35 | |
| SODIUM | | 106000 | |
| VANADIUM | | 48 B | |
| ZINC | | 389 | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN510015D | IN510015E | IN510015F | IN510015G | IN510015H | IN510048D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8666 | LLL8666 | LLL8666 | LLL8667 | LLL8667 | LLL8666 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | | 8 U | | -0.02 | | |
| CO-60 | | | 7.2 | | | | |
| CS-137 | | | | | | | 13 |
| GROSS ALPHA | | 22 | | | | | 85 |
| GROSS BETA | | 34 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 510
LOCATION: TAN/TSF DISPOSAL POND INLET
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN510015D | IN510015E | IN510015F | IN510015G | IN510015H | IN510048D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8666 | LLL8666 | LLL8666 | LLL8667 | LLL8667 | LLL8666 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| H-3 | | | | | | 100 | |
| SR-TOT | | | | 3.5 | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN510048E | IN510048F | IN510048G | IN510048H | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8666 | LLL8666 | LLL8667 | LLL8667 | | |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | | |
| AM-241 | | | | 0.13 | | | |
| CO-60 | | 31 | | | | | |
| CS-137 | | 93 | | | | | |
| GROSS ALPHA | | | | | | | |
| GROSS BETA | | | | | | | |
| H-3 | | | | | -120 | | |
| SR-TOT | | | 9.3 | | | | |

S&A REQUEST: 511
LOCATION: TAN/TSF DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN511027 | IN511050 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.89 | 0.68 | | | | |
| PH (UNITS) | | 7.8 | 7.1 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN511027D | IN511050D | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN511016D | IN511016D | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 38 | 27 | | | | |
| FLUORIDE | | 1 U | 1.4 | | | | |
| NITRATE-N | | 1.1 | 2.5 | | | | |
| O-PHOSPHATE-P | | 1.1 | 1.1 | | | | |
| SULFATE | | 10 | 21 | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 511
LOCATION: TAN/TSF DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN511027B | IN511027B | IN511027C | IN511027C | IN511050B | IN511050B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN511016B | IN514053C | IN301045D | IN511016K | IN511016B | IN514053C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 17100 | | | |
| BARIUM | | | | 222 | | | |
| BERYLLIUM | | | | 2.1 E | | | |
| CADMIUM | | | | 1.3 | | | |
| CALCIUM | | | | 76700 | | | |
| CHROMIUM | | | 29 | | | | 30 |
| COBALT | | | | 9.8 | | | |
| COPPER | | | | 37 | | | |
| IRON | | | | 24700 | | | |
| LEAD | | | | 19 B | | | |
| MAGNESIUM | | | | 14400 E | | | |
| MANGANESE | | | | 480 | | | |
| MERCURY | | 0.13 | | | | 0.13 | |
| NICKEL | | | | 36 | | | |
| POTASSIUM | | | | | 3500 | | |
| SILVER | | | | 3.5 | | | |
| SODIUM | | | | 599 B | | | |
| VANADIUM | | | | 48 E | | | |
| ZINC | | | | 137 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN511050C | IN511050C |
|---|---|---|---|
| | SDG NO: | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 15400 | |
| BARIUM | | 212 | |
| BERYLLIUM | | 2.2 E | |
| CADMIUM | | 1.4 | |
| CALCIUM | | 69200 | |
| CHROMIUM | | | |
| COBALT | | 9.1 B | |
| COPPER | | 50 | |
| IRON | | 23700 | |
| LEAD | | 16 B | |
| MAGNESIUM | | 14400 E | |
| MANGANESE | | 341 | |
| MERCURY | | | |
| NICKEL | | 36 | |
| POTASSIUM | | | 3300 |
| SILVER | | 9 | |
| SODIUM | | 591 B | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 511
LOCATION: TAN/TSF DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN511050C | IN511050C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301045D | IN511016K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| VANADIUM | | 40 E | | | | | |
| ZINC | | 202 | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN511050A | IN511050A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505052A | IN511050A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 44 | 18 | | | | |
| METHYLENE CHLORIDE | | 8 B | 8 U | | | | |
| * THIOBISMETHANE( 6.11) | | 29 J | | | | | |
| * 1,1,2-TRICHL-1,2,2-TRIF(11.29) | | 8 BJ | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN511027E | IN511027F | IN511027G | IN511027H | IN511027I | IN511050E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8689 | LLL8689 | LLL8689 | LLL8689 | LLL8689 | LLL8689 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | | 15 | | | | |
| CO-60 | | | | 21000 | | | |
| CS-137 | | | | 17000 | | | |
| GROSS ALPHA | | 7400 | | | | | 3900 |
| GROSS BETA | | 18000 | | | | | 34000 |
| H-3 | | | | | | 300 | |
| K-40 | | | | 18000 | | | |
| MN-54 | | | | 180 | | | |
| SR-TOT | | | | | 520 | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN511050F | IN511050G | IN511050H | IN511050I | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8689 | LLL8689 | LLL8689 | LLL8689 | | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | | |
| AM-241 | | 9.1 | | | | | |
| CO-60 | | | 42000 | | | | |
| CS-137 | | | 14000 | | | | |
| GROSS ALPHA | | | | | | | |
| GROSS BETA | | | | | | | |
| H-3 | | | | | 200 | | |
| K-40 | | | 18000 | | | | |
| MN-54 | | | 280 | | | | |
| SR-TOT | | | | 590 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 511
LOCATION: TAN/TSF DISPOSAL POND INLET
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN511016 | IN511049 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.92 | 0.81 | | | | |
| PH (UNITS) | | 7.1 | 7.9 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN511016D | IN511049D | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN511016D | IN511016D | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 38 | 91 | | | | |
| FLUORIDE | | 1.6 | 1.6 | | | | |
| NITRATE-N | | 12 | 1.9 | | | | |
| O-PHOSPHATE-P | | 0.62 | 0.75 | | | | |
| SULFATE | | 440 | 200 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN511016B | IN511016B | IN511016C | IN511016C | IN511049B | IN511049B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN511016B | IN514053C | IN301045D | IN511016K | IN511016B | IN514053C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 24500 | | | |
| BARIUM | | | | 248 | | | |
| BERYLLIUM | | | | 2.4 E | | | |
| CADMIUM | | | | 1.7 | | | |
| CALCIUM | | | | 50100 | | | |
| CHROMIUM | | | 35 | | | | 39 |
| COBALT | | | | 11 | | | |
| COPPER | | | | 37 | | | |
| IRON | | | | 29000 | | | |
| LEAD | | | | 20 B | | | |
| MAGNESIUM | | | | 15100 E | | | |
| MANGANESE | | | | 319 | | | |
| MERCURY | | 0.08 | | | | 1.7 | |
| NICKEL | | | | 45 | | | |
| POTASSIUM | | | | | 5300 | | |
| SILVER | | | | 3.3 | | | |
| SODIUM | | | | 849 B | | | |
| VANADIUM | | | | 48 E | | | |
| ZINC | | | | 196 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 511
LOCATION: TAN/TSF DISPOSAL POND INLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN511049C | IN511049C | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301045D | IN511016K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ALUMINUM | | 21300 | | | | | |
| BARIUM | | 226 | | | | | |
| BERYLLIUM | | 2.3 E | | | | | |
| CADMIUM | | 1.6 | | | | | |
| CALCIUM | | 38200 | | | | | |
| CHROMIUM | | | | | | | |
| COBALT | | 10 B | | | | | |
| COPPER | | 78 | | | | | |
| IRON | | 28200 | | | | | |
| LEAD | | 22 B | | | | | |
| MAGNESIUM | | 15500 E | | | | | |
| MANGANESE | | 202 | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 44 | | | | | |
| POTASSIUM | | | 5000 | | | | |
| SILVER | | 26 | | | | | |
| SODIUM | | 838 B | | | | | |
| VANADIUM | | 42 E | | | | | |
| ZINC | | 293 | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN511016A | IN511049A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505052A | IN505052A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 60 | 45 | | | | |
| METHYLENE CHLORIDE | | 11 B | 2 BJ | | | | |
| * 1,1,2-TRICHL-1,2,2-TRIF(11.29) | | | 10 BJ | | | | |
| * 1,1,2-TRICHL-1,2,2-TRIF(11.32) | | 9 BJ | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN511016E | IN511016F | IN511016G | IN511016H | IN511016I | IN511049E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8689 | LLL8689 | LLL8689 | LLL8689 | LLL8689 | LLL8689 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | | 11 | | | | |
| CO-60 | | | | 570 | | | |
| CS-137 | | | | 4400 | | | |
| EU-155 | | | | 130 | | | |
| GROSS ALPHA | | 5300 | | | | | 9100 |
| GROSS BETA | | 13000 | | | | | 29000 |
| H-3 | | | | | | -30 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 511
LOCATION: TAN/TSF DISPOSAL POND INLET
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN511016E | IN511016F | IN511016G | IN511016H | IN511016I | IN511049E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8689 | LLL8689 | LLL8689 | LLL8689 | LLL8689 | LLL8689 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| K-40 | | | | 19000 | | | |
| SR-TOT | | | | | 520 | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN511049F | IN511049G | IN511049H | IN511049I |
|---|---|---|---|---|---|
| | SDG NO: | LLL8689 | LLL8689 | LLL8689 | LLL8689 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | 17 | | | |
| CO-60 | | | 18000 | | |
| CS-137 | | | 59000 | | |
| EU-155 | | | | | |
| GROSS ALPHA | | | | | |
| GROSS BETA | | | | | 780 |
| H-3 | | | 21000 | | |
| K-40 | | | | 3000 | |
| SR-TOT | | | | | |

S&A REQUEST: 512
LOCATION: TAN/TSF DISPOSAL POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN512017 | IN512039 |
|---|---|---|---|
| FID/PID (PPM) | | 4.2 | 0 |
| PH (UNITS) | | 7.7 | 8 |
| RADS (CPM) | | 50 | 50 |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN512017D | IN512028D | IN512039D |
|---|---|---|---|---|
| | SDG NO: | IN503050H | IN512028D | IN512028D |
| | TYPE: | GRAB | GRAB | GRAB |
| CHLORIDE | | 15 | 21 | 15 |
| FLUORIDE | | 2.7 | 3 | 2.6 |
| NITRATE-N | | 0.7 N | 0.23 | 0.68 |
| SULFATE | | 15 | 13 | 15 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 512
LOCATION: TAN/TSF DISPOSAL POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN512017B | IN512017B | IN512017C | IN512017C | IN512028B | IN512028B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN512017B | IN515010C | IN503016D | IN503016K | IN512017B | IN515010C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 20900 | | | |
| ANTIMONY | | | | 4.9 UN | | | |
| ARSENIC | | | | 9.8 U | | | |
| BARIUM | | | | 272 | | | |
| BERYLLIUM | | | | 2.1 E | | | |
| CADMIUM | | | | 0.6 B | | | |
| CALCIUM | | | | 49700 | | | |
| CHROMIUM | | | 22 | | | | 29 |
| COBALT | | | | 11 | | | |
| COPPER | | | | 29 | | | |
| IRON | | | | 26600 | | | |
| LEAD | | | | 17 B | | | |
| MAGNESIUM | | | | 12200 E | | | |
| MANGANESE | | | | 553 E | | | |
| MERCURY | | 0.05 | | | | 0.04 B | |
| NICKEL | | | | 40 | | | |
| POTASSIUM | | | | | 3300 | | |
| SILVER | | | | 0.98 B | | | |
| SODIUM | | | | 805 B | | | |
| VANADIUM | | | | 52 E | | | |
| ZINC | | | | 119 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN512028C | IN512028C | IN512039B | IN512039B | IN512039C | IN512039C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K | IN503016C | IN509034C | IN503016D | IN503016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 14500 | | | | 19900 | |
| ANTIMONY | | 5.5 BN | | | | 4.9 BN | |
| ARSENIC | | 11 B | | | | 11 B | |
| BARIUM | | 214 | | | | 261 | |
| BERYLLIUM | | 1.8 E | | | | 2 E | |
| CADMIUM | | 0.5 B | | | | 0.78 B | |
| CALCIUM | | 75500 | | | | 66900 | |
| CHROMIUM | | | | | 32 | | |
| COBALT | | 7.9 B | | | | 9.1 | |
| COPPER | | 20 | | | | 24 | |
| IRON | | 19000 | | | | 23300 | |
| LEAD | | 12 B | | | | 13 B | |
| MAGNESIUM | | 13000 E | | | | 12900 E | |
| MANGANESE | | 650 E | | | | 695 E | |
| MERCURY | | | | 0.06 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 512
LOCATION: TAN/TSF DISPOSAL POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN512028C | IN512028C | IN512039B | IN512039B | IN512039C | IN512039C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K | IN503016C | IN509034C | IN503016D | IN503016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| NICKEL | | 31 | | | | 37 | |
| POTASSIUM | | | 2500 | | | | 3600 |
| SILVER | | 0.84 B | | | | 0.92 B | |
| SODIUM | | 654 B | | | | 708 B | |
| VANADIUM | | 42 E | | | | 51 E | |
| ZINC | | 85 | | | | 103 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN512017A | IN512028A | IN512039A | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503027A | IN503027A | IN503027A | | | |
| | TYPE: | GRAB | GRAB | GRAB | | | |
| CHLOROFORM | | 18 | 13 | 17 | | | |
| METHYLENE CHLORIDE | | 9 J | 11 J | 8 J | | | |
| TOLUENE | | 13 U | 12 U | 5 J | | | |
| 1,1,1-TRICHLOROETHANE | | 43 | 12 J | 18 | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN512017E | IN512017F | IN512017G | IN512017H | IN512017I | IN512028E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9056 | LLL9056 | LLL9056 | LLL9056 | LLL9056 | LLL9071 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | | 4 | | | | 5100 |
| GROSS ALPHA | | 6700 | | | | | 4900 |
| GROSS BETA | | 7900 | | | | 1200 | |
| H-3 | | | | 18000 | | | |
| K-40 | | | | | 260 | | |
| SR-TOT | | | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN512028F | IN512028G | IN512028H | IN512028I | IN512039E | IN512039F |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9071 | LLL9071 | LLL9071 | LLL9071 | LLL9077 | LLL9077 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | 15 | | | | | 21 |
| GROSS ALPHA | | | | | | 4100 | |
| GROSS BETA | | | | | | 6400 | |
| H-3 | | | | | 800 | | |
| K-40 | | | 14000 | | | | |
| SR-TOT | | | | 0 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 512
LOCATION: TAN/TSF DISPOSAL POND
MEDIUM: SOIL

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN512039G | IN512039H | IN512039I | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9077 | LLL9077 | LLL9077 | | | |
| | TYPE: | GRAB | GRAB | GRAB | | | |
| AM-241 | | | | | | | |
| GROSS ALPHA | | | | | | | |
| GROSS BETA | | | | | | | |
| H-3 | | | | 200 | | | |
| K-40 | | 15000 | | | | | |
| SR-TOT | | | 760 | | | | |

S&A REQUEST: 513
LOCATION: TAN/LOFT DISPOSAL POND
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN513256A | IN513256B | IN513256D | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015A | IN401013I | IN513018D | | | |
| | TYPE: | FIELD BLANK | FIELD BLANK | FIELD BLANK | | | |
| CHROMIUM | | | | 0.9 B | | | |
| MERCURY | | 0.03 B | | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN513256C | IN513256D | IN513256F | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8694 | LLL8694 | LLL8694 | | | |
| | TYPE: | FIELD BLANK | FIELD BLANK | FIELD BLANK | | | |
| AM-241 | | 0.14 | | | | | |
| GROSS ALPHA | | | 15 | | | | |
| GROSS BETA | | | 2 | | | | |
| SR-TOT | | | | 2.9 | | | |

| RADIOCHEMISTRY (UG/L) | SAMP NO: | IN513256C | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8694 | | | | | |
| | TYPE: | FIELD BLANK | | | | | |
| URANIUM-TOT | | 0.85 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 LEACHING PONDS

DRAFT DO NOT CITE

S&A REQUEST: 513
LOCATION: TAN/LOFT DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN513029 | IN513052 | IN513096 | IN513109 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.24 | 0.26 | 0.24 | 0.26 | | |
| PH (UNITS) | | 10 | 10 | 10 | 10 | | |
| TEMPERATURE (DEG C) | | 23 | 24 | 23 | 24 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN513029F | IN513052F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510026C | IN510026C | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| CHLORIDE | | 42000 | 45000 | | | | |
| NITRATE-N | | 271 N | 226 N | | | | |
| O-PHOSPHATE-P | | 326 UN | 1010 N | | | | |
| SULFATE | | 34000 N | 33000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN513029D | IN513029D | IN513029E | IN513029E | IN513052D | IN513052D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015A | IN513018D | IN401013I | IN401013K | IN510015A | IN513018D |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | | 312 | | | |
| BARIUM | | | | 11 B | | | |
| BERYLLIUM | | | | 1.5 B | | | |
| CALCIUM | | | | 30400 | | | |
| CHROMIUM | | | 2.6 B | | | | 3.1 B |
| IRON | | | | 189 | | | |
| MAGNESIUM | | | | 9110 | | | |
| MANGANESE | | | | 5.7 B | | | |
| MERCURY | | 0.03 B | | | | 0.03 B | |
| POTASSIUM | | | | | 3300 B | | |
| SODIUM | | | | 24700 | | | |
| VANADIUM | | | | 12 B | | | |
| ZINC | | | | 37 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN513052E | IN513052E |
|---|---|---|---|
| | SDG NO: | IN401013I | IN401013K |
| | TYPE: | OTHER | OTHER |
| ALUMINUM | | 616 | |
| BARIUM | | 15 B | |
| BERYLLIUM | | 1.7 B | |
| CALCIUM | | 29600 | |
| CHROMIUM | | | |
| IRON | | 507 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 513
LOCATION: TAN/LOFT DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN513052E | IN513052E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013I | IN401013K | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| MAGNESIUM | | 8650 | | | | | |
| MANGANESE | | 13 B | | | | | |
| MERCURY | | | | | | | |
| POTASSIUM | | | 3400 B | | | | |
| SODIUM | | 24300 | | | | | |
| VANADIUM | | 12 B | | | | | |
| ZINC | | 24 | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN513096A | IN513109A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401013A | IN401013A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 14 | 10 U | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN513029G | IN513029H | IN513029I | IN513029K | IN513052G | IN513052H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8694 | LLL8694 | LLL8693 | LLL8693 | LLL8694 | LLL8693 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | 0.04 | | | | 0.22 | |
| CS-137 | | | | 4.4 | | | |
| GROSS ALPHA | | | 7 | | | | 19 |
| GROSS BETA | | | 17 | | | | 15 |
| H-3 | | | | | -80 | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN513052I | IN513052K |
|---|---|---|---|
| | SDG NO: | LLL8693 | LLL8693 |
| | TYPE: | OTHER | OTHER |
| AM-241 | | | |
| CS-137 | | 5 U | |
| GROSS ALPHA | | | |
| GROSS BETA | | | |
| H-3 | | | -280 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 513
LOCATION: TAN/LOFT DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (UG/L) | SAMP NO: | IN513029G | IN513052G | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8694 | LLL8694 | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| URANIUM-TOT | | 0.84 | 1.7 | | | | |

S&A REQUEST: 513
LOCATION: TAN/LOFT DISPOSAL POND INLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN513018 | IN513041 | IN513074 | IN513085 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.27 | 0.27 | 0.27 | 0.27 | | |
| PH (UNITS) | | 9.8 | 10 | 9.8 | 10 | | |
| TEMPERATURE (DEG C) | | 22 | 22 | 22 | 22 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN513018F | IN513041F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510026C | IN510026C | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| CHLORIDE | | 42000 | 43000 | | | | |
| NITRATE-N | | 226 N | 226 N | | | | |
| SULFATE | | 36000 N | 36000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN513018D | IN513018D | IN513018E | IN513018E | IN513041D | IN513041D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015A | IN513018D | IN401013I | IN401013K | IN510015A | IN513018D |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | | 344 | | | |
| BARIUM | | | | 9.7 B | | | |
| BERYLLIUM | | | | 1.8 B | | | |
| CALCIUM | | | | 31500 | | | |
| CHROMIUM | | | 2.5 B | | | | 2.4 B |
| IRON | | | | 214 | | | |
| MAGNESIUM | | | | 9380 | | | |
| MANGANESE | | | | 6.1 B | | | |
| MERCURY | | 0.04 B | | | | 0.02 B | |
| POTASSIUM | | | | | 3300 B | | |
| SODIUM | | | | 24900 | | | |
| VANADIUM | | | | 13 B | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 513
LOCATION: TAN/LOFT DISPOSAL POND INLET
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN513018D | IN513018D | IN513018E | IN513018E | IN513041D | IN513041D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN510015A | IN513018D | IN401013I | IN401013K | IN510015A | IN513018D |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ZINC | | | | 97 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN513041E | IN513041E |
|---|---|---|---|
| | SDG NO: | IN401013I | IN401013K |
| | TYPE: | OTHER | OTHER |
| ALUMINUM | | 372 | |
| BARIUM | | 11 B | |
| BERYLLIUM | | 1.9 B | |
| CALCIUM | | 32500 | |
| CHROMIUM | | | |
| IRON | | 248 | |
| MAGNESIUM | | 9380 | |
| MANGANESE | | 7.8 B | |
| MERCURY | | | |
| POTASSIUM | | | 3600 B |
| SODIUM | | 25600 | |
| VANADIUM | | 12 B | |
| ZINC | | 67 | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN513074A | IN513085A |
|---|---|---|---|
| | SDG NO: | IN401013A | IN401013A |
| | TYPE: | GRAB | GRAB |
| ACETONE | | 11 | 10 U |
| TOLUENE | | 1 J | 1 J |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN513018G | IN513018H | IN513018J | IN513018K | IN513041G | IN513041H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8694 | LLL8694 | LLL8693 | LLL8693 | LLL8694 | LLL8693 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | 0.06 | | | | 0.002 | |
| GROSS ALPHA | | | 3 | | | | 14 |
| GROSS BETA | | | 21 | | | | 39 |
| H-3 | | | | | 100 | | |
| SR-TOT | | | | 2 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 513
LOCATION: TAN/LOFT DISPOSAL POND INLET
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN513041K |
|---|---|---|
| | SDG NO: | LLL8693 |
| | TYPE: | OTHER |
| AM-241 | | |
| GROSS ALPHA | | |
| GROSS BETA | | |
| H-3 | | 160 |
| SR-TOT | | |

| RADIOCHEMISTRY (UG/L) | SAMP NO: | IN513018G | IN513041G |
|---|---|---|---|
| | SDG NO: | LLL8694 | LLL8694 |
| | TYPE: | OTHER | OTHER |
| URANIUM-TOT | | 0.93 | 1.1 |

S&A REQUEST: 514
LOCATION: TAN/LOFT DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN514020E | IN514053E |
|---|---|---|---|
| | SDG NO: | IN502015E | IN502015E |
| | TYPE: | GRAB | GRAB |
| CHLORIDE | | 20 | 12 |
| NITRATE-N | | 1.9 N | 1.3 N |
| SULFATE | | 19 | 15 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN514020C | IN514020C | IN514020D | IN514020D | IN514053C | IN514053C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN511016B | IN514053C | IN514019D | IN514019K | IN511016B | IN514053C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 23900 | | | |
| BARIUM | | | | 265 | | | |
| BERYLLIUM | | | | 2.4 | | | |
| CADMIUM | | | | 1 | | | |
| CALCIUM | | | | 94500 * | | | 20 |
| CHROMIUM | | | 27 | | | | |
| COBALT | | | | 12 | | | |
| COPPER | | | | 33 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 514
LOCATION: TAN/LOFT DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN514020C IN511016B GRAB | IN514020C IN514053C GRAB | IN514020D IN514019D GRAB | IN514020D IN514019K GRAB | IN514053C IN511016B GRAB | IN514053C IN514053C GRAB |
|---|---|---|---|---|---|---|---|
| IRON | | | | 26900 | | | |
| LEAD | | | | 17 B | | | |
| MAGNESIUM | | | | 17300 | | | |
| MANGANESE | | | | 1080 N | | | |
| MERCURY | | 0.03 B | | | | 0.04 B | |
| NICKEL | | | | 49 | | | |
| POTASSIUM | | | | | 4200 | | |
| SODIUM | | | | 602 B | | | |
| VANADIUM | | | | 56 | | | |
| ZINC | | | | 143 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN514053D IN514019D GRAB | IN514053D IN514019K GRAB |
|---|---|---|---|
| ALUMINUM | | 14300 | |
| BARIUM | | 181 | |
| BERYLLIUM | | 1.8 | |
| CADMIUM | | 0.52 B | |
| CALCIUM | | 88000 * | |
| CHROMIUM | | | |
| COBALT | | 7.9 B | |
| COPPER | | 22 | |
| IRON | | 18800 | |
| LEAD | | 11 B | |
| MAGNESIUM | | 14400 | |
| MANGANESE | | 527 N | |
| MERCURY | | | |
| NICKEL | | 31 | |
| POTASSIUM | | | 2600 |
| SODIUM | | 512 B | |
| VANADIUM | | 42 | |
| ZINC | | 88 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: SDG NO: TYPE: | IN514020A IN514019A GRAB | IN514053A IN514019A GRAB |
|---|---|---|---|
| ACETONE | | 85 | 74 |
| METHYLENE CHLORIDE | | 15 U | 12 BJ |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 514
LOCATION: TAN/LOFT DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| VOLATILE ORGANICS (UG/KG) | | | | | | | |
|---|---|---|---|---|---|---|---|
| SAMP NO: | IN514020A | IN514053A | | | | | |
| SDG NO: | IN514019A | IN514019A | | | | | |
| TYPE: | GRAB | GRAB | | | | | |
| TOLUENE | 3 BJ | 13 U | | | | | |
| 1,1,1-TRICHLOROETHANE | 18 B | 12 BJ | | | | | |
| 2-BUTANONE | 110 | 120 | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | | | | | | | |
|---|---|---|---|---|---|---|---|
| SAMP NO: | IN514020F | IN514020H | IN514020I | IN514020J | IN514053F | IN514053G | |
| SDG NO: | LLL8692 | LLL8692 | LLL8691 | LLL8691 | LLL8692 | LLL8692 | |
| TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB | |
| AM-241 | 2.9 | | | | 3.7 | | |
| GROSS ALPHA | | | | | | 4400 | |
| GROSS BETA | | | | | | 6000 | |
| H-3 | | | | 300 | | | |
| K-40 | | 15000 | | | | | |
| SR-TOT | | | 180 | | | | |

| RADIOCHEMISTRY (PCI/KGD) | | | | | | | |
|---|---|---|---|---|---|---|---|
| SAMP NO: | IN514053H | IN514053I | IN514053J | | | | |
| SDG NO: | LLL8692 | LLL8691 | LLL8691 | | | | |
| TYPE: | GRAB | GRAB | GRAB | | | | |
| AM-241 | | | | | | | |
| GROSS ALPHA | | | | | | | |
| GROSS BETA | | | 200 | | | | |
| H-3 | 12000 | | | | | | |
| K-40 | | -30 | | | | | |
| SR-TOT | | | | | | | |

| RADIOCHEMISTRY (UG/KGD) | | | | | | | |
|---|---|---|---|---|---|---|---|
| SAMP NO: | IN514020F | IN514053F | | | | | |
| SDG NO: | LLL8692 | LLL8692 | | | | | |
| TYPE: | GRAB | GRAB | | | | | |
| URANIUM-TOT | 1400 | 1200 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 514
LOCATION: TAN/LOFT DISPOSAL POND INLET
MEDIUM: SEDIMENT

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN514019E | IN514042E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015E | IN502015E | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 15 | 23 | | | | |
| FLUORIDE | | 1.3 | 1 | | | | |
| NITRATE-N | | 1.9 N | 0.54 N | | | | |
| SULFATE | | 95 | 99 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN514019C | IN514019C | IN514019D | IN514019D | IN514042C | IN514042C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN511016B | IN514053C | IN514019D | IN514019K | IN511016B | IN514053C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 19200 | | | |
| BARIUM | | | | 218 | | | |
| BERYLLIUM | | | | 2.2 | | | |
| CADMIUM | | | | 0.88 B | | | |
| CALCIUM | | | | 97500 * | | | |
| CHROMIUM | | | 27 | | | | 29 |
| COBALT | | | | 9.7 | | | |
| COPPER | | | | 30 | | | |
| IRON | | | | 23400 | | | |
| LEAD | | | | 13 B | | | |
| MAGNESIUM | | | | 16300 | | | |
| MANGANESE | | | | 851 N | | | |
| MERCURY | | 0.04 B | | | | 0.03 B | |
| NICKEL | | | | 41 | | | |
| POTASSIUM | | | | | 3700 | | |
| SILVER | | | | 1.5 B | | | |
| SODIUM | | | | 546 B | | | |
| VANADIUM | | | | 45 | | | |
| ZINC | | | | 126 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN514042D | IN514042D |
|---|---|---|---|
| | SDG NO: | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 16900 | |
| BARIUM | | 188 | |
| BERYLLIUM | | 2.1 | |
| CADMIUM | | 0.84 B | |
| CALCIUM | | 102000 * | |
| CHROMIUM | | | |
| COBALT | | 8 B | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 514
LOCATION: TAN/LOFT DISPOSAL POND INLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN514042D | IN514042D | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN514019D | IN514019K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| COPPER | | 26 | | | | | |
| IRON | | 21200 | | | | | |
| LEAD | | 9.9 B | | | | | |
| MAGNESIUM | | 16300 | | | | | |
| MANGANESE | | 393 N | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 35 | | | | | |
| POTASSIUM | | | 3000 | | | | |
| SILVER | | 1.3 U | | | | | |
| SODIUM | | 588 B | | | | | |
| VANADIUM | | 41 | | | | | |
| ZINC | | 113 | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN514019A | IN514042A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN514019A | IN514019A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 99 | 89 | | | | |
| TOLUENE | | 5 BJ | 15 B | | | | |
| 1,1,1-TRICHLOROETHANE | | 26 B | 18 B | | | | |
| 2-BUTANONE | | 160 | 230 | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN514019F | IN514019G | IN514019H | IN514019I | IN514019J | IN514042F |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8692 | LLL8692 | LLL8692 | LLL8691 | LLL8691 | LLL8692 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | 6.6 | | | | | 6.3 |
| GROSS ALPHA | | | 8400 | | | | |
| GROSS BETA | | | 6100 | | | 1000 | |
| H-3 | | | | 14000 | | | |
| K-40 | | | | | -30 | | |
| SR-TOT | | | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN514042G | IN514042H | IN514042I | IN514042J |
|---|---|---|---|---|---|
| | SDG NO: | LLL8692 | LLL8692 | LLL8691 | LLL8691 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | | | | |
| GROSS ALPHA | | 3900 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 514
LOCATION: TAN/LOFT DISPOSAL POND INLET
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN514042G | IN514042H | IN514042I | IN514042J | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8692 | LLL8692 | LLL8691 | LLL8691 | | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | | |
| GROSS BETA | | 6500 | | | | | |
| H-3 | | | | | 800 | | |
| K-40 | | | 13000 | | | | |
| SR-TOT | | | | 10 | | | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN514019F | IN514042F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8692 | LLL8692 | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| URANIUM-TOT | | 1600 | 1300 | | | | |

S&A REQUEST: 514
LOCATION: TAN/LOFT DISPOSAL POND OUTLET
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN514031G | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8692 | | | | | |
| | TYPE: | GRAB | | | | | |
| GROSS ALPHA | | 6400 | | | | | |
| GROSS BETA | | 6000 | | | | | |

S&A REQUEST: 515
LOCATION: TAN/LOFT DISPOSAL POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN515010 | IN515021 | IN515032 | | | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0 | 0 | 0 | | | |
| PH (UNITS) | | 8.6 | 8.2 | 8.1 | | | |
| RADS (CPM) | | 100 | 50 | 50 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 515
LOCATION: TAN/LOFT DISPOSAL POND
MEDIUM: SOIL

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: IN515010E<br>SDG NO: IN503050H<br>TYPE: GRAB | IN515021E<br>IN503050H<br>GRAB | IN515032E<br>IN503050H<br>GRAB | | | |
|---|---|---|---|---|---|---|
| CHLORIDE | 5.9 | 7.8 | 4.7 | | | |
| FLUORIDE | 3.3 | 1.9 | 3 | | | |
| NITRATE-N | 1.6 N | 0.32 N | 0.7 N | | | |
| SULFATE | 1.4 | 6.9 | 17 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: IN515010C<br>SDG NO: IN512017B<br>TYPE: GRAB | IN515010C<br>IN515010C<br>GRAB | IN515010D<br>IN503016D<br>GRAB | IN515010D<br>IN503016K<br>GRAB | IN515021C<br>IN512017B<br>GRAB | IN515021C<br>IN515010C<br>GRAB |
|---|---|---|---|---|---|---|
| ALUMINUM | | | 22700 | | | |
| ANTIMONY | | | 4.9 UN | | | |
| ARSENIC | | | 9.8 U | | | |
| BARIUM | | | 219 | | | |
| BERYLLIUM | | | 2 E | | | |
| CADMIUM | | | 0.47 B | | | |
| CALCIUM | | | 40400 | | | 33 |
| CHROMIUM | | 74 | | | | |
| COBALT | | | 11 | | | |
| COPPER | | | 38 | | | |
| IRON | | | 29900 | | | |
| LEAD | | | 12 B | | | |
| MAGNESIUM | | | 12900 E | | | |
| MANGANESE | | | 625 E | | | |
| MERCURY | 0.04 B | | | | 0.03 B | |
| NICKEL | | | 42 | | | |
| POTASSIUM | | | | 3200 | | |
| SILVER | | | 0.91 B | | | |
| SODIUM | | | 885 | | | |
| VANADIUM | | | 53 E | | | |
| ZINC | | | 91 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: IN515021D<br>SDG NO: IN503016D<br>TYPE: GRAB | IN515021D<br>IN503016K<br>GRAB | IN515032C<br>IN512017B<br>GRAB | IN515032C<br>IN515010C<br>GRAB | IN515032D<br>IN503016D<br>GRAB | IN515032D<br>IN503016K<br>GRAB |
|---|---|---|---|---|---|---|
| ALUMINUM | 14400 | | | | 16400 | |
| ANTIMONY | 7.2 BN | | | | 7.4 BN | |
| ARSENIC | 9.4 U | | | | 13 B | |
| BARIUM | 146 | | | | 191 | |
| BERYLLIUM | 1.7 E | | | | 1.9 E | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 515
LOCATION: TAN/LOFT DISPOSAL POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN515021D | IN515021D | IN515032C | IN515032C | IN515032D | IN515032D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K | IN512017B | IN515010C | IN503016D | IN503016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CADMIUM | | 0.46 B | | | | 0.78 B | |
| CALCIUM | | 71300 | | | | 98600 | |
| CHROMIUM | | | | | 38 | | |
| COBALT | | 7.1 B | | | | 6.6 B | |
| COPPER | | 21 | | | | 21 | |
| IRON | | 17800 | | | | 18300 | |
| LEAD | | 7.9 U | | | | 10 B | |
| MAGNESIUM | | 11800 E | | | | 13900 E | |
| MANGANESE | | 297 E | | | | 473 E | |
| MERCURY | | | | 0.04 B | | | |
| NICKEL | | 27 | | | | 29 | |
| POTASSIUM | | | 2200 | | | | 3200 |
| SILVER | | 0.79 U | | | | 0.89 B | |
| SODIUM | | 736 B | | | | 647 B | |
| VANADIUM | | 36 E | | | | 43 E | |
| ZINC | | 61 | | | | 91 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN515010A | IN515021A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503027A | IN503027A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLOROFORM | | 9 J | 8 J | | | | |
| METHYLENE CHLORIDE | | 13 | 7 J | | | | |
| 1,1,1-TRICHLOROETHANE | | 25 | 26 | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN515010F | IN515010G | IN515010H | IN515010I | IN515010J | IN515021F |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9042 | LLL9042 | LLL9042 | LLL9042 | LLL9042 | LLL9042 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | 0 | | | | | 0 |
| GROSS ALPHA | | | 5300 | | | | |
| GROSS BETA | | | 6000 | | | | |
| H-3 | | | | | | 0 | |
| K-40 | | | | 14000 | | | |
| SR-TOT | | | | | 40 | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 515
LOCATION: TAN/LOFT DISPOSAL POND
MEDIUM: SOIL

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN515021G | IN515021H | IN515021I | IN515021J | IN515032F | IN515032G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9042 | LLL9042 | LLL9042 | LLL9042 | LLL9057 | LLL9057 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| AM-241 | | | | | | 0 | |
| GROSS ALPHA | | 4200 | | | | | 4900 |
| GROSS BETA | | 4800 | | | | | 6400 |
| H-3 | | | | | 0 | | |
| K-40 | | | 12000 | | | | |
| SR-TOT | | | | 270 | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN515032H | IN515032I | IN515032J |
|---|---|---|---|---|
| | SDG NO: | LLL9057 | LLL9057 | LLL9057 |
| | TYPE: | GRAB | GRAB | GRAB |
| AM-241 | | | | |
| GROSS ALPHA | | | | |
| GROSS BETA | | | | |
| H-3 | | | | 2000 |
| K-40 | | 12000 | | |
| SR-TOT | | | 310 | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN515010F | IN515021F | IN515032F |
|---|---|---|---|---|
| | SDG NO: | LLL9042 | LLL9042 | LLL9057 |
| | TYPE: | GRAB | GRAB | GRAB |
| URANIUM-TOT | | 1100 | 1000 | 1400 |

S&A REQUEST: 516
LOCATION: ICPP PERCOLATION POND 2 - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN516022 | IN516055 | IN516099 | IN516102 |
|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.46 | 0.36 | 1.2 | 0.37 |
| PH (UNITS) | | 8.8 | 8.8 | 8.9 | 8.6 |
| TEMPERATURE (DEG C) | | 26 | 28 | 29 | 26 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 516
LOCATION: ICPP PERCOLATION POND 2 - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN516022I | IN516055I | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN417011J | IN417011J | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| CHLORIDE | | 200000 | 230000 | | | | |
| FLUORIDE | | 1000 | 1000 U | | | | |
| NITRATE-N | | 7460 N | 4290 N | | | | |
| SULFATE | | 28000 N | 28000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN516022G | IN516022G | IN516022H | IN516022H | IN516055G | IN516055G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN507010D | IN522075F | IN411015I | IN411015K | IN507010D | IN522075F |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | | 440 | | | |
| BARIUM | | | | 81 B | | | |
| BERYLLIUM | | | | 4.2 B | | | |
| CALCIUM | | | | 45400 | | | |
| CHROMIUM | | | 5.3 B | | | | 7.5 B |
| COPPER | | | | 10 U | | | |
| IRON | | | | 77 B | | | |
| MAGNESIUM | | | | 16200 E | | | |
| MANGANESE | | | | 5 U | | | |
| MERCURY | | 0.42 | | | | 0.4 | |
| POTASSIUM | | | | | 3900 B | | |
| SODIUM | | | | 140000 | | | |
| VANADIUM | | | | 16 B | | | |
| ZINC | | | | 10 B | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN516055H | IN516055H |
|---|---|---|---|
| | SDG NO: | IN411015I | IN411015K |
| | TYPE: | OTHER | OTHER |
| ALUMINUM | | 1280 | |
| BARIUM | | 80 B | |
| BERYLLIUM | | 4 B | |
| CALCIUM | | 40100 | |
| CHROMIUM | | | |
| COPPER | | 13 B | |
| IRON | | 349 | |
| MAGNESIUM | | 14600 E | |
| MANGANESE | | 7.1 B | |
| MERCURY | | | |
| POTASSIUM | | | 3400 B |
| SODIUM | | 134000 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 516
LOCATION: ICPP PERCOLATION POND 2 - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN516055H | IN516055H |
|---|---|---|---|
| | SDG NO: | IN411015I | IN411015K |
| | TYPE: | OTHER | OTHER |
| VANADIUM | | 18 B | |
| ZINC | | 12 B | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN516022J | IN516022K | IN516022L | IN516022M | IN516022N | IN5160220 |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8620-B | LLL8620-B | LLL8620-B | LLL8620-A | LLL8620-A | LLL8621 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | 0.21 | | | | | |
| CS-134 | | | | | 7.3 | | |
| CS-137 | | | | | 73 | | |
| GROSS ALPHA | | | | 5 | | | |
| GROSS BETA | | | | 340 | | | |
| H-3 | | | | | | | 3900 |
| PU-238 | | 8.9 | | | | | |
| PU-239 | | 0.28 | | | | | |
| RU-106 | | | | | 72 | | |
| SR-TOT | | | | | | 5.9 | |
| TH-228 | | | 0 | | | | |
| TH-230 | | | 0 | | | | |
| TH-232 | | | 0.01 | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN516055J | IN516055K | IN516055L | IN516055M | IN516055N | IN5160550 |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8620-B | LLL8620-B | LLL8620-B | LLL8620-A | LLL8621 | LLL8621 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | 0.61 | | | | | |
| CS-134 | | | | | 61 | | |
| CS-137 | | | | 13 | | | |
| GROSS ALPHA | | | | 210 | | | |
| GROSS BETA | | | | | | | 3600 |
| H-3 | | 22 | | | | | |
| PU-238 | | 1.2 | | | | | |
| PU-239 | | | | | 80 | | |
| RU-106 | | | | | | 22 | |
| SR-TOT | | | 1.2 | | | | |
| TH-228 | | | 0 | | | | |
| TH-230 | | | 0 | | | | |
| TH-232 | | | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 516
LOCATION: ICPP PERCOLATION POND 2 - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (UG/L) | SAMP NO: | IN516022J | IN516055J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8620-B | LLL8620-B | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| URANIUM-TOT | | 2.7 | 2 | | | | |

S&A REQUEST: 516
LOCATION: ICPP PERCOLATION POND 2 INLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN516011 | IN516044 | IN516077 | IN516088 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.32 | 0.34 | 0.32 | 0.32 | | |
| PH (UNITS) | | 8.8 | 8.7 | 8.8 | 8.8 | | |
| TEMPERATURE (DEG C) | | 25 | 25 | 25 | 25 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN516011I | IN516044I | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN417011J | IN417011J | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| CHLORIDE | | 18000 | 19000 | | | | |
| NITRATE-N | | 226 UN | 542 N | | | | |
| SULFATE | | 24000 N | 24000 N | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN516011G | IN516011G | IN516011H | IN516011H | IN516044G | IN516044G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN507010D | IN522075F | IN411015I | IN411015K | IN507010D | IN522075F |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | | 1890 | | | |
| BARIUM | | | | 49 B | | | |
| BERYLLIUM | | | | 1.4 B | | | |
| CALCIUM | | | | 8580 | | | |
| CHROMIUM | | | 8.8 B | | | | 30 |
| COBALT | | | | 3.2 B | | | |
| COPPER | | | | 140 | | | |
| IRON | | | | 6780 | | | |
| MAGNESIUM | | | | 2740 BE | | | |
| MANGANESE | | | | 44 | | | |
| MERCURY | | 1.3 | | | | 0.52 | |
| NICKEL | | | | 12 B | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 516
LOCATION: ICPP PERCOLATION POND 2 INLET
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN516011G | IN516011G | IN516011H | IN516011H | IN516044G | IN516044G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN507010D | IN522075F | IN411015I | IN411015K | IN507010D | IN522075F |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| POTASSIUM | | | | | 5800 | | |
| SODIUM | | | | 77600 | | | |
| VANADIUM | | | | 18 B | | | |
| ZINC | | | | 59 | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN516044H | IN516044H |
|---|---|---|---|
| | SDG NO: | IN411015I | IN411015K |
| | TYPE: | OTHER | OTHER |
| ALUMINUM | | 1050 | |
| BARIUM | | 27 B | |
| BERYLLIUM | | 1.2 B | |
| CALCIUM | | 5220 | |
| CHROMIUM | | | |
| COBALT | | 3 U | |
| COPPER | | 73 | |
| IRON | | 3000 | |
| MAGNESIUM | | 1640 BE | |
| MANGANESE | | 19 | |
| MERCURY | | | |
| NICKEL | | 6.4 B | |
| POTASSIUM | | | 2800 B |
| SODIUM | | 82200 | |
| VANADIUM | | 11 B | |
| ZINC | | 28 | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN516011J | IN516011K | IN516011L | IN516011M | IN516011N | IN516011O |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8620-B | LLL8620-B | LLL8620-B | LLL8620-A | LLL8620-A | LLL8621 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | 0.61 | | | | | |
| CE-144 | | | | | 33 | | |
| CO-60 | | | | | 6 U | | |
| CS-134 | | | | | 28 | | |
| CS-137 | | | | | 310 | | |
| GROSS ALPHA | | | | 10 | | | |
| GROSS BETA | | | | 130 | | | |
| H-3 | | | | | | | 110 |
| PU-238 | | 33 | | | | | |
| PU-239 | | 1.8 | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 516
LOCATION: ICPP PERCOLATION POND 2 INLET
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN516011J | IN516011K | IN516011L | IN516011M | IN516011N | IN516011O |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8620-B | LLL8620-B | LLL8620-B | LLL8620-A | LLL8620-A | LLL8621 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| RU-106 | | | | | 770 | | |
| SB-125 | | | | | 110 | | |
| SR-TOT | | | | | | 10 | |
| TH-228 | | | 0 | | | | |
| TH-230 | | | 0 | | | | |
| TH-232 | | | 0.06 | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN516044J | IN516044K | IN516044L | IN516044M | IN516044N | IN516044O |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8620-B | LLL8620-B | LLL8620-B | LLL8620-A | LLL8621 | LLL8621 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| AM-241 | | 1 | | | | | |
| CE-144 | | | | | | | |
| CO-60 | | | | | 11 | | |
| CS-134 | | | | | 12 | | |
| CS-137 | | | | | 120 | | |
| GROSS ALPHA | | | | 37 | | | |
| GROSS BETA | | | | 260 | | | |
| H-3 | | | | | | | 320 |
| PU-238 | | 46 | | | | | |
| PU-239 | | 2.9 | | | | | |
| RU-106 | | | | | 240 | | |
| SB-125 | | | | | 30 | | |
| SR-TOT | | | | | | 2.9 | |
| TH-228 | | | 0 | | | | |
| TH-230 | | | 0 | | | | |
| TH-232 | | | 0.05 | | | | |

| RADIOCHEMISTRY (UG/L) | SAMP NO: | IN516011J | IN516044J |
|---|---|---|---|
| | SDG NO: | LLL8620-B | LLL8620-B |
| | TYPE: | OTHER | OTHER |
| URANIUM-TOT | | 3.2 | 2.4 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 517
LOCATION: ICPP PERCOLATION POND 2 - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN517023 | IN517056 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.39 | 0.33 | | | | |
| PH (UNITS) | | 7.1 | 7.6 | | | | |
| TEMPERATURE (DEG C) | | 25 | 25 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN517023F | IN517056F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011E | IN517045F | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 58 | 68 | | | | |
| NITRATE-N | | 2.3 | 1.3 N | | | | |
| SULFATE | | 16 | 77 N | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN517023D | IN517023D | IN517023E | IN517023E | IN517056D | IN517056D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011C | IN514053C | IN301012D | IN301012K | IN508011C | IN514053C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 5170 | | | |
| BARIUM | | | | 83 N | | | |
| BERYLLIUM | | | | 1 | | | |
| CADMIUM | | | | 0.42 B | | | |
| CALCIUM | | | | 15300 * | | | |
| CHROMIUM | | | 19 | | | | 17 |
| COBALT | | | | 3.7 B | | | |
| COPPER | | | | 15 | | | |
| IRON | | | | 11100 | | | |
| LEAD | | | | 5.2 B | | | |
| MAGNESIUM | | | | 3990 | | | |
| MANGANESE | | | | 141 | | | |
| MERCURY | | 1.7 | | | | 0.95 | |
| NICKEL | | | | 15 | | | |
| POTASSIUM | | | | | 1000 | | |
| SODIUM | | | | 228 B | | | |
| VANADIUM | | | | 30 | | | |
| ZINC | | | | 39 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN517056E | IN517056E |
|---|---|---|---|
| | SDG NO: | IN301012D | IN301012K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 6090 | |
| BARIUM | | 98 N | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 517
LOCATION: ICPP PERCOLATION POND 2 - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN517056E | IN517056E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012D | IN301012K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| BERYLLIUM | | 1.1 | | | | | |
| CADMIUM | | 0.59 B | | | | | |
| CALCIUM | | 19500 * | | | | | |
| CHROMIUM | | | | | | | |
| COBALT | | 3.8 B | | | | | |
| COPPER | | 16 | | | | | |
| IRON | | 11700 | | | | | |
| LEAD | | 5.6 B | | | | | |
| MAGNESIUM | | 4720 | | | | | |
| MANGANESE | | 117 | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 17 | | | | | |
| POTASSIUM | | | 1200 | | | | |
| SODIUM | | 294 B | | | | | |
| VANADIUM | | 34 | | | | | |
| ZINC | | 52 | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN517023A | IN517056A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN511050A | IN511050A | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| METHYLENE CHLORIDE | | 2 J | 6 U | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN517023G | IN517023H | IN517023I | IN517023J | IN517023K | IN517023L |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8622-A | LLL8622-A | LLL8622-B | LLL8622-B | LLL8622-B | LLL8622-A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CE-144 | | | | | 1200 | | |
| CO-60 | | | | | 320 | | |
| CS-134 | | | | | 1400 | | |
| CS-137 | | | | | 20000 | | |
| EU-154 | | | | | | | |
| EU-155 | | | | | 180 | | |
| GROSS ALPHA | | | | 9600 | | | |
| GROSS BETA | | | | 18000 | | | |
| H-3 | | | | | | | 500 |
| K-40 | | | | | 21000 | | |
| PU-238 | | 27000 | | | | | |
| PU-239 | | 1800 | | | | | |
| RU-106 | | | | | 1700 | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 517
LOCATION: ICPP PERCOLATION POND 2 - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN517023G | IN517023H | IN517023I | IN517023J | IN517023K | IN517023L |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8622-A | LLL8622-A | LLL8622-B | LLL8622-B | LLL8622-B | LLL8622-A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| SB-125 | | | | | | 570 | |
| SR-TOT | | | 520 | | | | |
| TH-228 | | | 800 | | | | |
| TH-230 | | | 1200 | | | | |
| TH-232 | | | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN517056G | IN517056H | IN517056I | IN517056J | IN517056K | IN517056L |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8622-A | LLL8622-B | LLL8622-B | LLL8622-B | LLL8622-A | LLL8622-A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CE-144 | | | | | 5600 | | |
| CO-60 | | | | | 550 | | |
| CS-134 | | | | | 10000 | | |
| CS-137 | | | | | 100000 | | |
| EU-154 | | | | | 810 | | |
| EU-155 | | | | | 310 | | |
| GROSS ALPHA | | | | 46000 | | | |
| GROSS BETA | | | | 97000 | | | 100 |
| H-3 | | | | | 19000 | | |
| K-40 | | 82000 | | | | | |
| PU-238 | | 5300 | | | 8300 | | |
| PU-239 | | | | | 7200 | | |
| RU-106 | | | | | | 2500 | |
| SB-125 | | | | | | | |
| SR-TOT | | | 500 | | | | |
| TH-228 | | | 530 | | | | |
| TH-230 | | | 670 | | | | |
| TH-232 | | | | | | | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN517023G | IN517056G |
|---|---|---|---|
| | SDG NO: | LLL8622-A | LLL8622-A |
| | TYPE: | GRAB | GRAB |
| URANIUM-TOT | | 1100 | 1000 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 517
LOCATION: ICPP PERCOLATION POND 2 INLET
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN517012 | IN517045 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 0.48 | 0.47 | | | | |
| PH (UNITS) | | 7.2 | 7.2 | | | | |
| TEMPERATURE (DEG C) | | 25 | 26 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN517012F | IN517045F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011E | IN517045F | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 40 | 64 | | | | |
| FLUORIDE | | 1.2 | 1.8 | | | | |
| NITRATE-N | | 0.68 | 1.1 N | | | | |
| O-PHOSPHATE-P | | 0.62 | 0.33 U | | | | |
| SULFATE | | 20 | 12 N | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN517012D | IN517012D | IN517012E | IN517012E | IN517045D | IN517045D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN508011C | IN514053C | IN301012D | IN301012K | IN508011C | IN514053C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 8370 | | | |
| BARIUM | | | | 96 N | | | |
| BERYLLIUM | | | | 1.1 | | | |
| CADMIUM | | | | 0.94 | | | |
| CALCIUM | | | | 6850 * | | | |
| CHROMIUM | | | 17 | | | | 23 |
| COBALT | | | | 4.3 B | | | |
| COPPER | | | | 54 | | | |
| IRON | | | | 14400 | | | |
| LEAD | | | | 7.6 B | | | |
| MAGNESIUM | | | | 5010 | | | |
| MANGANESE | | | | 168 | | | |
| MERCURY | | 4.1 | | | | 3.6 | |
| NICKEL | | | | 21 | | | |
| POTASSIUM | | | | | 1500 | | |
| SILVER | | | | 1.9 | | | |
| SODIUM | | | | 334 B | | | |
| VANADIUM | | | | 38 | | | |
| ZINC | | | | 65 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 517
LOCATION: ICPP PERCOLATION POND 2 INLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN517045E | IN517045E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012D | IN301012K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ALUMINUM | | 7720 | | | | | |
| BARIUM | | 81 N | | | | | |
| BERYLLIUM | | 0.95 B | | | | | |
| CADMIUM | | 0.38 B | | | | | |
| CALCIUM | | 5650 * | | | | | |
| CHROMIUM | | | | | | | |
| COBALT | | 4.8 B | | | | | |
| COPPER | | 62 | | | | | |
| IRON | | 12900 | | | | | |
| LEAD | | 8.3 B | | | | | |
| MAGNESIUM | | 4510 | | | | | |
| MANGANESE | | 111 | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 21 | | | | | |
| POTASSIUM | | | 1200 | | | | |
| SILVER | | 1.2 U | | | | | |
| SODIUM | | 301 B | | | | | |
| VANADIUM | | 33 | | | | | |
| ZINC | | 58 | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN517012G | IN517012H | IN517012I | IN517012J | IN517012K | IN517012L |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8622-A | LLL8622-A | LLL8622-B | LLL8622-B | LLL8622-B | LLL8622-A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CE-144 | | | | | 14000 | | |
| CO-60 | | | | | 1400 | | |
| CS-134 | | | | | 14000 | | |
| CS-137 | | | | | 150000 | | |
| EU-154 | | | | | 1800 | | |
| EU-155 | | | | | 900 | | |
| GROSS ALPHA | | | | 43000 | | | |
| GROSS BETA | | | | 190000 | | | |
| H-3 | | | | | | | 1500 |
| K-40 | | | | | 21000 | | |
| PU-238 | | 31000 | | | | | |
| PU-239 | | 3000 | | | | | |
| RU-106 | | | | | 20000 | | |
| SB-125 | | | | | 34000 | | |
| SR-TOT | | | | | | 500 | |
| TH-228 | | | 500 | | | | |
| TH-230 | | | 400 | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 517
LOCATION: ICPP PERCOLATION POND 2 INLET
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN517012G | IN517012H | IN517012I | IN517012J | IN517012K | IN517012L |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8622-A | LLL8622-A | LLL8622-B | LLL8622-B | LLL8622-B | LLL8622-A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| TH-232 | | | 650 | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN517045G | IN517045H | IN517045I | IN517045J | IN517045K | IN517045L |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8622-A | LLL8622-B | LLL8622-B | LLL8622-B | LLL8622-A | LLL8622-A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CE-144 | | | | | 24000 | | |
| CO-60 | | | | | 1700 | | |
| CS-134 | | | | | 18000 | | |
| CS-137 | | | | | 200000 | | |
| EU-154 | | | | | 3300 | | |
| EU-155 | | | | | 1400 | | |
| GROSS ALPHA | | | | 53000 | | | |
| GROSS BETA | | | | 360000 | | | |
| H-3 | | | | | | | 600 |
| K-40 | | | | | 22000 | | |
| PU-238 | | 50000 | | | | | |
| PU-239 | | 2600 | | | | | |
| RU-106 | | | | | 36000 | | |
| SB-125 | | | | | 10000 | | |
| SR-TOT | | | | | | 1900 | |
| TH-228 | | | 580 | | | | |
| TH-230 | | | 530 | | | | |
| TH-232 | | | 750 | | | | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN517012G | IN517045G |
|---|---|---|---|
| | SDG NO: | LLL8622-A | LLL8622-A |
| | TYPE: | GRAB | GRAB |
| URANIUM-TOT | | 1000 | 940 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 518
LOCATION: ICPP PERCOLATION POND 2
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN518035 |
|---|---|---|
| FID/PID (PPM) | | 0 |
| PH (UNITS) | | 7.5 |
| RADS (CPM) | | 150 |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN518013F | IN518035F |
|---|---|---|---|
| | SDG NO: | IN512028D | IN512028D |
| | TYPE: | GRAB | GRAB |
| CHLORIDE | | 9.7 | 5.4 |
| FLUORIDE | | 2.4 | 1.2 |
| NITRATE-N | | 0.79 | 2 |
| SULFATE | | 17 | 17 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN518013D | IN518013D | IN518013E | IN518013E | IN518035D | IN518035D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016C | IN509034C | IN503016D | IN503016K | IN503016C | IN509034C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 8330 | | | |
| ANTIMONY | | | | 4.2 UN | | | |
| BARIUM | | | | 141 | | | |
| BERYLLIUM | | | | 1.1 E | | | |
| CALCIUM | | | | 13500 | | | |
| CHROMIUM | | | 16 | | | | 12 |
| COBALT | | | | 5.3 B | | | |
| COPPER | | | | 16 | | | |
| IRON | | | | 15100 | | | |
| LEAD | | | | 7.6 B | | | |
| MAGNESIUM | | | | 5600 E | | | |
| MANGANESE | | | | 215 E | | | |
| MERCURY | | 0.05 | | | | 0.04 | |
| NICKEL | | | | 23 | | | |
| POTASSIUM | | | | | 1500 | | |
| SODIUM | | | | 425 B | | | |
| VANADIUM | | | | 38 E | | | |
| ZINC | | | | 52 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN518035E | IN518035E |
|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 6900 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 518
LOCATION: ICPP PERCOLATION POND 2
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN518035E | IN518035E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503016D | IN503016K | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ANTIMONY | | 5.6 BN | | | | | |
| BARIUM | | 151 | | | | | |
| BERYLLIUM | | 1.1 E | | | | | |
| CALCIUM | | 22900 | | | | | |
| CHROMIUM | | | | | | | |
| COBALT | | 3.9 B | | | | | |
| COPPER | | 17 | | | | | |
| IRON | | 12500 | | | | | |
| LEAD | | 7 U | | | | | |
| MAGNESIUM | | 4380 E | | | | | |
| MANGANESE | | 173 E | | | | | |
| MERCURY | | | | | | | |
| NICKEL | | 18 | | | | | |
| POTASSIUM | | | 1300 | | | | |
| SODIUM | | 299 B | | | | | |
| VANADIUM | | 34 E | | | | | |
| ZINC | | 49 | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN518013G | IN518013I | IN518013J | IN518013K | IN518013L | IN518035G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL9101 | LLL9101 | LLL9101 | LLL9101 | LLL9101 | LLL9101 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| GROSS ALPHA | | | 5200 | | | | |
| GROSS BETA | | | 6000 | | | | |
| H-3 | | | | | | 2600 | |
| K-40 | | | | 19000 | | | |
| PU-238 | | 0 | | | | | 19 |
| PU-239 | | 0 | | | | | 0 |
| SR-TOT | | | | | 330 | | |
| TH-228 | | 510 | | | | | 590 |
| TH-230 | | 320 | | | | | 380 |
| TH-232 | | 460 | | | | | 540 |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN518035I | IN518035J | IN518035K | IN518035L |
|---|---|---|---|---|---|
| | SDG NO: | LLL9101 | LLL9101 | LLL9101 | LLL9101 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB |
| GROSS ALPHA | | 5600 | | | |
| GROSS BETA | | 5700 | | | |
| H-3 | | | | | 1800 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 518
LOCATION: ICPP PERCOLATION POND 2
MEDIUM: SOIL

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN518035I | IN518035J | IN518035K | IN518035L |
|---|---|---|---|---|---|
| | SDG NO: | LLL9101 | LLL9101 | LLL9101 | LLL9101 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB |
| K-40 | | | 22000 | | |
| PU-238 | | | | | |
| PU-239 | | | | 150 | |
| SR-TOT | | | | | |
| TH-228 | | | | | |
| TH-230 | | | | | |
| TH-232 | | | | | |

| RADIOCHEMISTRY (UG/KGD) | SAMP NO: | IN518013G | IN518035G |
|---|---|---|---|
| | SDG NO: | LLL9101 | LLL9101 |
| | TYPE: | GRAB | GRAB |
| URANIUM-TOT | | 1300 | 1100 |

S&A REQUEST: 519
LOCATION: ANL-W DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN519025 | IN519058 | IN519092 | IN519105 |
|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 1.6 | 1.6 | 1.6 | 1.6 |
| DO (PPM) | | 5.8 | 5.8 | 5.8 | 5.8 |
| PH (UNITS) | | 8.1 | 8.1 | 8.1 | 8.1 |
| TEMPERATURE (DEG C) | | 24 | 24 | 24 | 24 |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN519025F | IN519058F |
|---|---|---|---|
| | SDG NO: | IN404016J | IN409011J |
| | TYPE: | OTHER | OTHER |
| CHLORIDE | | 57000 | 54000 |
| FLUORIDE | | 1800 | 1900 |
| NITRATE-N | | 226 U* | 226 |
| O-PHOSPHATE-P | | 1790 * | 2050 |
| SULFATE | | 330000 | 320000 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 519
LOCATION: ANL-W DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN519025D | IN519025E | IN519025E | IN519058D | IN519058E | IN519058E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN519014D | IN404016I | IN404016K | IN519014D | IN404016I | IN404016K |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | 3990 | | | 830 | |
| BARIUM | | | 148 B | | | 103 B | |
| BERYLLIUM | | | 4 B | | | 3.6 B | |
| CALCIUM | | | 119000 | | | 105000 | |
| CHROMIUM | | | 187 | | | 19 | |
| COPPER | | | 14 B | | | 10 U | |
| IRON | | | 3190 | | | 400 | |
| MAGNESIUM | | | 41000 | | | 34700 | |
| MANGANESE | | | 138 | | | 34 | |
| MERCURY | | 0.04 B | | | 0.04 B | | |
| NICKEL | | | 8.2 B | | | 6 U | |
| POTASSIUM | | | | 19000 | | | 18000 |
| SILVER | | | 7 B | | | 6 U | |
| SODIUM | | | 68300 | | | 67400 | |
| VANADIUM | | | 29 B | | | 19 B | |
| ZINC | | | 116 | | | 15 B | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN519092A | IN519105A |
|---|---|---|---|
| | SDG NO: | IN404016B | IN404016B |
| | TYPE: | GRAB | GRAB |
| ACETONE | | 10 U | 14 |
| METHYLENE CHLORIDE | | 4 J | 4 J |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN519025G | IN519025H | IN519025J | IN519058G | IN519058H | IN519058J |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8569 | LLL8569 | LLL8570 | LLL8569 | LLL8568 | LLL8570 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| CO-60 | | | 4 U | | | 3 | |
| CS-137 | | | 6.2 | | | 3 U | |
| GROSS ALPHA | | 1 | | | 9 | | |
| GROSS BETA | | 10 | | | 60 | | |
| H-3 | | | | 6700 | | | 6700 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 519
LOCATION: ANL-W DISPOSAL POND INLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN519014 | IN519047 | IN519070 | IN519081 | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 2.5 | 2.5 | 2.5 | 2.5 | | |
| DO (PPM) | | 6.8 | 6.8 | 6.8 | 6.8 | | |
| PH (UNITS) | | 8.3 | 8 | 8.3 | 8.3 | | |
| TEMPERATURE (DEG C) | | 26 | 25 | 26 | 25 | | |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN519014F | IN519047F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016J | IN409011J | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| CHLORIDE | | 61000 | 59000 | | | | |
| FLUORIDE | | 2100 | 2100 | | | | |
| NITRATE-N | | 2710 * | 2940 | | | | |
| O-PHOSPHATE-P | | 2350 * | 1790 | | | | |
| SULFATE | | 350000 | 350000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN519014D | IN519014E | IN519014E | IN519047D | IN519047E | IN519047E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN519014D | IN404016I | IN404016K | IN519014D | IN404016I | IN404016K |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | 546 | | | 750 | |
| BARIUM | | | 96 B | | | 98 B | |
| BERYLLIUM | | | 3.7 B | | | 3.7 B | |
| CALCIUM | | | 118000 | | | 117000 | |
| CHROMIUM | | | 16 | | | 15 | |
| IRON | | | 137 | | | 311 | |
| MAGNESIUM | | | 38100 | | | 37500 | |
| MANGANESE | | | 16 | | | 20 | |
| MERCURY | | 0.03 B | | | 0.04 B | | |
| POTASSIUM | | | | 21000 | | | 21000 |
| SODIUM | | | 58600 | | | 58200 | |
| VANADIUM | | | 28 B | | | 28 B | |
| ZINC | | | 12 B | | | 15 B | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN519070A | IN519081A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016B | IN404016B | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| ACETONE | | 140 | 5 J | | | | |
| METHYLENE CHLORIDE | | 6 | 4 J | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 519
LOCATION: ANL-W DISPOSAL POND INLET
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN519014G | IN519014H | IN519014I | IN519014J | IN519047G | IN519047H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8569 | LLL8569 | LLL8568 | LLL8570 | LLL8569 | LLL8568 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| CO-60 | | | 4 U | | | | 3.8 |
| CS-137 | | | 3 U | | | | 0.2 |
| GROSS ALPHA | | 8 | | | | 1.9 | |
| GROSS BETA | | 18 | | | | 0 | |
| H-3 | | | | | 6700 | | |
| SR-TOT | | | | 3.1 | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN519047I | IN519047J |
|---|---|---|---|
| | SDG NO: | LLL8568 | LLL8570 |
| | TYPE: | OTHER | OTHER |
| CO-60 | | | |
| CS-137 | | | |
| GROSS ALPHA | | | |
| GROSS BETA | | | |
| H-3 | | | 7200 |
| SR-TOT | | 2.9 | |

S&A REQUEST: 519
LOCATION: ANL-W DISPOSAL POND OUTLET
MEDIUM: SURFACE WATER

| FIELD MEASUREMENTS | SAMP NO: | IN519036 | IN519069 | IN519116 | IN519127 |
|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 1.8 | 1.8 | 1.8 | 1.8 |
| DO (PPM) | | 2.5 | 2.4 | 27 | 2.5 |
| PH (UNITS) | | 8.4 | 8.4 | 8.4 | 8.4 |
| TEMPERATURE (DEG C) | | 23 | 23 | 23 | 23 |

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN519036F | IN519069F |
|---|---|---|---|
| | SDG NO: | IN404016J | IN409011J |
| | TYPE: | OTHER | OTHER |
| CHLORIDE | | 56000 | 53000 |
| FLUORIDE | | 1900 | 1800 |
| NITRATE-N | | 610 * | 520 |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 519
LOCATION: ANL-W DISPOSAL POND OUTLET
MEDIUM: SURFACE WATER

| ANIONS AND CYANIDE (UG/L) | SAMP NO: | IN519036F | IN519069F | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016J | IN409011J | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| O-PHOSPHATE-P | | 2350 * | 2050 | | | | |
| SULFATE | | 330000 | 310000 | | | | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN519036D | IN519036E | IN519036E | IN519069D | IN519069E | IN519069E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN519014D | IN404016I | IN404016K | IN519014D | IN404016I | IN404016K |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| ALUMINUM | | | 717 | | | 678 | |
| BARIUM | | | 102 B | | | 99 B | |
| BERYLLIUM | | | 3.5 B | | | 3.4 B | |
| CALCIUM | | | 103000 | | | 99400 | |
| CHROMIUM | | | 14 | | | 14 | |
| IRON | | | 300 | | | 270 | |
| MAGNESIUM | | | 33700 | | | 32700 | |
| MANGANESE | | | 29 | | | 30 | |
| MERCURY | | 0.04 B | | | 0.03 B | | |
| POTASSIUM | | | | 18000 | | | 17000 |
| SODIUM | | | 65500 | | | 63000 | |
| VANADIUM | | | 20 B | | | 20 B | |
| ZINC | | | 11 B | | | 13 B | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN519116A | IN519127A | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016B | IN404016B | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| METHYLENE CHLORIDE | | 3 J | 3 J | | | | |
| TOLUENE | | 4 J | 5 U | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN519036G | IN519036H | IN519036I | IN519036J | IN519069G | IN519069H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8569 | LLL8569 | LLL8568 | LLL8570 | LLL8569 | LLL8568 |
| | TYPE: | OTHER | OTHER | OTHER | OTHER | OTHER | OTHER |
| CO-60 | | | 5 U | | | | 0.4 |
| CS-137 | | | 5 U | | | | 0.1 |
| GROSS ALPHA | | 2.9 | | | | 24 | |
| GROSS BETA | | 25 | | | | 57 | |
| H-3 | | | | | 6600 | | |
| SR-TOT | | | | 41 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 519
LOCATION: ANL-W DISPOSAL POND OUTLET
MEDIUM: SURFACE WATER

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN519069I | IN519069J | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8568 | LLL8570 | | | | |
| | TYPE: | OTHER | OTHER | | | | |
| CO-60 | | | | | | | |
| CS-137 | | | | | | | |
| GROSS ALPHA | | | | | | | |
| GROSS BETA | | | | | | | |
| H-3 | | | 7200 | | | | |
| SR-TOT | | 3 U | | | | | |

S&A REQUEST: 520
LOCATION: ANL-W DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN520028 | IN520051 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 1.2 | 1.2 | | | | |
| DO (PPM) | | 8.6 | 8.6 | | | | |
| PH (UNITS) | | 8.5 | 8.6 | | | | |
| TEMPERATURE (DEG C) | | 22 | 22 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN520028E | IN520051E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN520017E | IN520017E | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 22 | 33 | | | | |
| FLUORIDE | | 6.6 | 8.7 | | | | |
| NITRATE-N | | 0.27 N | 0.25 N | | | | |
| SULFATE | | 1800 | 3300 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN520028C | IN520028D | IN520028D | IN520051C | IN520051D | IN520051D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN505018C | IN505018K | IN505018B | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 13600 | | | 22300 | |
| BARIUM | | | 149 | | | 242 | |
| BERYLLIUM | | | 1.6 | | | 1.9 | |
| CADMIUM | | | 1.1 | | | 0.88 | |
| CALCIUM | | | 55400 | | | 32500 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3
LEACHING PONDS

S&A REQUEST: 520
LOCATION: ANL-W DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN520028C | IN520028D | IN520028D | IN520051C | IN520051D | IN520051D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN505018C | IN505018K | IN505018B | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CHROMIUM | | | 956 | | | 718 | |
| COBALT | | | 6.1 B | | | 7.8 B | |
| COPPER | | | 30 | | | 37 | |
| IRON | | | 15500 | | | 23400 | |
| LEAD | | | 9.4 B | | | 14 B | |
| MAGNESIUM | | | 14700 | | | 13100 | |
| MANGANESE | | | 244 E | | | 260 E | |
| MERCURY | | 0.42 | | | 0.17 | | |
| NICKEL | | | 20 | | | 25 | |
| POTASSIUM | | | | 3500 | | | 6600 |
| SILVER | | | 8.6 | | | 3.3 | |
| SODIUM | | | 614 B | | | 747 B | |
| VANADIUM | | | 31 E | | | 36 E | |
| ZINC | | | 272 | | | 224 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN520028A | IN520028A | IN520051A |
|---|---|---|---|---|
| | SDG NO: | IN514019A | IN522019A | IN522019A |
| | TYPE: | GRAB | GRAB | GRAB |
| ACETONE | | 100 | 150 | 130 |
| CHLOROFORM | | 14 U | 7 U | 5 J |
| METHYLENE CHLORIDE | | 56 | 320 E | 150 |
| TOLUENE | | 14 U | 2 J | 5 J |
| 1,1,1-TRICHLOROETHANE | | 14 U | 3 J | 21 |
| 2-BUTANONE | | 170 | 30 | 200 |
| * 1,1,2-TRICHLORO-1,2,2-T( 7.27) | | | | 46 J |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN520028F | IN520028G | IN520028H | IN520028I | IN520051F | IN520051G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8574 | LLL8574 | LLL8572 | LLL8572 | LLL8574 | LLL8572 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | 740 | | | | 1500 |
| CS-137 | | | 22000 | | | | 52000 |
| GROSS ALPHA | | 4500 | | | | 6100 | |
| GROSS BETA | | 25000 | | | | 22000 | |
| H-3 | | | | | 1000 | | |
| K-40 | | | 16000 | | | | 14000 |
| SR-TOT | | | | 290 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 520
LOCATION: ANL-H DISPOSAL POND - REDUCED FLOW AREA
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN520051H | IN520051I | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8572 | LLL8573 | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CO-60 | | | | | | | |
| CS-137 | | | | | | | |
| GROSS ALPHA | | | | | | | |
| GROSS BETA | | | | | | | |
| H-3 | | | 900 | | | | |
| K-40 | | | | | | | |
| SR-TOT | | 250 | | | | | |

S&A REQUEST: 520
LOCATION: ANL-H DISPOSAL POND INLET
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN520017 | IN520040 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 1.4 | 1.4 | | | | |
| DO (PPM) | | 8.4 | 8.4 | | | | |
| PH (UNITS) | | 8.5 | 8.5 | | | | |
| TEMPERATURE (DEG C) | | 26 | 26 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN520017E | IN520040E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN520017E | IN520017E | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 44 | 34 | | | | |
| FLUORIDE | | 9 | 9.1 | | | | |
| SULFATE | | 270 | 470 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN520017C | IN520017D | IN520017D | IN520040C | IN520040D | IN520040D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN505018C | IN505018K | IN505018B | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 16100 | | | 14200 | |
| BARIUM | | | 186 | | | 149 | |
| BERYLLIUM | | | 2.2 | | | 1.7 | |
| CADMIUM | | | 0.83 B | | | 0.35 B | |
| CALCIUM | | | 46300 | | | 40200 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 520
LOCATION: ANL-W DISPOSAL POND INLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN520017C | IN520017D | IN520017D | IN520040C | IN520040D | IN520040D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN505018C | IN505018K | IN505018B | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CHROMIUM | | | 52 | | | 48 | |
| COBALT | | | 7.5 B | | | 6.5 B | |
| COPPER | | | 36 | | | 21 | |
| IRON | | | 20200 | | | 17600 | |
| LEAD | | | 20 B | | | 12 B | |
| MAGNESIUM | | | 13000 | | | 11600 | |
| MANGANESE | | | 233 E | | | 202 E | |
| MERCURY | | 0.18 | | | 0.23 | | |
| NICKEL | | | 27 | | | 22 | |
| POTASSIUM | | | | 3900 | | | 3600 |
| SILVER | | | 2.8 B | | | 9.6 | |
| SODIUM | | | 667 B | | | 570 B | |
| VANADIUM | | | 39 E | | | 33 E | |
| ZINC | | | 170 | | | 113 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN520017A | IN520040A |
|---|---|---|---|
| | SDG NO: | IN514019A | IN514019A |
| | TYPE: | GRAB | GRAB |
| ACETONE | | 79 | 88 |
| CHLOROFORM | | 4 J | 16 U |
| METHYLENE CHLORIDE | | 300 | 85 |
| 2-BUTANONE | | 97 | 190 |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN520017F | IN520017G | IN520017H | IN520017I | IN520040F | IN520040G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8574 | LLL8574 | LLL8572 | LLL8572 | LLL8574 | LLL8574 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | 10 | | | | 60 |
| CS-137 | | | 360 | | | | 530 |
| GROSS ALPHA | | 2000 | | | | 6700 | |
| GROSS BETA | | 5000 | | | | 8000 | |
| H-3 | | | | | 2600 | | |
| K-40 | | | 13000 | | | | 14000 |
| SR-TOT | | | | 60 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 520
LOCATION: ANL-W DISPOSAL POND INLET
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN520040H | IN520040I | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8572 | LLL8573 | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CO-60 | | | | | | | |
| CS-137 | | | | | | | |
| GROSS ALPHA | | | | | | | |
| GROSS BETA | | | | | | | |
| H-3 | | | 2600 | | | | |
| K-40 | | | | | | | |
| SR-TOT | | 10 | | | | | |

S&A REQUEST: 520
LOCATION: ANL-W DISPOSAL POND OUTLET
MEDIUM: SEDIMENT

| FIELD MEASUREMENTS | SAMP NO: | IN520039 | IN520062 | | | | |
|---|---|---|---|---|---|---|---|
| CONDUCTIVITY (MS/CM) | | 1.2 | 1.2 | | | | |
| DO (PPM) | | 8.9 | 8.9 | | | | |
| PH (UNITS) | | 8.9 | 8.9 | | | | |
| TEMPERATURE (DEG C) | | 22 | 22 | | | | |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN520039E | IN520062E | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN520017E | IN520017E | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CHLORIDE | | 27 | 36 | | | | |
| FLUORIDE | | 6.7 | 6.8 | | | | |
| NITRATE-N | | 0.23 N | 0.7 N | | | | |
| O-PHOSPHATE-P | | 0.42 | 0.39 | | | | |
| SULFATE | | 550 | 290 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN520039C | IN520039D | IN520039D | IN520062C | IN520062D | IN520062D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN505018C | IN505018K | IN505018B | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 10300 | | | 10200 | |
| BARIUM | | | 122 | | | 130 | |
| BERYLLIUM | | | 1.6 | | | 1.6 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 520
LOCATION: ANL-N DISPOSAL POND OUTLET
MEDIUM: SEDIMENT

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN520039C | IN520039D | IN520039D | IN520062C | IN520062D | IN520062D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018B | IN505018C | IN505018K | IN505018B | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CADMIUM | | | 0.43 B | | | 0.43 B | |
| CALCIUM | | | 60900 | | | 60400 | |
| CHROMIUM | | | 24 | | | 25 | |
| COBALT | | | 5 B | | | 4.9 B | |
| COPPER | | | 13 | | | 13 | |
| IRON | | | 13100 | | | 12600 | |
| LEAD | | | 9.5 B | | | 7.2 B | |
| MAGNESIUM | | | 13900 | | | 14500 | |
| MANGANESE | | | 238 E | | | 261 E | |
| MERCURY | | 0.09 | | | 0.07 | | |
| NICKEL | | | 17 | | | 16 | |
| POTASSIUM | | | | 2500 | | | 3900 |
| SILVER | | | 3.4 | | | 4.2 | |
| SODIUM | | | 542 B | | | 590 B | |
| VANADIUM | | | 29 E | | | 27 E | |
| ZINC | | | 65 | | | 68 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN520039A | IN520062A |
|---|---|---|---|
| | SDG NO: | IN514019A | IN522019A |
| | TYPE: | GRAB | GRAB |
| ACETONE | | 120 | 24 U |
| METHYLENE CHLORIDE | | 47 | 27 |
| TOLUENE | | 16 U | 3 J |
| 1,1,1-TRICHLOROETHANE | | 13 J | 5 J |
| 2-BUTANONE | | 170 | 140 |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN520039F | IN520039G | IN520039H | IN520039I | IN520062F | IN520062G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8574 | LLL8574 | LLL8572 | LLL8573 | LLL8574 | LLL8572 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | 52 | | | | 110 |
| CS-137 | | | 330 | | | | 270 |
| GROSS ALPHA | | 4000 | | | | 2300 | |
| GROSS BETA | | 4400 | | | | 2800 | |
| H-3 | | | | | 700 | | |
| K-40 | | | 12000 | | | | 12000 |
| SR-TOT | | | | 40 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 520
LOCATION: ANL-W DISPOSAL POND OUTLET
MEDIUM: SEDIMENT

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN520062H | IN520062I | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8572 | LLL8573 | | | | |
| | TYPE: | GRAB | GRAB | | | | |
| CO-60 | | | | | | | |
| CS-137 | | | | | | | |
| GROSS ALPHA | | | | | | | |
| GROSS BETA | | | | | | | |
| H-3 | | | 2200 | | | | |
| K-40 | | | | | | | |
| SR-TOT | | 100 U | | | | | |

S&A REQUEST: 522
LOCATION: ANL-W DITCHES - DITCH #2
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN522019 | IN522020 | IN522031 | IN522042 | IN522053 | IN522064 |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7 | 7.2 | 9.6 | 7.7 | 7.7 | 7.2 |
| TEMPERATURE (DEG C) | | 24 | 25 | 26 | 27 | 28 | 30 |

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN522019E | IN522020E | IN522031E | IN522042E | IN522053E | IN522064E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019E | IN522019E | IN522019E | IN522019E | IN522019E | IN522019E |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CHLORIDE | | 14 | 9.3 | 8.6 | 37 | 19 | 22 |
| FLUORIDE | | 4.8 | 3 | 3.2 | 6.2 | 4.2 | 7 |
| NITRATE-N | | 0.66 N | 4.7 N | 5 N | 0.29 N | 2.1 N | 2 N |
| O-PHOSPHATE-P | | 0.82 | 0.82 | 0.49 | 1.1 | 2 | 5.5 |
| SULFATE | | 24 | 140 | 41 | 620 | 110 | 160 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN522019C | IN522019C | IN522019D | IN522019D | IN522020C | IN522020C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN522064C | IN505018C | IN505018K | IN522019C | IN522064C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 21900 | | | |
| BARIUM | | | | 186 | | | |
| BERYLLIUM | | | | 2 | | | |
| CADMIUM | | | | 1.9 | | | |
| CALCIUM | | | | 32400 | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 522
LOCATION: ANL-W DITCHES - DITCH #2
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN522019C IN522019C GRAB | IN522019C IN522064C GRAB | IN522019D IN505018C GRAB | IN522019D IN505018K GRAB | IN522020C IN522019C GRAB | IN522020C IN522064C GRAB |
|---|---|---|---|---|---|---|---|
| CHROMIUM | | | 66 | | | | 31 |
| COBALT | | | | 7.2 B | | | |
| COPPER | | | | 59 | | | |
| IRON | | | | 23800 | | | |
| LEAD | | | | 14 B | | | |
| MAGNESIUM | | | | 11800 | | | |
| MANGANESE | | | | 374 E | | | |
| MERCURY | | 0.04 B | | | | 0.06 | |
| NICKEL | | | | 25 | | | |
| POTASSIUM | | | | | 5100 | | |
| SILVER | | | | 153 | | | |
| SODIUM | | | | 631 B | | | |
| VANADIUM | | | | 37 E | | | |
| ZINC | | | | 134 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN522020D IN505018C GRAB | IN522020D IN505018K GRAB | IN522031C IN522019C GRAB | IN522031C IN522064C GRAB | IN522031D IN505018C GRAB | IN522031D IN505018K GRAB |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | 14500 | | | | 13900 | |
| BARIUM | | 151 | | | | 273 | |
| BERYLLIUM | | 1.7 | | | | 1.5 | |
| CADMIUM | | 1 | | | | 1.5 | |
| CALCIUM | | 74700 | | | | 42700 | |
| CHROMIUM | | | | | 39 | | |
| COBALT | | 6.9 B | | | | 5.8 B | |
| COPPER | | 32 | | | | 50 | |
| IRON | | 17500 | | | | 17100 | |
| LEAD | | 10 B | | | | 15 B | |
| MAGNESIUM | | 11600 | | | | 9420 | |
| MANGANESE | | 348 E | | | | 298 E | |
| MERCURY | | | | 0.06 B | | | |
| NICKEL | | 22 | | | | 20 | |
| POTASSIUM | | | 2900 | | | | 2800 |
| SILVER | | 150 | | | | 138 | |
| SODIUM | | 799 B | | | | 567 B | |
| VANADIUM | | 32 E | | | | 34 E | |
| ZINC | | 135 | | | | 139 | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 522
LOCATION: ANL-W DITCHES - DITCH #2
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN522042C | IN522042C | IN522042D | IN522042D | IN522053C | IN522053C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN522064C | IN505018C | IN505018K | IN522019C | IN522064C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 14500 | | | |
| BARIUM | | | | 209 | | | |
| BERYLLIUM | | | | 1.7 | | | |
| CADMIUM | | | | 0.5 B | | | |
| CALCIUM | | | | 69500 | | | |
| CHROMIUM | | | 51 | | | | 15 |
| COBALT | | | | 6.6 B | | | |
| COPPER | | | | 59 | | | |
| IRON | | | | 17000 | | | |
| LEAD | | | | 23 B | | | |
| MAGNESIUM | | | | 14600 | | | |
| MANGANESE | | | | 304 E | | | |
| MERCURY | | 0.14 | | | | 0.02 B | |
| NICKEL | | | | 29 | | | |
| POTASSIUM | | | | | 3000 | | |
| SILVER | | | | 1.4 B | | | |
| SODIUM | | | | 821 B | | | |
| VANADIUM | | | | 33 E | | | |
| ZINC | | | | 122 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN522053D | IN522053D | IN522064C | IN522064C | IN522064D | IN522064D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018C | IN505018K | IN522019C | IN522064C | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 13300 | | | | 17200 | |
| BARIUM | | 164 | | | | 164 | |
| BERYLLIUM | | 1.7 | | | | 1.7 | |
| CADMIUM | | 0.23 B | | | | 0.43 B | |
| CALCIUM | | 72300 | | | | 22500 | |
| CHROMIUM | | | | | 23 | | |
| COBALT | | 5.9 B | | | | 8 B | |
| COPPER | | 13 | | | | 20 | |
| IRON | | 14700 | | | | 20600 | |
| LEAD | | 8.7 B | | | | 14 B | |
| MAGNESIUM | | 14800 | | | | 11400 | |
| MANGANESE | | 348 E | | | | 565 E | |
| MERCURY | | | | 0.02 B | | | |
| NICKEL | | 20 | | | | 28 | |
| POTASSIUM | | | 2600 | | | | 3500 |
| SILVER | | 1.1 U | | | | 1.1 B | |
| SODIUM | | 704 B | | | | 577 B | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 522
LOCATION: ANL-W DITCHES - DITCH #2
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN522053D | IN522053D | IN522064C | IN522064C | IN522064D | IN522064D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505018C | IN505018K | IN522019C | IN522064C | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| VANADIUM | | 31 E | | | | 36 E | |
| ZINC | | 55 | | | | 88 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN522019A | IN522020A | IN522031A | IN522042A | IN522053A | IN522064A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019A | IN522019A | IN522019A | IN522019A | IN522019A | IN522019A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 27 | 27 U | 79 | 69 | 42 | 19 U |
| CHLOROFORM | | 10 U | 13 U | 4 J | 3 J | 10 U | 10 U |
| METHYLENE CHLORIDE | | 210 | 50 | 200 | 130 | 170 | 120 |
| TOLUENE | | 10 U | 4 J | 11 U | 13 U | 10 U | 3 J |
| 1,1,1-TRICHLOROETHANE | | 33 | 530 | 250 | 56 | 18 | 11 |
| 2-BUTANONE | | 180 | 150 | 130 | 110 | 110 | 100 |
| * 2,4,6 TRIMETHYLOCTANE(21.72) | | | 49 J | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN522019F | IN522019G | IN522019H | IN522019I | IN522020F | IN522020G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8581 | LLL8581 | LLL8580 | LLL8580 | LLL8581 | LLL8581 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | 30 | | | | 95 |
| CS-137 | | | 430 | | | | 1100 |
| GROSS ALPHA | | 4000 | | | | 4000 | |
| GROSS BETA | | 4800 | | | | 4200 | |
| H-3 | | | | | 400 | | |
| K-40 | | | 17000 | | | | 14000 |
| SR-TOT | | | | 10 | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN522020H | IN522020I | IN522031F | IN522031G | IN522031H | IN522031I |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8580 | LLL8582 | LLL8581 | LLL8581 | LLL8580 | LLL8582 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | | | 8 | | |
| CS-137 | | | | 3600 | 310 | | |
| GROSS ALPHA | | | | 3800 | | | |
| GROSS BETA | | | 1100 | | | | 1100 |
| H-3 | | | | | 14000 | | |
| K-40 | | 100 | | | | 0 | |
| SR-TOT | | | | | | | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3 DRAFT DO NOT CITE
LEACHING PONDS

S&A REQUEST: 522
LOCATION: ANL-W DITCHES - DITCH #2
MEDIUM: SOIL

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN522042F | IN522042G | IN522042H | IN522042I | IN522053F | IN522053G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8581 | LLL8580 | LLL8580 | LLL8582 | LLL8581 | LLL8580 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | 80 U | | | | 70 U |
| CS-137 | | | 180 | | | | 60 U |
| GROSS ALPHA | | 3800 | | | | 3500 | |
| GROSS BETA | | 3800 | | | | 3600 | |
| H-3 | | | | | 2200 | | |
| K-40 | | | 13000 | | | | 12000 |
| SR-TOT | | | | 90 | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN522053H | IN522053I | IN522064F | IN522064G | IN522064H | IN522064I |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8580 | LLL8582 | LLL8581 | LLL8580 | LLL8580 | LLL8582 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | | | | 80 U | | |
| CS-137 | | | | | 70 U | | |
| GROSS ALPHA | | | | 3300 | | | |
| GROSS BETA | | | | 7000 | | | |
| H-3 | | | 2600 | | | | 1700 |
| K-40 | | | | | 17000 | | |
| SR-TOT | | 10 | | | | 60 | |

S&A REQUEST: 522
LOCATION: ANL-W DITCHES - DITCH #2
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN522075F | IN522075G |
|---|---|---|---|
| | SDG NO: | IN504017A | IN409011I |
| | TYPE: | RINSATE | RINSATE |
| BARIUM | | | 5.6 B |
| BERYLLIUM | | | 0.53 B |
| IRON | | | 86 B |
| MAGNESIUM | | | 14 BE |
| MERCURY | | 0.02 B | |

TABLE 4.3.3 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 3
LEACHING PONDS

S&A REQUEST: 522
LOCATION: ANL-W DITCHES - DITCH #2
MEDIUM: SURFACE WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: IN522075A<br>SDG NO: IN514019A<br>TYPE: RINSATE |
|---|---|
| METHYLENE CHLORIDE | 11 |
| TOLUENE | 5 |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: IN522075I<br>SDG NO: LLL8579<br>TYPE: RINSATE | IN522075K<br>LLL8579<br>RINSATE | IN522075L<br>LLL8579<br>RINSATE |
|---|---|---|---|
| GROSS ALPHA | 6 | | |
| GROSS BETA | 4 | | |
| H-3 | | | 28000 |
| SR-TOT | | 12 | |

## 4.9 Environmental Problem 4: Central Facilities Area Sewage Treatment Plant (Hazardous Wastes)

**Request Number:** 523.

**Requester:** D. Worley

**Finding and Basis:** It was suspected that the sanitary sewage treatment plant at the Central Facilities Area (CFA) may have been receiving hazardous inorganic and organic wastes from the Radiological and Environmental Sciences Laboratory (RESL), thereby potentially releasing hazardous waste into the soil and groundwater and requiring that an RCRA Part B permit be obtained for the treatment plant. The RESL discharges to the CFA sewage treatment plant a wide variety of organic and inorganic chemicals, many of which are radioactively contaminated. The inorganic chemicals include cyanides, thiocyanates, various compounds of arsenic, cadmium, chromium, lead, copper, mercury, titanium, rhodium, niobium, rubidium, etc. The organics used in the laboratory include chloroform, acrolein, phenol, toluene, acetonitrile, etc. Some of the discharged wastes, such as cyanides, acrolein, phenol, and some compounds of heavy metals, become EPA hazardous wastes; some products of their reactions may also be hazardous. All hazardous compounds of the RESL wastewater streams and their quantities could not be identified at the time of the Survey; however, they were believed to be extensive. Flammable liquids from RESL are collected in containers and lab packed for off-site disposal. All other waste liquids are poured into laboratory sinks that are served by the CFA Sewage Treatment Plant.

### 4.9.1 Sampling and Analysis Objectives

**Statement:** Samples were to be collected and analyzed to determine if the influent to the sewage treatment plant contains hazardous constituents above the method detection limit.

**Supporting Information:** The CFA sewage treatment plant collects and treats a variety of wastewater streams from numerous facilities such as RESL, the Chemistry and Physics Laboratory, maintenance shops, vehicle fleet service facilities, photographic services, the fire station, the dispensary, the machine shop, the paint shop, and a cafeteria. The sewage treatment plant provides physical and biological treatment and chemical disinfection to the CFA wastewater, but this would not substantially reduce the concentration of hazardous constituents in the CFA influent. The effluent from the sewage treatment plant is discharged into a 2-acre drainfield about 2000 ft east of the plant.

### 4.9.2 Sampling and Analytical Design

#### 4.9.2.1 Sampling Design

**Request 523: CFA Sewage Treatment Plant (Water) (Fig. 4.4).** Three composite and nine grab water samples (Sampling Method: References E4.2.2 and E4.2.3A) were to be taken from the CFA Sewage Treatment Plant influent pipe on three different days between the hours of 1000 and 1600.

The Sampling Team arrived on 15JUN88 at 1415 at the sewage treatment plant to sample the raw sewage influent out of a holding tank in the floor. The weather outside was calm and clear, with a temperature of approximately 85$^{o}$F. Because the team lacked an escort and the proper permits, grab sample IN523043 could not be collected at the specified time (1100). Grab sample IN523054 was collected at 1421, one hour later than called for in the plan. At 1430, the Manning sampler was taken to the building and set up inside to take 300 mL every 3 min. Gamma screening of the tank showed 250 cpm. Gamma screening outside the building showed 50 cpm. Grab sample IN523065 was collected at 1606. Time composite sample IN523010 was collected at 1621. There was a considerable amount of sediment in the composite sample.

On 16JUN88, the Sampling Team arrived at the treatment plant at 0930 and collected grab sample IN523076 at 0932. At this time, the team set the Manning sampler to take a 300 mL sample every 6 min. Grab sample IN523087 was collected at 1309. Grab sample IN523098 was collected at 1717. The grab samples were milky and contained floating debris. Time composite sample IN523021, collected at 1726, was much darker than the grab samples and had some sediment in the bottom.

On 17JUN88, the Sampling Team arrived at the sewage treatment plant at 1055. The sky was overcast with the wind at approximately 30 mph. At this time, the team set the Manning sampler for a 300 mL sample every 6 min. Grab sample IN523101 was collected at 1055. Grab sample IN523112 was collected at 1307. Grab sample IN523123 and time composite sample IN523032 were collected at 1628. The grab samples had a milky appearance and contained floating debris. QC rinsate sample IN523134 and field blank sample IN523145 were collected at 1715.

#### 4.9.2.2 Analytical Design

**Request 523:** No field measurements were requested. The parameters analyzed included volatiles, semivolatiles, ICP metals, AA mercury, gross alpha, gross beta, and gamma scan.

### 4.9.3 Field and Analytical Data

**Field Data:** *Although no field measurements were requested, the results of analyses presented in Table 4.3.4 would be better evaluated by identifying the samples with the type and time of sampling. The three composite samples are: Day 1 (15JUN88) = IN523010 taken at 1621 hr; Day 2 (16JUN88) = IN523021 taken at 1726 hr; and Day 3 (17JUN88) = IN523032 taken at 1628 hr. For the grab samples (all samples IDs begin with IN523): Day 1 = -054 taken at 1421 hr and -065 taken at 1606; Day 2 = -076 taken at 0932, -087 taken at 1309, and -098*

*taken at 1717; and Day 3 = -101 taken at 1055, -112 taken at 1307, and -123 taken at 1628.*

Field Data Evaluation: NA.

Analytical Data:

*Metals. Analytical data for metals in surface water are presented in Table 4.3.4. Of the 16 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all three samples: beryllium, cadmium, and nickel. Of the metals of interest detected, barium was 216 ug/L; chromium ranged from 19 to 45 ug/L; copper, 47 to 72 ug/L; mercury, 0.14 to 0.17 ug/L; and zinc, 110 to 189 ug/L. Toxic metals of interest not listed in Table 4.3.4 were below the IDL for the samples tested.*

*Extractable organics. Analytical data for extractable organic compounds are given in Table 4.3.4. There were 26 extractable organic compounds detected in one of these surface water (time composite) samples, 35 in another, and 38 in the remaining sample for this request. Phthalates were detected in these samples in measured or estimated concentrations always less than 500 ppb, and di-n-butylphthalate was also detected in the method blank. Benzoic acid, naphthalene, phenanthrene, and phenol were detected below the quantitation limit in at least one sample. Some 2-methylnaphthalene (12 ppb) was measured in sample IN523032 and 4-methylphenol was measured in all three time composite samples (as high as 220 ppb in sample IN523021). Estimated concentrations of TICs were always 520 ppb or less, and usually less than 100 ppb.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.4. From 3 to 18 volatile organic compounds were detected in each of the 15 samples taken for this request. Chloroform was detected below the quantitation limit in some samples. Methylene chloride was detected in all samples and also in the blank. The highest measured or estimated concentration*

*was 22 ppb. Toluene was detected below the quantitation limit in five samples. An estimated 1 ppb of 1,2-dichloroethane was detected in sample IN523098. The highest concentrations of any compound were the (measured) 180 ppb to 590 ppb of 1,1,1-trichloroethane (estimated concentrations were as high as 700 ppb). Tentatively identified compounds and unknowns were always 53 ppb or less.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.4. Three water samples from the CFA Sewage Treatment Plants contained the following ranges of radionuclide concentrations in pCi/L: gross alpha, 9 to 23; gross beta, 62 to 68; and cesium-137, 0 to 5.1. Rinsate sample IN523134 contained: gross alpha, 10; gross beta, 8; and cesium-137, 0.1 pCi/L. Field blank IN523145 contained: gross alpha, 24; gross beta, 22; and cesium-137, 2.7 pCi/L.*

**Analytical Data Evaluation:**

**Request 523:**

Metals. Five metals of interest--barium, chromium, copper, mercury, and zinc--were detected above either the CRDL or the IDL for Request 523.

Extractable organics. Phenol was detected below the quantitation limit in all three composite samples. Both 2-methylnaphthalene and 4-methylphenol were detected in at least one sample. Estimated concentrations of TICs were always 520 ppb or less.

Volatile organics. The highest concentrations of any compound were the measured or estimated values of 1,1,1-trichloroethane, which were as high as 700 ppb. Chloroform and toluene were detected below the quantitation limits in some samples. Methylene chloride was detected in all samples and also in the blank. An estimated 1 ppb of 1,2-dichloroethane was detected in sample

IN523098. Tentatively identified compounds and unknowns were always less than 100 ppb.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

### 4.9.4 Limitations and Qualifications

**Data Quality Level:** The sampling design is rated Quality Level I; the field sampling is rated Quality Level II. The overall analytical Quality Level is I.

**Field Data:** The field sampling is rated Quality Level II mainly because the first sample to be taken for the first day (15JUN88) was not taken and because the composite samples represent only a 2-hr duration instead of the 6-hr duration requested in the INEL Sampling and Analysis Plan.

**Analytical Data:**

Metals. Analytical results for ICP metals were Quality Level I, except for arsenic at Quality Level II. For arsenic, the percent recovery for spikes was within the range of 30 to 74% and the reported sample result is less than the IDL, indicating the possibility of false negatives. Analytical results for AA metals were Quality Level I.

Extractable organics. Because the extraction holding times for these samples were exceeded by 7 days, there may be a low bias. The data are, therefore, Quality Level II except for di-n-butylphthalate and bis(2-ethylhexyl)phthalate, which were assigned Quality Level III due to their ubiquitous nature. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Volatile organics. Positively identified compounds are Quality Level I. The samples were diluted and reanalyzed to confirm the high concentrations of 1,1,1-trichloroethane. Several compounds were detected below quantitation limits in many of the samples. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Environmental Problem: 4
Request Number: 523

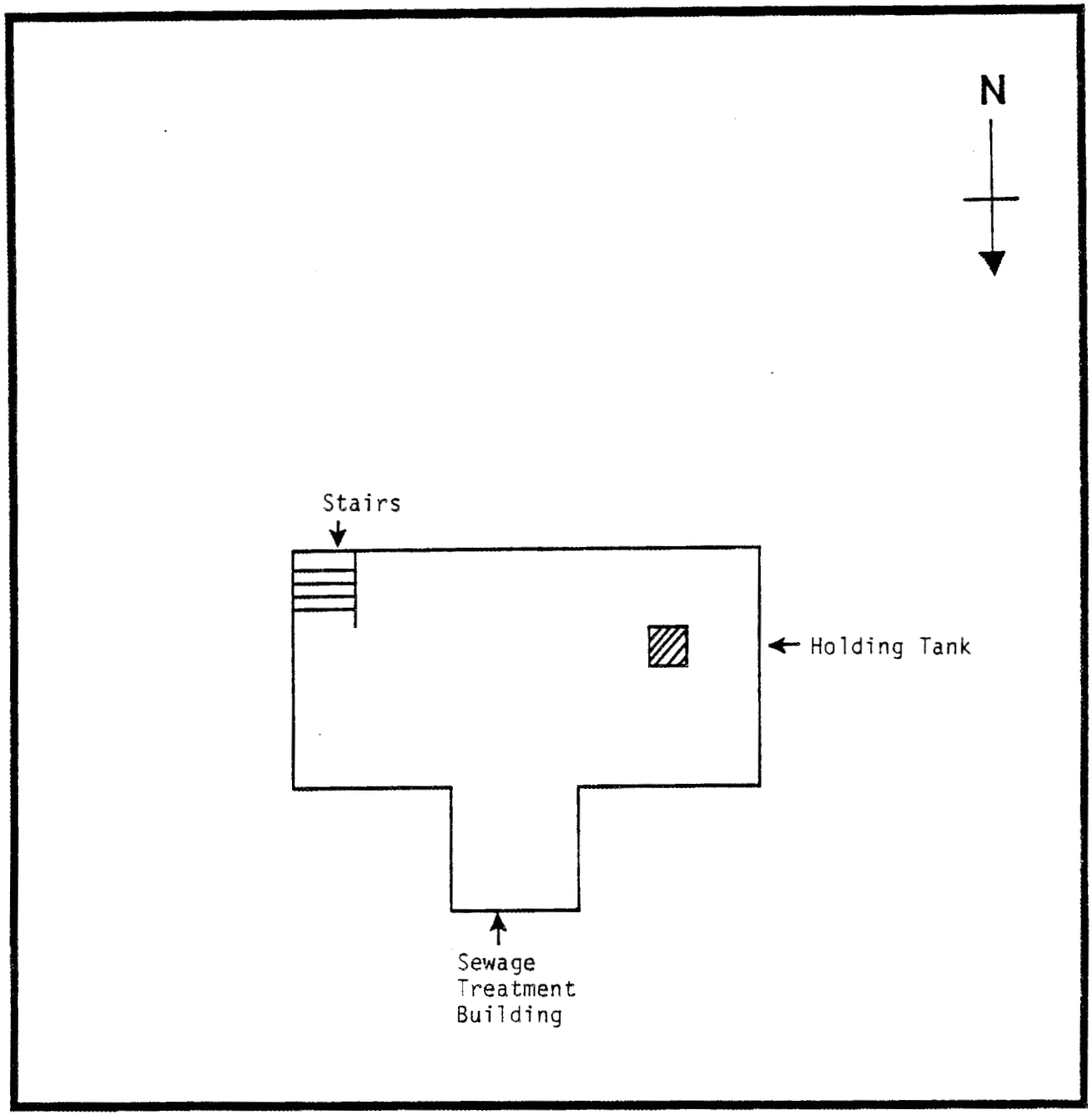


Figure 4.4. CFA Sewage Treatment Plant (Request 523)

TABLE 4.2.4 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 4

DRAFT DO NOT CITE

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN523 | CFA STP | CFA STP | SUR WATER | 1 | 1 | QC FL | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| IN523 | CFA STP | CFA STP | SUR WATER | 9 | 8 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 8 | 0 | 0 |
| IN523 | CFA STP | CFA STP | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| IN523 | CFA STP | CFA STP | SUR WATER | 3 | 3 | T COM | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 3 | 3 |
| | | MED TOTAL | | 14 | 13 | | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 4 | 4 | 8 | 8 | 5 | 5 |
| | | EP TOTAL | | 14 | 13 | | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 4 | 4 | 8 | 8 | 5 | 5 |

TABLE 4.3.4 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 4 DRAFT DO NOT CITE
CFA SEWAGE TREATMENT PLANT (HAZARDOUS WASTES)

S&A REQUEST: 523
LOCATION: CFA SEWAGE TREATMENT PLANT - INFLUENT
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN523010D | IN523010E | IN523010E | IN523021D | IN523021E | IN523021E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN519014D | IN404016I | IN404016K | IN519014D | IN404016I | IN404016K |
| | TYPE: | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE |
| ALUMINUM | | | 475 | | | 792 | |
| BARIUM | | | 71 B | | | 161 B | |
| BERYLLIUM | | | 3.2 B | | | 3.6 B | |
| CADMIUM | | | 2 U | | | 2 U | |
| CALCIUM | | | 55000 | | | 61100 | |
| CHROMIUM | | | 19 | | | 26 | |
| COPPER | | | 20 B | | | 47 | |
| IRON | | | 481 | | | 3480 | |
| MAGNESIUM | | | 18100 | | | 19000 | |
| MANGANESE | | | 19 | | | 77 | |
| MERCURY | | 0.08 B | | | 0.17 | | |
| NICKEL | | | 6 U | | | 9.9 B | |
| POTASSIUM | | | | 8800 | | | 11000 |
| SODIUM | | | 46200 | | | 72300 | |
| VANADIUM | | | 16 B | | | 16 B | |
| ZINC | | | 110 | | | 158 | |

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN523032D | IN523032E | IN523032E | IN523134B | IN523134C | IN523134C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN519014D | IN404016I | IN404016K | IN519014D | IN404016I | IN404016K |
| | TYPE: | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE | RINSATE | RINSATE | RINSATE |
| ALUMINUM | | | 1580 | | | 60 U | |
| BARIUM | | | 216 | | | 2 U | |
| BERYLLIUM | | | 3.5 B | | | 0.58 B | |
| CADMIUM | | | 2 B | | | 2 U | |
| CALCIUM | | | 66500 | | | 200 U | |
| CHROMIUM | | | 45 | | | 6 U | |
| COPPER | | | 72 | | | 10 U | |
| IRON | | | 4640 | | | 20 U | |
| MAGNESIUM | | | 20700 | | | 10 U | |
| MANGANESE | | | 69 | | | 5 U | |
| MERCURY | | 0.14 | | | 0.02 B | | |
| NICKEL | | | 9.8 B | | | 6 U | |
| POTASSIUM | | | | 10000 | | | 100 U |
| SODIUM | | | 52100 | | | 200 U | |
| VANADIUM | | | 18 B | | | 4 U | |
| ZINC | | | 189 | | | 13 B | |

TABLE 4.3.4 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 4 DRAFT DO NOT CITE
CFA SEWAGE TREATMENT PLANT (HAZARDOUS WASTES)

S&A REQUEST: 523
LOCATION: CFA SEWAGE TREATMENT PLANT - INFLUENT
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN523145A | IN523145B | IN523145B | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN519014D | IN404016I | IN404016K | | | |
| | TYPE: | FIELD BLANK | FIELD BLANK | FIELD BLANK | | | |
| ALUMINUM | | | 60 U | | | | |
| BARIUM | | | 2 U | | | | |
| BERYLLIUM | | | 0.52 B | | | | |
| CADMIUM | | | 2 U | | | | |
| CALCIUM | | | 200 U | | | | |
| CHROMIUM | | | 6 U | | | | |
| COPPER | | | 10 U | | | | |
| IRON | | | 20 U | | | | |
| MAGNESIUM | | | 10 U | | | | |
| MANGANESE | | | 5 U | | | | |
| MERCURY | | 0.02 B | | | | | |
| NICKEL | | | 6 U | | | | |
| POTASSIUM | | | | 100 U | | | |
| SODIUM | | | 200 U | | | | |
| VANADIUM | | | 4 U | | | | |
| ZINC | | | 7.2 | | | | |

| EXTRACTABLE ORGANICS (UG/L) | SAMP NO: | IN523010B | IN523021C | IN523032A | IN523134A | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN523010B | IN523010B | IN523010B | IN523010B | | |
| | TYPE: | T. COMPOSITE | T. COMPOSITE | T. COMPOSITE | RINSATE | | |
| BENZOIC ACID | | 16 J | 50 U | 50 U | 50 U | | |
| BENZYL ALCOHOL | | 10 U | 10 U | 10 U | 8 J | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | 140 | 29 | 470 E | 10 U | | |
| DI-N-BUTYLPHTHALATE | | 2 BJ | 4 BJ | 3 BJ | 1 BJ | | |
| DI-N-OCTYLPHTHALATE | | 10 U | 10 U | 2 J | 10 U | | |
| NAPHTHALENE | | 5 J | 3 J | 3 J | 10 U | | |
| PHENANTHRENE | | 10 U | 2 J | 6 J | 10 U | | |
| PHENOL | | 4 J | 8 J | 7 J | 10 U | | |
| 2-METHYLNAPHTHALENE | | 10 U | 8 J | 12 | 10 U | | |
| 4-METHYLPHENOL | | 26 | 220 | 35 | 10 U | | |
| * BENZENEPROPANIOC ACID(20.70) | | | 50 J | | | | |
| * BENZENESULFONAMIDE, 4-M(27.57) | | 26 J | | | | | |
| * BORANAMINE, N,N,1,1-TET(11.64) | | | 65 J | | | | |
| * BUTANOIC ACID( 6.92) | | | | 31 J | | | |
| * BUTANOIC ACID( 7.35) | | | 150 J | | | | |
| * CAFFEINE(30.89) | | 9.9 J | | | | | |
| * C10-ALKANE(11.64) | | | | | 2.4 J | | |
| * C12-ALKANE(17.44) | | | | 38 J | | | |
| * C13-ALKANE(17.40) | | | 11 J | | | | |
| * C14-ALKANE(21.34) | | | 44 J | | | | |

TABLE 4.3.4 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 4 DRAFT DO NOT CITE
CFA SEWAGE TREATMENT PLANT (HAZARDOUS WASTES)

S&A REQUEST: 523
LOCATION: CFA SEWAGE TREATMENT PLANT - INFLUENT
MEDIUM: SURFACE WATER

| EXTRACTABLE ORGANICS (UG/L) | SAMP NO: | IN523010B | IN523021C | IN523032A | IN523134A |
|---|---|---|---|---|---|
| | SDG NO: | IN523010B | IN523010B | IN523010B | IN523010B |
| | TYPE: | T. COMPOSITE | T. COMPOSITE | T. COMPOSITE | RINSATE |
| * C14-ALKANE(21.39) | | | | 95 J | |
| * C15-ALKANE(23.25) | | | 29 J | | |
| * C15-ALKANE(23.32) | | | | 140 J | |
| * C16-ALKENE(25.27) | | | | 48 J | |
| * C17-ALKANE(27.21) | | | | 100 J | |
| * C17-ALKANE(28.29) | | | 44 J | | |
| * C17-ALKANE(28.34) | | | | 140 J | |
| * C18-ALKENE(29.41) | | | | 31 J | |
| * C18-ALKENE(30.24) | | | | 62 J | |
| * C19-ALKANE(31.29) | | 5.7 J | | | |
| * C22-ALKANE(35.37) | | | | 56 J | |
| * C22-ALKENE(34.91) | | | | 14 J | |
| * C24-ALKANE(37.36) | | | | 68 J | |
| * C24-ALKENE(36.67) | | | | | 6.4 J |
| * C25-ALKANE(38.34) | | | | 35 J | |
| * C27-ALKANE(40.71) | | | | 41 J | |
| * C27-ALKENE(38.91) | | | | | 3.8 J |
| * C28-ALKENE(41.19) | | | | | 5.4 J |
| * C29-ALKANE(42.21) | | | | 26 J | |
| * C33-ALKENE(45.54) | | | | | 10 J |
| * DECANE(11.62) | | 57 J | | | |
| * DECANE, 2,6,7-TRIMETHYL(13.42) | | 17 J | | | |
| * DECANE, 3,6-DIMETHYL-(13.47) | | | | 31 J | |
| * DECANE, 4-METHYL-(12.27) | | | 47 J | | |
| * DODECANOIC ACID(25.56) | | | 83 J | | |
| * EICOSANE(32.97) | | 9.4 J | | | |
| * EICOSANE(33.02) | | | | 130 J | |
| * ETHANOL, 2-[2-[4-(1,1,3(34.94) | | 28 J | | | |
| * ETHANOL, 2-[2-[4-(1,1,3(34.96) | | | 23 J | | |
| * ETHANOL, 2-BUTOXY-( 9.02) | | | 120 J | | |
| * ETHANOL, 2-BUTOXY-, PHO(37.47) | | 130 J | | | |
| * ETHANOL, 2-BUTOXY-, PHO(37.49) | | | 61 J | | |
| * ETHANOL, 2-BUTOXY-,PHOS(37.52) | | | | 53 J | |
| * HENEICOSANE(34.26) | | | | 89 J | |
| * HEPTADECANE(28.16) | | 11 J | 64 J | | |
| * HEPTADECANE(28.22) | | | | 280 J | |
| * HEPTANE, 2,3,6-TRIMETHY(12.42) | | 14 J | | | |
| * HEPTANOIC ACID(14.74) | | | 78 J | | |
| * HEXACOSANE(39.44) | | | | 57 J | |
| * HEXADECANE(26.17) | | 15 J | 59 J | | |
| * HEXADECANE(26.24) | | | | 310 J | |
| * HEXANOIC ACID (DOT)(10.45) | | | 520 J | | |

TABLE 4.3.4 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 4 DRAFT DO NOT CITE
CFA SEWAGE TREATMENT PLANT (HAZARDOUS WASTES)

S&A REQUEST: 523
LOCATION: CFA SEWAGE TREATMENT PLANT - INFLUENT
MEDIUM: SURFACE WATER

| EXTRACTABLE ORGANICS (UG/L) | SAMP NO: | IN523010B | IN523021C | IN523032A | IN523134A | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN523010B | IN523010B | IN523010B | IN523010B | | |
| | TYPE: | T. COMPOSITE | T. COMPOSITE | T. COMPOSITE | RINSATE | | |
| * NONADECANE(31.59) | | 7.2 J | | 140 J | | | |
| * NONADECANE(31.66) | | | 20 J | | | | |
| * NONANE( 8.77) | | | | 16 J | | | |
| * NONANE, 2-METHYL-(10.65) | | 21 J | | 68 J | | | |
| * NONANE, 2,6-DIMETHYL-(12.27) | | | | | | | |
| * NONANE, 2,6-DIMETHYL-(12.32) | | 17 J | | | | | |
| * NONANE, 4-METHYL-(10.54) | | | 31 J | | | | |
| * NONANOIC ACID(19.17) | | | 81 J | | | | |
| * OCTANE, 2,3,7-TRIMETHYL(18.87) | | 9 J | 59 J | | | | |
| * PENTADECANE(24.07) | | 24 J | | | | | |
| * PENTANOIC ACID( 7.78) | | | 100 J | | | | |
| * PENTANOIC ACID(12.52) | | | 15 J | | | | |
| * PHENOL, 4-(1,1,3,3-TETR(26.36) | | 11 J | | | | | |
| * PHENOL, 4-(2,2,3,3-TETR(26.34) | | | 5.3 J | | 7.7 J | | |
| * PROPANEDIOIC ACID, PHEN(18.64) | | | | | | | |
| * PROPANOIC ACID, 2-METHY(26.21) | | 8 J | | | | | |
| * TETRADECANE(21.85) | | | 55 J | | | | |
| * TETRADECANE(21.87) | | | | 290 J | | | |
| * TETRADECANE(21.94) | | | | 64 J | | | |
| * TRICOSANE(36.39) | | 6.7 J | | | | | |
| * TRIDECANE(19.52) | | | | 160 J | | | |
| * TRIDECANE(19.59) | | | | 61 J | | | |
| * TRIDECANE, 7-METHYL-(18.92) | | 35 J | 65 J | | | | |
| * UNDECANE(14.40) | | | | | 1.4 J | | |
| * UNDECANE(14.42) | | | | 150 J | | | |
| * UNDECANE(14.45) | | | | | 17 J | | |
| * UNKNOWN HYDROCARBON(49.08) | | | | | 9.7 J | | |
| * UNKNOWN HYDROCARBON(49.74) | | | 2.5 J | | | | |
| * UNKNOWN( 8.47) | | | 41 J | | | | |
| * 1,3,2-DIOXABOROLANE, 2,(13.02) | | | 43 J | | | | |
| * 1H-INDOLE(19.39) | | | 37 J | | | | |
| * 1H-INDOLE, 7-METHYL-(21.60) | | | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN523054A | IN523054B | IN523065A | IN523065B | IN523076A | IN523087A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A | IN406018A | IN406018A | IN406018A | IN406018A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 8 J | 20 U | 10 | 33 U | 8 J | 100 |
| CHLOROFORM | | 4 J | 4 JD | 2 J | 3 JD | 1 J | 5 U |
| METHYLENE CHLORIDE | | 2 JDB | 5 JDB | 12 DB | 22 DB | 4 JDB | 10 DB |
| TOLUENE | | 5 U | 2 JD | 5 U | 17 U | 1 J | 5 U |

TABLE 4.3.4 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 4 DRAFT DO NOT CITE
CFA SEWAGE TREATMENT PLANT (HAZARDOUS WASTES)

S&A REQUEST: 523
LOCATION: CFA SEWAGE TREATMENT PLANT - INFLUENT
MEDIUM: SURFACE WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN523054A | IN523054B | IN523065A | IN523065B | IN523076A | IN523087A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A | IN406018A | IN406018A | IN406018A | IN406018A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| TRICHLOROETHENE | | 5 U | 10 U | 5 U | 17 U | 5 U | 5 U |
| XYLENE (TOTAL) | | 5 U | 10 U | 5 U | 17 U | 5 U | 5 U |
| 1,1-DICHLOROETHANE | | 2 J | 10 U | 5 | 5 JD | 2 J | 3 J |
| 1,1-DICHLOROETHENE | | 8 | 6 JD | 10 | 8 JD | 4 J | 9 |
| 1,1,1-TRICHLOROETHANE | | 360 E | 300 | 500 E | 390 | 180 | 470 E |
| 1,2-DICHLOROETHANE | | 5 U | 10 U | 5 U | 17 U | 5 U | 5 U |
| 1,2-DICHLOROETHENE | | 5 U | 2 JD | 5 U | 17 U | 5 U | 1 J |
| 2-BUTANONE | | 10 U | 20 U | 10 U | 33 U | 10 U | 10 |
| * DIMETHYL DISULFIDE(15.49) | | | | 4 J | | | |
| * TETRAHYDROFURAN( 9.76) | | | | | | | |
| * TETRAHYDROFURAN( 9.80) | | 14 J | | 7 J | | | |
| * TETRAHYDROFURAN( 9.83) | | | | | | | 5 J |
| * UNKNOWN HC(25.57) | | | | | | | |
| * UNKNOWN HYDROCARBON(25.54) | | | | | | | |
| * UNKNOWN HYDROCARBON(32.62) | | | | | | | |
| * UNKNOWN(15.49) | | | | | | | |
| * UNKNOWN(25.85) | | | | | | | |
| * UNKNOWN(26.51) | | | | | | | |
| * UNKNOWN(27.20) | | | | | | | |
| * UNKNOWN(30.76) | | | | | | | |
| * UNKNOWN(32.45) | | | | | | | |
| * UNKNOWN(33.24) | | | | | | | |
| * UNKNOWN(34.04) | | | | | | | |
| * UNKNOWN(34.76) | | | | | | | |
| * UNKNOWNHC(25.44) | | | | | | | |
| * UNKNOWNHC(30.76) | | | | | | | |
| * UNKNOWNHC(31.10) | | | | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN523087B | IN523098A | IN523098B | IN523101A | IN523101B | IN523112A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A | IN406018A | IN406018A | IN406018A | IN404016B |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 150 | 35 | 50 U | 180 | 170 | 41 |
| CHLOROFORM | | 17 U | 1 J | 25 U | 3 J | 3 JD | 1 J |
| METHYLENE CHLORIDE | | 8 JDB | 1 JDB | 12 JDB | 2 JDB | 13 JDB | 1 J |
| TOLUENE | | 17 U | 1 J | 25 U | 5 U | 25 U | 1 J |
| TRICHLOROETHENE | | 17 U | 5 U | 25 U | 5 U | 8 JD | 5 U |
| XYLENE (TOTAL) | | 17 U | 5 U | 25 U | 3 J | 25 U | 5 U |
| 1,1-DICHLOROETHANE | | 3 JD | 4 J | 25 U | 4 J | 4 JD | 2 J |
| 1,1-DICHLOROETHENE | | 17 U | 10 | 10 JD | 14 | 10 JD | 4 J |
| 1,1,1-TRICHLOROETHANE | | 410 | 690 E | 560 | 620 E | 510 | 230 E |

TABLE 4.3.4 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 4 DRAFT DO NOT CITE
CFA SEWAGE TREATMENT PLANT (HAZARDOUS WASTES)

S&A REQUEST: 523
LOCATION: CFA SEWAGE TREATMENT PLANT - INFLUENT
MEDIUM: SURFACE WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN523087B | IN523098A | IN523098B | IN523101A | IN523101B | IN523112A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN406018A | IN406018A | IN406018A | IN406018A | IN406018A | IN404016B |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| 1,2-DICHLOROETHANE | | 17 U | 1 J | 25 U | 5 U | 25 U | 5 U |
| 1,2-DICHLOROETHENE | | 17 U | 5 U | 25 U | 5 U | 25 U | 5 U |
| 2-BUTANONE | | 33 U | 10 U | 50 U | 16 | 50 U | 10 U |
| * DIMETHYL DISULFIDE(15.49) | | | | | | | |
| * TETRAHYDROFURAN( 9.76) | | | | | 16 J | | 10 J |
| * TETRAHYDROFURAN( 9.80) | | | | | | | |
| * TETRAHYDROFURAN( 9.83) | | | | | | | |
| * UNKNOWN HC(25.57) | | | | | | | |
| * UNKNOWN HYDROCARBON(25.54) | | | | | | | 29 J |
| * UNKNOWN HYDROCARBON(32.62) | | | | | | | 53 J |
| * UNKNOWN(15.49) | | | | | | | |
| * UNKNOWN(25.85) | | | | | | | |
| * UNKNOWN(26.51) | | | | | 3 J | | |
| * UNKNOWN(27.20) | | | | | 2 J | | |
| * UNKNOWN(30.76) | | | | | | | 16 J |
| * UNKNOWN(32.45) | | | | | 8 J | | |
| * UNKNOWN(33.24) | | | | | 11 J | | |
| * UNKNOWN(34.04) | | | | | 7 J | | |
| * UNKNOWN(34.76) | | | | | 15 J | | |
| * UNKNOWNHC(25.44) | | | | | 4 J | | |
| * UNKNOWNHC(30.76) | | | | | 17 J | | |
| * UNKNOWNHC(31.10) | | | | | 3 J | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN523112B | IN523123A | IN523123B |
|---|---|---|---|---|
| | SDG NO: | IN404016B | IN404016B | IN404016B |
| | TYPE: | GRAB | GRAB | GRAB |
| ACETONE | | 58 | 39 | 50 U |
| CHLOROFORM | | 2 JD | 1 J | 25 U |
| METHYLENE CHLORIDE | | 4 JD | 1 J | 12 JD |
| TOLUENE | | 10 U | 1 J | 25 U |
| TRICHLOROETHENE | | 10 U | 5 U | 25 U |
| XYLENE (TOTAL) | | 10 U | 5 U | 25 U |
| 1,1-DICHLOROETHANE | | 10 U | 6 | 25 U |
| 1,1-DICHLOROETHENE | | 4 JD | 9 | 10 JD |
| 1,1,1-TRICHLOROETHANE | | 200 | 700 E | 590 |
| 1,2-DICHLOROETHANE | | 10 U | 5 U | 25 U |
| 1,2-DICHLOROETHENE | | 10 U | 5 U | 25 U |
| 2-BUTANONE | | 20 U | 37 | 50 U |
| * DIMETHYL DISULFIDE(15.49) | | | | |
| * TETRAHYDROFURAN( 9.76) | | 9 JD | 14 J | |

TABLE 4.3.4 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 4 DRAFT DO NOT CITE
CFA SEWAGE TREATMENT PLANT (HAZARDOUS WASTES)

S&A REQUEST: 523
LOCATION: CFA SEWAGE TREATMENT PLANT - INFLUENT
MEDIUM: SURFACE WATER

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN523112B | IN523123A | IN523123B | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN404016B | IN404016B | IN404016B | | | |
| | TYPE: | GRAB | GRAB | GRAB | | | |
| * TETRAHYDROFURAN( 9.80) | | | | | | | |
| * TETRAHYDROFURAN( 9.83) | | | | | | | |
| * UNKNOWN HC(25.57) | | 22 JD | | | | | |
| * UNKNOWN HYDROCARBON(25.54) | | | | | | | |
| * UNKNOWN HYDROCARBON(32.62) | | | | | | | |
| * UNKNOWN(15.49) | | | 1 J | | | | |
| * UNKNOWN(25.85) | | | 35 J | | | | |
| * UNKNOWN(26.51) | | | | | | | |
| * UNKNOWN(27.20) | | | | | | | |
| * UNKNOWN(30.76) | | | | | | | |
| * UNKNOWN(32.45) | | | | | | | |
| * UNKNOWN(33.24) | | | | | | | |
| * UNKNOWN(34.04) | | | | | | | |
| * UNKNOWN(34.76) | | | | | | | |
| * UNKNOWNHC(25.44) | | | | | | | |
| * UNKNOWNHC(30.76) | | | | | | | |
| * UNKNOWNHC(31.10) | | | | | | | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN523010F | IN523010G | IN523021F | IN523021G | IN523032F | IN523032G |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8549 | LLL8549 | LLL8549 | LLL8549 | LLL8549 | LLL8549 |
| | TYPE: | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE | I. COMPOSITE |
| CS-137 | | | 4 U | | 5 U | | 5.1 |
| GROSS ALPHA | | 9 | | 23 | | 19 | |
| GROSS BETA | | 68 | | 62 | | 64 | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN523134D | IN523134E | IN523145C | IN523145D | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8548 | LLL8548 | LLL8548 | LLL8548 | | |
| | TYPE: | RINSATE | RINSATE | FIELD BLANK | FIELD BLANK | | |
| CS-137 | | | 0.1 | | 2.7 | | |
| GROSS ALPHA | | 10 | | 24 | | | |
| GROSS BETA | | 8 | | 22 | | | |

## 4.10 Environmental Problem 5: Percolation Units and Ditches

**Requests:** 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, and 811.
**Requester:** Levitan/Sichelstiel.
**Finding and Basis:** Surface percolation units and ditches at the INEL were used to dispose of liquid wastes containing hazardous chemical and radioactive constituents and may have contaminated the unsaturated zone and groundwater. Thirty-five inactive surface percolation units and ditches that received liquid effluents contaminated with radionuclides or chemicals, or both, have been identified at the INEL. These units include such areas as percolation ponds, leach ponds, and drainage ditches open to the atmosphere and wider or longer than they are deep. Most of these units are between 3 and 10 ft deep, built directly into the surficial alluvial soil, and not lined. The liquids they received were detained and percolated into the soil and evaporated into the atmosphere. The liquids contained a wide variety of constituents, including radionuclides, metals, acids, solvents, and other organics.

These sites were evaluated based on the volumes and types of known or suspected contaminants released into them, dates of use, and the likelihood of contaminant migration. As a result, 17 sites were noted to be of particular environmental concern. Eleven sites were recommended for sampling and analysis.

In addition, two other areas were to be sampled. One sample was to be in loess, typical of PBF/SPERT, EOCR/OMRE, ARA, ANL-W, BORAX, and a portion of CFA. The other sample was to be in the Big Lost River stream bottom, typical of ICPP, TRA, and a portion of CFA. These samples were to be taken and analyzed so that soils data are available to which data from inactive sites can be compared.

### 4.10.1 Sampling and Analysis Objectives

**Statement:** Soil and sediment samples were to be collected at 11 surface percolation units and ditches to determine whether various contaminants were present as a result of their use.

### 4.10.2 Sampling and Analytical Design

#### 4.10.2.1 Sampling Design

**Request 801: OMRE Leach Pond (Fig. 4.5a.)** Three grab soil samples (Sampling Method: Reference E5.2.3) were to be collected from the pond 1 ft above the basalt layer using a straight auger (Field Method: References E4.5.2 for pH and E4.5.1 for temperature).

The Sampling Team arrived on-site at 0810 on 20JUL88. The weather was clear and sunny, with winds at 10 to 15 mph. The temperature was approximately 80°F. The pond was approximately 85 $m^2$ and considered homogeneous. It was divided into a 60-segment grid by the Sampling Team, and three segments were selected at random for sampling.

The surface of the pond had some desert-type grasses, and the soil had basaltic rocks less than 1 to 4 in. in size scattered on the surface. The site was visited by a Health Physicist before drilling began; team members were told that no Health Physicist needed to be present for further drilling at that location. Sample IN801017 (grid 4) was collected from 0850 to 0852 after drilling 2.5 ft to bedrock. Because it was difficult to drive a split spoon to obtain samples, the decision was made to use a hand auger to obtain additional material. Sample IN801028 (grid 16) was collected from 0903 to 0905, after bedrock was hit at 2.5 ft. Sample IN801039 (grid 48) was collected at 0918. Field measurements for temperature were not applicable due to the heat of the friction from the drill. A radiation scan of the area surface and samples showed 40 cpm.

**Request 802: CFA Motor Pool Pond (Fig. 4.5b.)** Fifteen grab soil samples (Sampling Method: Reference E5.2.3) were to be collected from three locations at five depths in the pond. The area to be sampled was a low area in a borrow pit and was approximately 400 $m^2$.

The Sampling Team arrived on-site on 17JUN88 at 1000. Skies were partly cloudy, the temperature was approximately 90°F, winds were at 5 to 15 mph, and humidity was about 10 to 30 percent. The Sampling Team divided the area into a 60-segment grid and randomly selected three segments for sampling. Grab samples were to be collected at the 1 to 3 ft, 5 to 7 ft, 10 to 12 ft, 15 to 17 ft, and 20 to 22 ft (or refusal) depths, using a straight auger. The split spoon was driven to a depth of 3 ft. and sample IN802029 (grid 40) was collected from 1 to 3 ft. The team augered from 3 ft to 5 ft, pulled the auger out of the hole, and hooked up the split spoon to collect sample IN802052 from 5 ft to 7 ft. The team attempted to auger from 7 ft to 10 ft when the auger rig engine lost power. Several attempts were made to restart the rig but with no success. The team decided to collect samples IN802018 (grid 29) and IN802030 (grid 55) from 1 ft to 3 ft with the split spoon driven from the surface to 3 ft with the sample from 1 to 3 ft. Additional sample collection was rescheduled.

On 18JUL88, arrived at the CFA Motor Pool Pond at 0945. The temperature was approximately 80°F, skies were sunny and clear, and wind was at 5 to 10 mph. A discussion with drillers on required sample depths led to a change in the sample plan per the assistant Sampling Team Leader to drill 3 ft, then break each 5 ft at the rod change, recording the depth and adjusting to the easiest breaks. Sample IN802041 (grid 29), taken at a depth of 8-9 ft at 1023, was hard-packed, clayey soil. A Health Physicist performed a radiochemistry scan of the sample. Sample IN802074 (grid 29) was collected from the 13-14 ft depth at 1034. It was wet packed clay and soft. The drillers hit basalt at 15 ft 10 in. and stopped drilling at 1045. Samples IN802109 and -132 could not be collected from the 18-19 ft and 23-24 ft depths, respectively, because of the basalt. All

excess sample material was returned to the hole. The team next set up at grid 55. Because the 1 to 3 ft sample was taken on 17JUL88, the first sample collected from grid 55 was IN802063 at the 8-9 ft depth at 1138. The sample was packed, dry, clayey soil containing small black flecks and 1 to 2 mm pellets that looked like lead.

The Health Physicist continued to perform radiochemistry checks on cuttings and samples. Sample IN802096 was collected from 13 ft at 1300. It was damp, packed, clayey soil with hard brown/sandy stringers. Because basalt was struck at 14 ft and the rig stopped, samples IN802121 and IN802154 could not be collected from the 18-19 ft and 23-24 ft depths, respectively. The drill rig was then moved to grid 40. The Health Physicist and Safety personnel were not required at this grid location. At grid 40, cuttings were dry to approximately 6 to 7 ft; damp for 2 ft; dry, packed clayey soil with white coating for 1 1/2 ft; and wet again at 11 ft. There was a minor amount of black organics. Sample IN802085 was dry, packed soil collected from the 13 to 14 ft depth at 1409. There were no visible organics or metals in the sample. Because basalt was struck at 15 ft 9 in., the team stopped drilling at 1417. Samples IN802110 and-143 could not be collected from the 18-19 ft and 23-24 ft depths, respectively, for this reason.

**Request 803: PBF/SPERT IV Lake (Fig. 4.5c.)** Five grab spatial composite soil samples (Sampling Method: Reference E5.2) were to be collected from the 0 to 3 ft depth from the PBF/SPERT IV lake (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site 27JUN88 at 1100. It was hot and dry, with clear skies, at 1100. The team divided the lake into two areas: 1) the area near the discharge and 2) the lowest lying area of the lake (dry at the time of sampling). Area 1, the effluent area, was divided into a 40-segment grid, and two segments were randomly selected for sampling. Area 2, the lake bottom, was divided into a 60-segment grid and three segments were randomly selected

for sampling. Soil gas samples were also requested by the Survey Team in addition to the grab samples requested in the INEL Sampling and Analysis Plan. Soil gas sampling was to take place adjacent to the soil sample locations.

The soil was fine grained and sandy, with few cobbles. The sparse vegetation was sagebrush and desert grasses. The Sampling Team was escorted by EG&G personnel who performed a radiochemistry scan of the area and confirmed background instrument levels only. Beginning at 1300, 2 in. in diameter by 4 ft deep holes were augered adjacent to sites where spatial composite and grab soil samples were to be collected. These holes were scanned. Spatial composite (SC) sample IN803019 (grid 17), taken at 1054, was collected from the 0 to 3 ft depth. The background instrument readings taken with a Ludlum 2A by the escorts showed 150 cpm. Sample IN803020 (grid 35) was collected at 2.5 ft at 1059. Sample IN803031 (grid 16) was collected at 2.5 ft at 1110. Sample IN803042 (grid 46), was collected at 2.5 ft at 1125. Sample IN803053 (grid 48) was collected at 2 ft at 1140. All soil samples were sandy and brown.

On 28JUN88, the additional soil gas samples requested for this location were collected. Sample IN803064 was collected at 0956 (grid 17); IN803075 at 1003 (grid 35); IN803086 at 1016 (grid 16); IN803097 at 1027 (grid 46); IN803100 at 1037 (grid 48); and QC field blank IN803111 at 1039 (grid 48). These grids corresponded to the grids for the grab spatial composite soil-sampling grids of 27JUN88. An additional QC field blank sample, IN803122, was collected at 1045.

**Request 804: BORAX II-V Leach Pond (Fig. 4.5d.)** Six grab soil samples (Sampling Method: Reference E5.2.3) were to be collected from three locations at two depths (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH). The area of interest was an area at the north end of the pond that had exhibited higher radioactivity than the rest of the pond.

The team arrived on-site 28JUN88 at 1430. The weather was sunny, winds were 10-15 mph, and the temperature was approximately 90$^{o}$F. The sampling area was

gridded off and locations marked. The 30 ft by 20 ft area generally lacked vegetation, except for a few tumbleweeds and desert grasses. Three "ridges" were visible, indicating the burial trench locations. The surface soil was sandy silt, light brown to yellowish brown, with rounded to sub-rounded pebbles and cobbles scattered about. A walking radiation scan of the area indicated 130 to 180 cpm. Some cable and wire debris remained on the surface along with pieces of broken concrete from building materials. Grab samples were to be collected at 3 to 5 ft and 8 to 10 ft using a straight auger and/or posthole diggers.

The original sampling plan could not be followed. Although all three originally-designated grids were drilled, a depth greater than 3 ft was unobtainable because debris and rock were encountered at approximately 1.5 ft at the three gridded locations. The Sampling Team Leader re-assessed the area and samples were collected in a biased manner at locations where a total depth of 10 ft was obtainable. The stone monument showing the location of the buried Borax V leach pond was used as a reference point.

At auger hole 1 (replacing grid 56) (see Fig 4.5d), sample IN804032 was collected from the 3 and 5 ft depth at 1545. Because the Health Physicist had to leave at 1600, the team had to cease drilling and return to finish sampling on 29JUN88.

On 29JUN88, the Sampling Team returned to the site of auger hole 1 at 0846. The sky was clear, the temperature was 70 to 75$^{o}$F, and winds were gusting from the southwest at 20 mph. At 0851, sample IN804065 was collected from the 8-10 ft depth. A radiation scan of the cuttings as they were brought up was done by the Health Physicist and read 80 to 100 cpm. The Health Physicist also scanned the samples after they were bottled. All bottles read 80 cpm. At auger hole 2 (replacing grid 46), the team began cutting for IN804021 and IN804054 at 0924. Cuttings from both holes showed brown sand and rounded to sub-rounded gravel, with the samples taken at 1033. A radiation scan read 100 cpm. The auger began to stick beyond 6 ft, which made drilling slower. The team moved to hole 3 (replacing grid 31) for samples IN804010 at 3 to 5 ft and IN804043 for 8

to 10 ft, taken at 1036. A radiation scan by the Health Physicist indicated 100 cpm.

**Request 805: ANL-W Abandoned and Covered Ditch (Fig. 4.5e.).** On 21JUN88, the Sampling Team arrived on-site at 1330. The 260 $m^2$ area had been covered with approximately 6 ft of fill material. Six grab spatial composite soil samples (Sampling Method: Reference E5.2.3) were to be collected from two depths at three locations (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH). The grid for the ANL-W abandoned and covered ditches was placed on 20JUN88 by ORNL. The Health Physicist assured the ORNL Sampling Team that it was permissible to dig at the selected grid locations.

On 23JUN88, the Sampling Team arrived on-site at 1021. It was sunny and warm, and winds were out of the southwest at 10 to 20 mph. Split spoon sample IN805011 was taken from the 7.5 ft to 9 ft depth of grid 7 at 1100 because the split spoon did not appear to be through the fill material until that depth. Because the auger would not drill any deeper, sample IN805044 was collected from the 12 to 13.5 ft depth of grid 7 at 1125.

After passing the fill material depth at 7.5 ft, sample IN805022 (grid 23) was collected at 1340 from the 7.5 to 9-ft depth and sample IN804055 (grid 23) was collected at 1409 from the 12 to 13.5 ft depth. Sample IN805033 (grid 46) was collected at the 6 to 7.5 ft depth at 1425 because the fill material ended at 6 ft rather than 7.5 ft. Sample IN805066 was collected from the 11 to 12.5 ft depth of grid 46 at 1500 because the rig would go no deeper at this particular hole.

**Request 806: TAN/TSF Drainage Pond (Fig. 4.5f.)** Twenty grab soil samples (Sampling Method: Reference E5.2.3) were to be collected from four locations at the TAN/TSF drainage pond (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on 25JUL88 at 1330. Under clear skies, the temperature was approximately 95$^{o}$F. The pond area was divided into a 6 x 10 segment grid (each segment 7 x 12 ft) by the Assistant Sampling Team Leader. The pond bottom was covered with gravel and sagebrush. The area of interest, approximately 70 ft$^2$, was covered with sweet yellow clover that suggested an enhanced water or moisture regime. Because the area was smaller than stated in the INEL Sampling and Analysis Plan, (240 ft$^2$), three sample locations (grids 49, 55, and 58) were judged to be adequate.

The soil was sandy. Sample IN806012 (grid 49) was collected from the 0 to 2 ft depth at 1315. Sample IN806056 (grid 49) was collected from 5 to 7 ft at 1320. Sample IN806090 (grid 49) was collected from 10 to 13 ft at 1350. Sample IN806136 (grid 49) was collected from the 15 to 18 ft depth. Sample IN806170 from the 20 to 22 ft depth was omitted because of hardpan and the extreme heat generated by auger. Drillers indicated that the maximum depth attainable was 18 ft. At grid 55, sample IN806034 was taken at 1500 at 0 to 2 ft; IN806078 at 1505 at 5 to 7 ft; and IN806114 at 1530 at 10 to 12 ft. QC rinsate sample IN806216 was collected at 1700.

On 26JUL88, sample IN806158 (grid 55) was taken at 18 ft at 1015; the maximum soil temperature was 113$^{o}$F due to auger friction but posed no problem for metals, etc. [Volatile samples were always collected from 2 ft below the auger position by drive tube (split barrel) with little or no influence by auger temperature.] At grid 58, sample IN806023 was taken at 0915 from 0 to 2 ft, IN806067 at 0930 from 5 to 7 ft, IN806103 at 0950 from 10 to 12 ft; and IN806147 from the 15.0 to 18.0 ft depth. Grid 58 samples had soil that was light brown with little or no moisture. Grid 64 samples IN806045, IN806089, IN806125, IN806169, and IN806205 were omitted. Samples IN806170, IN806181, and IN806192, for the 20 to 22 ft depths at grids 49, 55, and 58 were also omitted because of auger limitations, i.e., the driller indicated that drilling was not feasible past 18 ft.

**Request 807: ICPP Gravel Pit 1 (Fig. 4.5g.)** Six or nine grab soil samples (Sampling Method: Reference E5.2.2) were to be collected from two locations at three depths in ICPP gravel pit 1 or from three locations along the perimeter of the pit if there was water in the pit at the time of sampling (Field Method: Reference "Use of Photoionization Detection - 'TIP' - PhotoVac," INEL Sampling and Analysis Plan, Appendix D).

The Sampling Team arrived at the CCP gravel pit at 0745 on 22JUL88. The weather was sunny and clear and temperatures were approximately 80 to 85$^{o}$F with the wind from the southwest at 0 to 5 mph. The Sampling Team divided the area into 100 grid segments and randomly selected two segments for sampling, with bias to the low-lying areas. The team was to drill to 60 ft (or refusal) using a hollow-stem auger; sample with a split spoon; and use a PID to detect organics and a radiation meter to detect radioactivity at every 5 ft. Samples were to be selected from each borehole at the locations with the highest PID or radiation meter readings, not to exceed three samples per borehole. If both PID and radiation readings were zero or normal, metals samples were to be collected at 3 ft and radiochemistry and volatile samples at 60 ft.

The Assistant Sampling Team Leader arrived at about 0800. Per INEL requirements, no one was to enter the pit until the Health Physicist arrived. At 0845 EE personnel and the Health Physicist arrived. The work permit noted that work could begin at 0800. At 0910 the drillers set up on location. Additional ORNL personnel had to be added to the Safe Work permit and approval was required before anyone entered the pit. The Health Physicist checked the area in the pit. The Assistant Team Leader filmed the set up of rig. The augers needed decontamination. Following receipt of the corrected Construction Safe Work permit, the area was roped off-limits to others. Drilling began at 0957 for sample IN807013 (grid 20); the ICP-metals sample was collected at 3 ft at 1014. TIP and radiation meter readings were instrument background. The team had drilled to 15 ft by 1033. At 18 ft, the auger drilled "soft" and the driller felt near bedrock. The radiation and TIP meter readings were instrument background

at 20 to 22 ft for the sandy clay. No bedrock was hit, and the team augered to 23 ft. The split spoon sample taken at 23 to 25 ft represented the bottom of the hole for sample IN807046 (grid 20) at 1354. The team continued with TIP readings throughout the morning. Due to mechanical failure, the TIP was replaced with a Ludlum from CPP which was calibrated that day. Ludlum readings were taken almost continually during drilling and on all media as the split spoon was opened; readings were 0.3 to 0.5. Samples and cuttings were radiation screened and read 50 to 100 cpm on site. The last samples contained bits of bedrock and clay. The team stopped drilling at 1345, and brought auger flights out of the hole and decontaminated them and the split spoon and sampling equipment. The team left the site at approximately 1500.

On 25JUL88, the Sampling Team arrived at 0830. The sky was clear, sunny, and it was hot with a slight breeze of approximately 5 mph. The drilling procedure for grid 82 was the same as for grid 20 on 22JUL88. Sample IN807057 was collected from 3 to 5 ft at 0902. Sample IN807080 was collected at 23 to 25 ft at 0940. The QC rinsate sample IN807104 was collected at 1005.

Samples IN807024 (grid 82), IN807035 (grid 44), IN807068 (grid 44), IN807079 (grid 20), and IN807091 (grid 44) were not collected because the team was unable to drill to 60 ft.

**Request 808: LCCDA Pits 1 and 2 (Soil) (Fig. 4.5h.)** Five grab soil samples (Sampling Method: Reference E5.2.3) were to be collected at random from the pits (Field Method: Reference E4.5.2 for pH, E4.5.1 for temperature, and "Use of Photoionization Detection - 'TIP' - PhotoVac," INEL Sampling and Analysis Plan, Appendix D) which had a combined area of approximately 3,900 $m^2$.

The Sampling Team arrived at the site of the LCCAA pits 1 and 2 at 0915 on 12JUL88. Under partly cloudy skies, the temperature was approximately 75$^{o}$F, winds were approximately 15 to 20 mph, and humidity was about 20%. The grid had been laid out by the Assistant Sampling Team Leader the week of 27JUN88.

Samples were to be collected from 15 to 17 ft using straight augering. If bedrock was encountered, samples were to be collected at the maximum depth possible.

The radiation scan reading was 100-120 cpm. The team set up the auger rig on grid 5. Soil at the surface was light brown, sandy, and silty. It changed to dark brown, with slight moisture, at approximately 2 ft but was still sandy and silty. All soil was fine texture and no gravel was encountered. PID readings were taken at every auger flight change and readings ranged from 0.2 to 2.5 ppm. The LEL meter read 0 to 2%. The auger hit refusal at 14 ft. Sample IN808014 was taken from 12 to 14 ft at 0945.

The team set up on grid 84. The background gamma/beta reading was 100 to 120 cpm. Soil at the surface was light brown, sandy, and silty. It changed to dark brown with slight moisture, at approximately 2 ft but was still sandy and silty. All of the soil was fine texture and no gravel was encountered. PID readings were 0.5 to 2.8 ppm. Drillers hit an obstruction at 8 to 9 ft. The team offset the drill approximately 2 ft northeast and again hit an obstruction at 8 to 9 ft. They again offset the drill and hit an obstruction at 8 to 9 ft. Sample IN808036 was collected from 8 to 9 ft at 1300.

The team set up at grid 6 and began drilling. The radiation scan reading was 100 to 120 cpm. PID readings at each auger flight ranged from 0.5 to 2.5 ppm. The soil had an acidic odor and at the surface was light brown, sandy, and silty. At approximately 2 ft, it changed to dark brown sandy silt with slight moisture. All soil was fine textured and no gravel was encountered. The auger hit refusal at 11 ft. Sample IN808025 was collected from the 9 to 11 ft depth at 1430.

The team set up at grid 85. The radiation scan readings ranged from 100 to 120 cpm. PID readings ranged from 0.9 to 2.0. Soil at the surface was light brown, sandy, silty, and changed to dark brown with slight moisture at approximately 2 ft. The soil had a slight acidic odor. All soil was fine textured

and no gravel was encountered. The team hit refusal at 10 ft. Sample IN808047 was collected at 8 to 10 ft at 1530.

The team set up on grid 96. The radiation scan readings ranged from 100 to 120 cpm. PID readings ranged from 0.5 to 1.8 ppm. Soil at the surface was light brown, sandy, and silty and changed to dark brown with slight moisture at approximately 2 ft. It was still sandy and silty. All soil was fine textured and no gravel was encountered. Due to refusal at 7 ft, sample IN808058 was collected at 5 to 7 ft at 1605.

Temperature readings were not taken for any samples in Request 808 because of friction heat from the auger.

**Request 809: LCCDA Pits 1 and 2 (Soil Gas) (Fig. 4.5i.)** Five soil gas samples (Sampling Method: Reference E5.4) were to be collected from LCCDA pits 1 and 2 using the same grids in Request 808 but moving 2 ft north (Field Method: Reference - None). The Sampling Team was to auger a 2-inch by 4-ft hole and cap it for 24 hours. The cap was then to be removed, a thermal desorption tube placed in the hole, and the hole recapped. There were areas of subsidence which may have been the former pit areas.

The Sampling Team arrived at the site at 1430 on 28JUN88. Winds were to the north at about 10 mph and skies were clear, bright, and hot. The soil was dry and compact. A drive tube was used initially but was not successful. The soil was collected by post hole digger to various depths. Grab soil samples were collected and submitted for volatiles analysis instead of soil-gas samples.

Grab soil sample IN809015 was collected by posthole digger at 0 to 30 in. (grid 5) at 1430; IN809026 at 0 to 30 in. (grid 6) at 1440; IN809037 at 0 to 26 in. (grid 84) at 1500; IN809048 at 0 to 16 in. (grid 85) at 1510; and IN809059 at 0 to 16 in. (grid 96) at 1515.

**Request 810: SPERT IV Lake Reference Soil Sample (Loess) (Fig. 4.5j.)** Two grab soil samples (Sampling Method: Reference E5.2) were to be collected from an area approximately 1500 ft southeast of the SPERT IV Lake (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH ).

The Sampling Team arrived on-site 27JUN88 at approximately 1030. The weather was sunny and clear and the temperature was approximately 85$^{o}$F. Two locations were selected from a specified area. The team checked in with the PBF shift supervisor and the PBF Health Physicist. A Siddings drill rig was set up to obtain the samples. Sample IN810018 was composited and collected from a final depth of approximately 7 ft at 1030. Sample IN810029 was composited and collected from a depth of 10 ft at 1130.

**Request 811: Reference Soil Sample (Stream Bottom) (Fig. 4.5k.)** Two grab vertical composite soil samples (Sampling Method: Reference E5.2) were to be collected from a depth of 10 ft from an area near a dirt road .4 miles east of Lincoln Boulevard (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH ).

The team arrived on-site at 1017 on 28JUN88. Skies were cloudy with a chance of showers and the temperature was approximately 75$^{o}$F. Auger hole 1 (grid 16) was 14 ft off a dirt road in an area of vegetation (sagebrush, cactus, and desert grasses). The surface was composed of alluvial material, with sub-rounded to rounded, predominantly volcanic pebbles and cobbles of fluvial origin. At a 7 ft depth, there was a zone of sandy, pebble-laden soil. The lense was about 6 in. thick. The total depth of the hole was 10 ft. The pale yellow to yellowish brown, sandy soil with pebbles less than 1 in. in size was well blended. Composite sample IN811019 was collected from grid 16 at 1025 from 0.0 to 10.0 ft.

Auger hole 2 (grid 23) was located 200 ft west of hole 1. At 1105, the weather was dark and cloudy, with scattered showers. Wire and wood debris were

scattered throughout the area. At approximately 6.5 ft, a similar layer of sandy, pebble-laden soil was encountered as in sample IN811019. At approximately 9 ft, another lense of pebbles was encountered. At 9.5 ft, a fine-grained, sandy silt was encountered. The total hole depth was 10 ft. The sample of pale yellow to yellowish brown silty sand with pebbles was well blended. Composite sample IN811020 was collected from grid 23 at 1115 from the 0.0 to 10.0 ft depth. The equipment was then decontaminated.

#### 4.10.2.2 Analytical Design

**Request 801:** The field parameters requested for Request 801 were pH and temperature. The parameters analyzed included volatiles, semivolatiles, ICP metals, and AA mercury.

**Request 802:** The parameter analyzed for Request 802 was volatiles.

**Request 803:** The field parameters requested .for Request 803 were pH, temperature, and HNu (PID). The parameter analyzed was CLP metals. The collection of soil gas samples was requested at the site after issuance of the INEL Sampling and Analysis Plan.

**Request 804:** The field parameters requested for Request 804 were pH and temperature. The parameters analyzed included ICP metals, PCBs, and AA mercury.

**Request 805:** The field parameters requested for Request 805 were pH and temperature. The parameters analyzed included volatiles, ICP metals, and AA mercury.

**Request 806:** The field parameters requested for Request 806 were pH and temperature. The parameters analyzed included volatiles, ICP metals, AA mercury, and gamma scan.

**Request 807:** The field parameter requested for Request 807 was HNu (PID). The parameters analyzed included volatiles, ICP metals, AA mercury, gross alpha, gross beta, gamma scan, and tritium oxide.

**Request 808:** The field parameters requested for Request 808 were pH, temperature, and HNu (PID). The parameters analyzed included ICP metals and AA mercury.

**Request 809:** The parameter analyzed for Request 809 was volatiles.

**Requests 810:** The field parameters requested for Request 810 were pH and temperature. The parameters analyzed included CLP metals, anions, gross alpha, gross beta, gamma scan, tritium oxide, and strontium-90.

**Requests 811:** The field parameters requested for Request 811 were pH and temperature. The parameters analyzed included CLP metals, anions, gross alpha, gross beta, gamma scan, tritium oxide, and strontium-90.

### 4.10.3 Field and Analytical Data

**Field Data:**

**Request 801:** *The field data results are shown in Table 4.3.5. The pH of the soil of the OMRE leach pond showed two samples with pHs of 7.7 and the third with a pH of 8.7. No temperature measurements were made because the samples could be influenced by the heat generated by auguring. Radiation scans were made of the sampling sites; both readings were 100 cpm.*

**Request 802:** *The field data results are shown in Table 4.3.5. Although no field measurements were requested for the soil samples from the CFA motor pool*

*pond, two radiation scan readings were recorded for the 8-9 ft and 13-14 ft zone of one of the sampling sites; both readings were 100 cpm.*

**Request 803:** *The field data results are shown in Table 4.3.5. The INEL Sampling and Analysis Plan requested pH, temperature, and PID readings. However, the plan was revised and these measurements were eliminated; in turn, soil gas samples were collected for laboratory organic vapor analysis. For clarification, grids 17 and 35 are in the effluent discharge area and grids 16, 46, and 48 are in the lowest lying area of the lake.*

**Request 804:** *The field data results are shown in Table 4.3.5. The INEL Sampling and Analysis Plan requested pH and temperature measurements. The plan was revised when the original grids could not be used due to debris and obstacles. Only radiation scan measurements were taken and the readings were in the range of 80 to 100 cpm.*

**Request 805:** *The field data results are shown in Table 4.3.5. The INEL Sampling and Analysis Plan requested pH and temperature measurements. pH readings were provided but temperatures were not taken because the heat generated by auger friction to obtain samples would give erroneous readings.*

**Request 806:** *The field data results are shown in Table 4.3.5. The field measurements requested were pH and temperature. Temperature readings were not recorded because the samples could be heated by the friction of the auger. Two readings were recorded to illustrate the enhanced temperatures of the augered samples; they were 113°C and 131°C from the 18 ft depth. It should also be noted that volatile samples were collected 2 ft below the augured sample using a split-spoon sampler to mitigate the effect of the heat. Although temperature readings were not taken, the samples were lower in temperature based on the feel of the sample. The pH ranged from 7.2 to 8.4. PID readings were taken which showed that no organic vapors were present. A radiation scan showed the radioactivity to be 100 cpm.*

**Request 807:** *The field data results are shown in Table 4.3.5. A minimum of six samples were to have been collected from two grid sites; four samples were collected because the drillers could not auger to 60 ft. The requested field measurement was for PID or HNu readings. A reading of 0.5 ppm was obtained with the HNu instrument for the samples from grid 20. In the sample from grid 82, the PID reading at the shallow depth (3-5 ft) was 0.8 but at the 23-25 ft it was 0. A radiation scan was also made. The sample from grid 20 was 100 cpm and the sample from grid 82 was 300 cpm.*

**Request 808:** *The field data results are shown in Table 4.3.5. Although the samples were to have been collected from the 15 to 17 ft depth, only sample IN808014 was collected below 10 ft (at 14 ft). The remaining samples were collected at 10 ft, or less, due to refusal by the formation. The sample collected at 14 ft had a pH of 5.8; all the other samples were above pH 8 (8.1 to 8.5). The PID readings ranged from 1.8 to 2.8 ppm, with IN808014 reading 2.7 ppm.*

**Request 809:** *The field data results are shown in Table 4.3.5. The INEL Sampling and Analysis Plan requested soil gas samples; however, grab soil samples were collected and submitted for volatiles analysis. No field measurements were requested.*

**Request 810:** *The field data results are shown in Table 4.3.5. The INEL Sampling and Analysis Plan requested pH and temperature measurements. No pH readings were taken; it may also be assumed that temperature readings would be erroneous, if taken, due to heat generated by auger friction.*

**Request 811:** *The field data results are shown in Table 4.3.5. The INEL Sampling and Analysis Plan requested pH and temperature measurements. No pH readings were taken; it may also be assumed that temperature readings would be erroneous, if taken, due to heat generated by auger friction.*

Field Data Evaluation:

**Request 801:** Because the instrument used to measure the pH was calibrated prior to field use, the results are reliable. The radiological instrument was calibrated at the sampling team's laboratory prior to departure to the site, the readings are considered reliable for the rugged portable instrument.

**Request 802:** From the field notes, it is not clear whether the radiation scan readings were taken by an INEL Health Physicist or the ORNL sampling team. It is likely that both organizations calibrated their instruments. With the ORNL team, it was at ORNL prior to departure to INEL. Health physics protocol would require INEL to calibrate their instruments on schedule. Therefore, the radiation scan readings can be considered reliable. Only three depth samples were collected from each of the three grid locations. Because bedrock was reached at approximately 15 ft, the last two sample depths could not be taken.

**Request 803:** No field measurements were taken. Soil gas samples were collected for laboratory analysis of soil organic vapors.

**Request 804:** The radiological readings were made by INEL health physics personnel and can be considered reliable.

**Request 805:** Because no field measurements were made, no evaluation can be made.

**Request 806:** Because the instrument used for pH and temperature readings was calibrated prior to field use, the readings are reliable. The PID was also calibrated prior to field use and its readings are reliable. The radiological instrument was calibrated at the sampling team's laboratory prior to departure and the readings are considered reliable. Due to the area under consideration,

only three segments were sampled; also, the lowest depth was not sampled because of auger limitations.

**Request 807:** Because the organic vapor instruments were calibrated prior to field use, their readings are reliable. The radiological instrument was calibrated at the sampling team's laboratory and the results are considered reliable.

**Request 808:** Because both the organic vapor and pH instruments were calibrated prior to field use, their results are reliable.

**Request 809:** No field measurements were requested.

**Request 810:** No field measurements were made.

**Request 811:** No field measurements were made.

**Analytical Data:**

**Request 801:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.5. Of the 19 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all three samples: cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 201 to 247 mg/kg; beryllium, 1.7 to 1.9 mg/kg; chromium, 25 to 29 mg/kg; copper was 17 mg/kg; mercury ranged from 0.03 to 0.05 mg/kg; nickel, 21 to 25 mg/kg; and zinc, 63 to 66 mg/kg. Toxic metals of interest not listed in Table 4.3.5 were below the IDL for the three samples tested.*

*Extractable organics. Analytical data for extractable organics are presented in Table 4.3.5. Three extractable organic compounds were detected in each of two samples, and 10 compounds were detected in the remaining sample. Bis(2-*

*ethylhexyl)phthalate was detected below the detection limit in two samples. All other compounds were tentatively identified, with the greatest number and highest concentrations being in sample IN801039. Several estimated TIC concentrations exceeded 1000 ppb in sample IN801039, and one probable C18 hydrocarbon was as high as 6,400 ppb.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.5. Methylene chloride was measured in concentrations ranging from 41 to 69 ppb and 1,1,1-trichloroethane was measured in concentrations from 21 to 51 ppb in each of the three soil samples. An unknown was also detected in sample IN801039.*

Request 802:

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.5. From one to four volatile organic compounds were detected in each of the nine samples taken for this request. Methylene chloride was measured in each sample, with concentrations ranging from 33 to 460 ppb. Toluene was detected below the detection limit in one sample. Some 1,1,1-trichloroethane was detected in six of the samples in measured or estimated concentrations ranging from 8 to 25 ppb. Some 2-butanone was detected in three of the samples in concentrations of 140 to 190 ppb.*

Request 803:

*Metals. (PBF/SPERT IV Lake-Lowest Lying Area) - Analytical data for metals in soil are presented in Table 4.3.5. Of the 23 metals detected, the following 6 metals of interest to the Survey were below the CRDL in all three samples: antimony, cadmium, mercury, selenium, silver, and thallium. Of the metals of interest detected, arsenic ranged from 4.5 to 4.7 mg/kg; barium, 187 to 192 mg/kg; beryllium, 1.4 to 1.5 mg/kg; chromium, 18 to 22 mg/kg; copper, 20 to 21 mg/kg; lead, 12 to 18 mg/kg; nickel, 24 to 26 mg/kg; and zinc, 69 to 76 mg/kg.*

*(PBF/SPERT IV Lake-Near Discharge) - Analytical data for metals in soil are presented in Table 4.3.5. Of the 23 metals detected, the following 7 metals of interest to the Survey were below the CRDL in all three samples: antimony, cadmium, mercury, selenium, silver, sodium, and thallium. Of the metals of interest detected, arsenic ranged from 2.2 to 3.6 mg/kg; barium, 183 to 216 mg/kg; beryllium, 1.6 to 1.7 mg/kg; chromium, 24 to 25 mg/kg; copper, 23 to 24 mg/kg; lead, 13 to 14 mg/kg; nickel was 26 mg/kg; and zinc ranged from 77 to 83 mg/kg.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.5. From 13 to 23 volatile organic compounds were detected in each of the three soil gas samples taken from the lowest lying area of the lake. Methylene chloride had the highest concentrations of any compound in two of the samples and in the field blanks. Toluene and acetone also had relatively high (compared to other compounds) concentrations in the samples and in the field blanks. Among the tentatively identified compounds, the 6600 ug/m$^3$ of air sampled of trichlorofluoromethane in sample IN803100 was the highest; all other concentrations of TICs were 1200 ug/m$^3$ of air sampled or less.*

*Two soil gas samples were taken from the effluent discharge area. There were 18 volatile compounds identified in one of these samples and 22 in the other. Acetone was present in concentrations of 1600 to 4900 ug/m$^3$ of air sampled and methylene chloride was present in concentrations of 2400 to 4000 ug/m$^3$ of air sampled. Both of these compounds were also present in the field blanks. The 8600 ug/m$^3$ of air sampled of (tentatively identified) trichlorofluoromethane in sample IN803064 was the highest. All other TIC concentrations were below 100 ug/m$^3$ of air sampled.*

*Benzene, carbon tetrachloride, chloroform, and 1,1,1-trichloroethane were among the compounds identified in both sets of samples. Chlorobenzene was also identified in the samples from near the lowest lying area of the lake. Of these*

*five compounds, benzene, chloroform, ethylbenzene, and chlorobenzene were identified in at least one of the two field blanks. Methylene chloride was also identified in the method blank.*

**Request 804:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.5. Of the 19 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all three samples: lead, mercury, and silver. Of the metals of interest detected, barium ranged from 234 to 282 mg/kg; beryllium, 1.6 to 2 mg/kg; cadmium, 0.72 to 0.91 mg/kg; chromium, 21 to 29 mg/kg; copper, 17 to 25 mg/kg; nickel, 22 to 26 mg/kg; and zinc, 64 to 82 mg/kg. Toxic metals of interest not listed in Table 4.3.5 were below the IDL for the samples tested.*

*PCBs and other extractables. No compounds in this category were reported in the samples for this request.*

**Request 805:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.5. Of the 19 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all six samples: lead, mercury, and silver. Of the metals of interest detected, barium ranged from 143 to 209 mg/kg; beryllium, 1.4 to 1.8 mg/kg; cadmium, 0.77 to 0.79 mg/kg; chromium, 22 to 29 mg/kg; copper, 16 to 22 mg/kg; nickel, 22 to 26 mg/kg; and zinc, 57 to 111 mg/kg. Toxic metals of interest not listed in Table 4.3.5 were below the IDL for the six samples tested.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.5. Acetone was detected in two of these six soil samples. Methylene chloride was detected below the detection limit in three of the samples and also in the method blank. One TIC was identified in sample IN805022. The highest measured or estimated concentrations of any compound*

*were the 25 and 14 ppb of acetone in samples IN805011 and IN805033, respectively.*

**Request 806:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.5. Of the 21 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all 12 samples: arsenic, selenium, and silver. Of the metals of interest detected, barium ranged from 182 to 349 mg/kg; beryllium, 1.6 to 2.2 mg/kg; cadmium, 0.79 to 2.7 mg/kg; chromium, 27 to 83 mg/kg; lead was 34 mg/kg; mercury ranged from 0.05 to 0.08 mg/kg; nickel, 26 to 47 mg/kg; and zinc, 72 to 157 mg/kg. Toxic metals of interest not listed in Table 4.3.5 were below the IDL for the 12 samples tested.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.5. One unknown compound was detected with an estimated concentration of 5 ppb.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.5. Twelve soil samples from the TAN/TSF Drainage Pond were found to contain from 0 to 6,300 pCi of cesium-137/kg and from 13,000 to 19,000 pCi/kg of potassium-40 (natural).*

**Request 807:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.5. Of the 19 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all four samples: antimony, cadmium, and lead. Of the metals of interest detected, barium ranged from 105 to 187 mg/kg; beryllium, 0.92 to 1.7 mg/kg; chromium, 20 to 34 mg/kg; copper, 14 to 26 mg/kg; mercury, 0.04 to 0.05 mg/kg; nickel, 18 to 29 mg/kg; and zinc, 42 to 81 mg/kg. Toxic metals of*

*interest not listed in Table 4.3.5 were below the IDL for the four samples tested.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.5. No volatile organic compounds were reported in these samples.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.5. Two soil samples contained the following radionuclide concentrations in pCi/kg: gross alpha, 4,600 and 6,100; gross beta, 5,500 and 6,900; tritium, 1,100 and 1,200; potassium-40, 13,000 and 21,000; manganese-54, 0 and 34; and cesium-137, 0 and 85. Rinsate sample IN807104 contained gross alpha, 7; gross beta, 25; and tritium, 2,600 pCi/L.*

**Request 808:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.5. Of the 19 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all five samples: cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 215 to 290 mg/kg; beryllium, 1.6 to 1.9 mg/kg; chromium, 24 to 30 mg/kg; copper, 20 to 27 mg/kg; mercury was 0.06 mg/kg; nickel ranged from 22 to 27 mg/kg; and zinc, 39 to 68 mg/kg. Toxic metals of interest not listed in Table 4.3.5 were below the IDL for the samples tested.*

**Request 809:**

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.5. Three volatile organic compounds were detected in each of three soil samples, two compounds were detected in another sample, and none were detected in the remaining sample. Methylene chloride was present in four samples, and also in the method blank. The highest measured or estimated*

*concentration was 6 ppb. A tentatively identified compound was also present in each sample (concentrations less than 10 ppb) and in the method blank.*

**Request 810:**

*Anions and cyanide. Analytical data results are presented in Table 4.3.5. Two samples of loess-derived soil samples were analyzed for anions. The samples contained chloride at 1.4 and 10 mg/kg, fluoride at 2.5 and 2.2 mg/kg, nitrate-N at 0.61 and 6.3 mg/kg, ortho-phosphate-P at 0.62 and 1.3 mg/kg, and sulfate at 5.3 and 14 mg/kg. One of the samples contained from 2 to 10 times higher anion concentrations with the exception of fluoride, which was about 10% lower.*

*Metals. Analytical data for metals in soil are presented in Table 4.3.5. Of the 23 metals detected, the following 5 metals of interest to the Survey were below the CRDL in both samples: antimony, mercury, selenium, silver, and thallium. Of the metals of interest detected, arsenic ranged from 5.2 to 6.2 mg/kg; barium, 163 to 178 mg/kg; beryllium was 1.3 mg/kg; cadmium was 1.3 mg/kg; chromium ranged from 14 to 18 mg/kg; copper, 16 to 19 mg/kg; lead, 9.8 to 12 mg/kg; nickel, 18 to 22 mg/kg; and zinc, 47 to 52 mg/kg.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.5. Two soil samples collected from the SPERT IV Lake for reference contained the following radionuclide concentrations in pCi/kg: gross alpha, 4,500 and 6,900; gross beta 4,600 and 6,300; tritium, 71 and 82; potassium-40, 18,000 and 19,000; total strontium, 70 and 240; cesium-137, 92 and 190; and europium-155, 8 and 76. Recount of the samples show that over 94% of the total strontium was strontium-90.*

**Request 811:**

*Anions and cyanide. Analytical data results are presented in Table 4.3.5. Two samples of sediment-derived soils were analyzed for anions. The samples*

*contained chloride at 5.3 and 140 mg/kg, fluoride at 1 mg/kg, nitrate-N at 1.4 and 2.7 mg/kg, ortho-phosphate-P at 0.33 and 1.2 mg/kg, and sulfate at 6.1 and 17 mg/kg. One of the ortho-phosphate-P results is below the detection limit of the method and both fluoride results are at the detection limit.*

*Metals. Analytical data for metals in soil are presented in Table 4.3.5. Of the 22 metals detected, the following 5 metals of interest to the Survey were below the CRDL in both samples: antimony, cadmium, mercury, selenium, and silver. Of the metals of interest detected, arsenic was 3.8 mg/kg; barium ranged from 159 to 180 mg/kg; beryllium, 1.3 to 1.4 mg/kg; chromium, 23 to 24 mg/kg; copper, 16 to 19 mg/kg; lead was 14 mg/kg; nickel ranged from 26 to 27 mg/kg; and zinc, 82 to 1.0 mg/kg. Toxic metals of interest not listed in Table 4.3.5 were below the IDL for the samples tested.*

*Radiochemistry. Analytical data for radiochemistry are given in Table 4.3.5. Two stream-bottom soil samples contained, in pCi/kg: gross alpha, 3,300 and 6,400; gross beta, 6,200 and 6,900; tritium, 0 and 1,500; potassium-40, 18,000 and 18,000; total strontium, 150 and 150; and cesium-137, 160 and 300. Recount of the samples show that over 94% of the total strontium was strontium-90.*

Analytical Data Evaluation:

Request 801:

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Extractable organics. The only positively identified compound in these samples was bis(2-ethylhexyl)phthalate, which was detected below the detection limit in one sample. Estimated concentrations of TICs often exceeded 1000 ppb in that sample, but were never higher than 6,400 ppb.

Volatile organics. Methylene chloride and 1,1,1-trichloroethane were measured in all three samples. The highest concentration of any compound was 69 ppb.

**Request 802:**

Volatile organics. Methylene chloride was measured in each sample, with concentrations up to 460 ppb. Some 1,1,1-trichloroethane was detected in six of the samples in measured or estimated concentrations of 25 ppb or less. There was some 2-butanone detected in three of the samples in concentrations of 140 to 190 ppb.

**Request 803:**

Metals. (PBF/SPERT IV Lake-Lowest Lying Area) Eight metals of interest--arsenic, barium, beryllium, chromium, copper, lead, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

(PBF /SPERT IV Lake-Near Discharge) Eight metals of interest--arsenic, barium, beryllium, chromium, copper, lead, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Methylene chloride, toluene, and acetone were the compounds with the highest concentrations in the samples from near the lake bottom, and also in the field blanks. In the two samples taken from the effluent discharge area, acetone and methylene chloride were present within the range of 1000 to 5000 ug/m$^3$ of air sampled. Acetone and methylene chloride were also in the field blanks. Methylene chloride was detected in the method blank. Among the tentatively identified compounds, trichlorofluoromethane had by far the highest concentrations. The 8600 ug/m$^3$ of air sampled of (tentatively identified) trichlorofluoromethane in sample IN803064 and the 6600 ug/m$^3$ of air sampled in sample IN803100 were anomalous in the sense that all of the other TIC

concentrations were 1200 ug/m$^3$ of air sampled or less, and all but one were less than 500 ug/m$^3$ of air sampled. Benzene, carbon tetrachloride, chloroform, and 1,1,1-trichloroethane were among the compounds identified in both sets of samples. Chlorobenzene was also identified in the samples from near the lowest lying area of the lake. Benzene, chloroform, ethylbenzene, and chlorobenzene were identified in at least one of the two field blanks.

**Request 804:**

Metals. Seven metals of interest--barium, beryllium, cadmium, chromium, copper, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

PCBs and other extractables. No compounds in this category were reported.

**Request 805:**

Metals. Seven metals of interest--barium, beryllium, cadmium, chromium, copper, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Methylene chloride was detected in three of the six samples and also in the method blank. The highest estimated concentration was 6 ppb in sample IN805033.

**Request 806:**

Metals. Nine metals of interest--barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Only one (unknown) compound with an estimated concentration of 5 ppb was detected.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 807:**

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above the either CRDL or the IDL for this request.

Volatile organics. No volatile organic compounds were reported in these samples.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 808:**

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

**Request 809:**

Volatile organics. Methylene chloride was present in four samples and in the method blank. The highest measured or estimated concentration of any volatile

organic compound was 46 ppb of acetone. All other compounds were estimated at less than 10 ppb.

**Request 810:**

Anions and cyanide. The analysis of all the anions met the required quality assurance standards with the exception of laboratory controls which were not run. Calibration verification was within ±10%; spike recovery was within the control limits of 85 to 115% recovery for the spikes; all calibration and preparation blanks were less than MDL; and sample duplicates were within the control limit of ±10%.

Metals. Nine metals of interest--arsenic, barium, beryllium, cadmium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

**Request 811:**

Anions and cyanide. The calibration verification was out of compliance for chloride, nitrate-N, and sulfate; the recovery percentages were 116%, 119%, and 81%, respectively. The spike recovery of nitrate-N was 116%. The spike recovery of sulfate was 70%.

Metals. Eight metals of interest--arsenic, barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

### 4.10.4 Limitations and Qualifications

**Data Quality Level:**

**Request 801:** The sampling design and field sampling are both rated Quality Level I. The overall analytical data Quality Level is II.

**Request 802:** The sampling design and field sampling are both rated Quality Level I. The overall analytical data Quality Level is I.

**Request 803:** The sampling design is rated Quality Level II. The field sampling is rated Quality Level I. The overall analytical data Quality Level is II.

**Request 804:** The sampling design is rated Quality Level II. The field sampling is rated Quality Level II. The overall analytical data Quality Level is II.

**Request 805:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical data Quality Level is II.

**Request 806:** Both the sampling design and field sampling are rated Quality Level I. The overall analytical quality rating is I.

**Request 807:** Both the sampling design and field sampling are rated Quality Level II. The overall analytical quality rating is I.

**Request 808:** Both the sampling design and field sampling are rated Quality Level I. The overall analytical quality rating is I.

**Request 809:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical data Quality Level is I.

**Request 810:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical data Quality Level is I.

**Request 811:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical data Quality Level is II.

**Field Data:**

**Request 801:** Both the design and the sampling were considered Quality Level I.

**Request 802:** Both the sampling design and the sampling were considered Quality Level I. The reduced number of samples collected was due to reaching bedrock above the suspected depth of the soil.

**Request 803:** The sampling design called for organic vapor measurements based on PID readings. If organic vapors are suspected, soil gas samples are more reliable measurements.

**Request 804:** The sampling design should have requested radiation scanning because the area was known to be radioactive. The sampling team should have measured the pH of the subsurface samples because past activities released both acids and alkalis.

**Request 805:** The field sampling is rated Quality Level II because no record of changes in the plan was mentioned in the field notes.

**Request 806:** Both the sampling design and the field sampling were Quality Level I.

**Request 807:** Both the sampling design and the field sampling were Quality Level I. Although the deepest samples could not be collected, it was due to the driller's limitations.

**Request 808:** Both the sampling design and the field sampling were Quality Level I.

**Request 809:** Because reason(s) for the substitution of grab soil samples for the soil gas analysis were not provided, the rating for field sampling is Quality Level II.

**Request 810:** This request was to serve as a reference sample for loess-derived soil samples. As a reference measurement, it would have been useful in aiding interpretation of other contaminated samples. A rating of Quality Level II is assigned to the field sampling.

**Request 811:** This request was to serve as a reference sample for sediment-derived soil samples. As a reference measurement, it would have been useful in aiding interpretation of other contaminated samples. A rating of Quality Level II is assigned to the field sampling.

**Analytical Data:**

**Request 801:**

Metals. Analytical results for ICP metals were Quality Level I, except for antimony at Quality Level II. For antimony the percent recovery for spikes was within the range of 30 to 74% and the reported sample result was less than the IDL, indicating the possibility of false negatives. Analytical results for AA metals were Quality Level I.

Extractable organics. This sample data group is given an overall Quality Level rating of I. However, bis(2-ethylhexyl)phthalate was the only compound that was positively identified (below the detection limit) in only one sample for this environmental problem. All other compounds were specifically identified TICs (Quality Level II) or unknown TICs (Quality Level III).

Volatile organics. Data are of Quality Level III because there were no spikes or duplicates for this sample data group. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Request 802:

Volatile organics. These data come from four different sample data groups. As a rule, the highest concentrations of volatile organic compounds are of data Quality Level I. Samples IN802041, IN802063, IN802085, and IN802096 are of Quality Level III due to lack of spikes and duplicates in the analysis. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Request 803:

Metals. Analytical results for ICP metals were Quality Level I, except for antimony at Quality Level III. For antimony, the percent recovery for spikes was less than 30% and the sample result was less than the IDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

Volatile organics. The data are Quality Level III because the holding time was exceeded and also because conventional quality control (matrix spike, matrix-spike duplicate, and surrogate additions) could not be used with this type of sample. Although these data are determined to be of Quality Level III, data for compounds above the CRDL (except methylene chloride, as discussed below) and

for the known TICs (except for hexamethyl disiloxane) were deemed in the case narrative to be usable. The methylene chloride concentrations in samples IN803086, IN803097, and IN803100 (from near the lake bottom) were deemed usable according to the case narrative, but the samples from the effluent discharge area and the field blanks were deemed to be unusable. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

**Request 804:**

Metals. Analytical results for ICP metals were Quality Level I, except for antimony at Quality Level III. For antimony the percent recovery for spikes was less than 30% and the sample result was less than the IDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

PCBs and other extractables. No compounds in this category were reported.

**Request 805:**

Metals. Analytical results for ICP metals were Quality Level I except for zinc at Quality Level III. For zinc, positive values were observed in the calibration blank that were greater than the CRDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

Volatile organics. Data in this SDG are of Quality Level I except for the 1,1,2-trichloro-1,2,2-trifluoromethane which is a TIC assigned a Quality Level of III due to its presence in the blank. Methylene chloride was also present in the blank and was always below the detection limit. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Request 806:

Metals. Analytical results for ICP metals were Quality Level I except for antimony and copper at Quality Level II. For antimony, the percent recovery for spikes was within the range of 30 to 74% and the reported sample result was less than the IDL, indicating the possibility of false negatives. For copper, the positive values observed for the solid laboratory control standard were outside the established lower control limits and a sample result greater than two times the CRDL was obtained. The data should be viewed as semi-quantitative. Analytical results for AA metals were Quality Level I.

Volatile organics. The overall data Quality Level for this sample data group is I, but the only volatile organic compound listed for this request is an unknown (Quality Level III). Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

Request 807:

Metals. Analytical results for ICP metals were Quality Level I except for antimony and copper at Quality Level II. For antimony the percent recovery for spikes was within the range of 30 to 74% and the reported sample result was less than the IDL, indicating the possibility of false negatives. For copper, the positive values observed for the solid laboratory control standard were outside the established lower control limits and a sample result greater than two times the CRDL was obtained. The data should be viewed as semi-quantitative. Analytical results for AA metals were Quality Level I.

Volatile organics. No volatile organic compounds were reported in these samples. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Radiochemistry. All data are Quality Level I.

**Request 808:**

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level II. For antimony the percent recovery for spikes was within the range of 30 to 74% and the reported sample result is less than the IDL, indicating the possibility of false negatives. Analytical results for AA metals were Quality Level I.

**Request 809:**

Volatile organics. Data for this SDG are of Quality Level I except for the specifically identified TICs which are Quality Level II. Methylene chloride was usually below the detection limit and was also present in the blank. All unknown TIC data are assigned a Quality Level of III.

**Request 810:**

Anions and cyanide. The data quality for anions is Quality Level I. All applicable quality control standards were met, with the exception of laboratory controls which were not run.

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level III. For antimony, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicating severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

Radiochemistry. All data are Quality Level I.

Request 811:

Anions and cyanide. The data quality level for anions is Quality Level II. The calibration verifications of chloride, nitrate-N, and sulfate were out of compliance and the spike recoveries of nitrate-N and sulfate were also out of compliance.

Metals. Analytical results for ICP metals were Quality Level I, except for antimony at Quality Level III. For antimony, the percent recovery for spikes was less than 30% and the reported sample result was less than the IDL, indicative of severe analytical deficiencies. Analytical results for AA metals were Quality Level I.

Radiochemistry. All data are Quality Level I.

Environmental Problem: 5
Request Number: 801

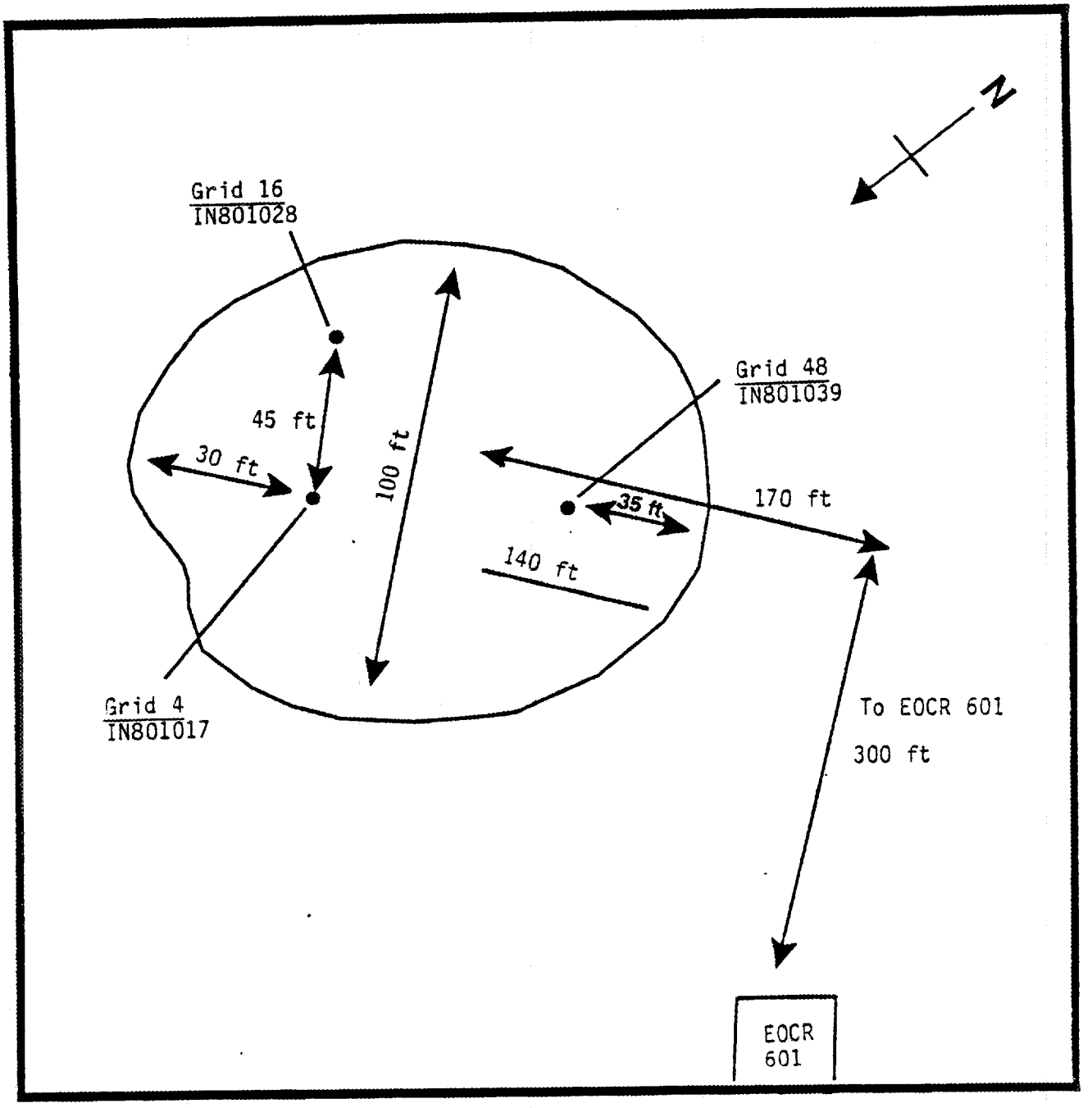


Figure 4.5a. OMRE Leach Pond (Request 801)

Environmental Problem: 5
Request Number: 802

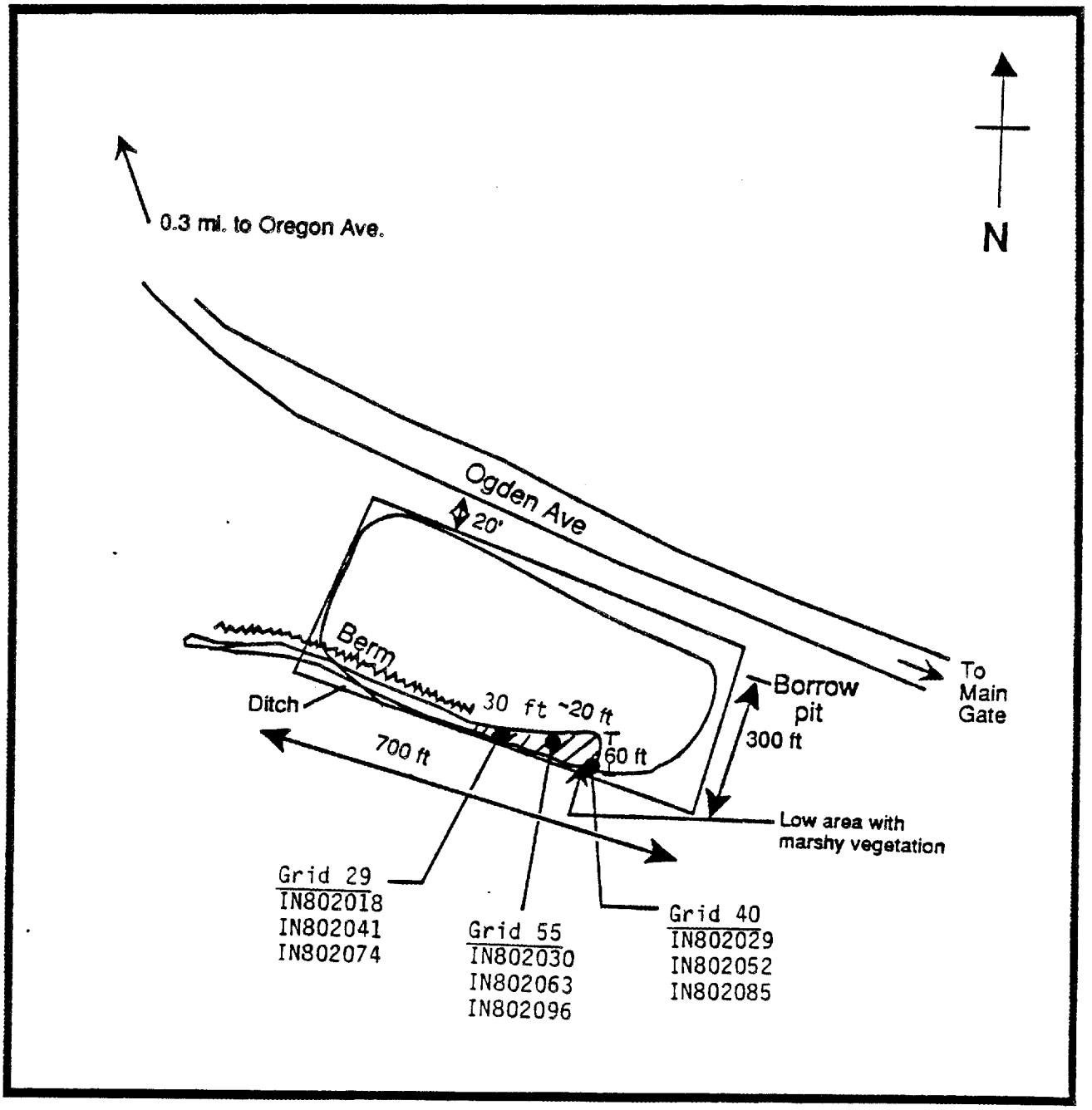


Figure 4.5b. CFA Motor Pool Pond (Request 802)

Environmental Problem: 5
Request Number: 803

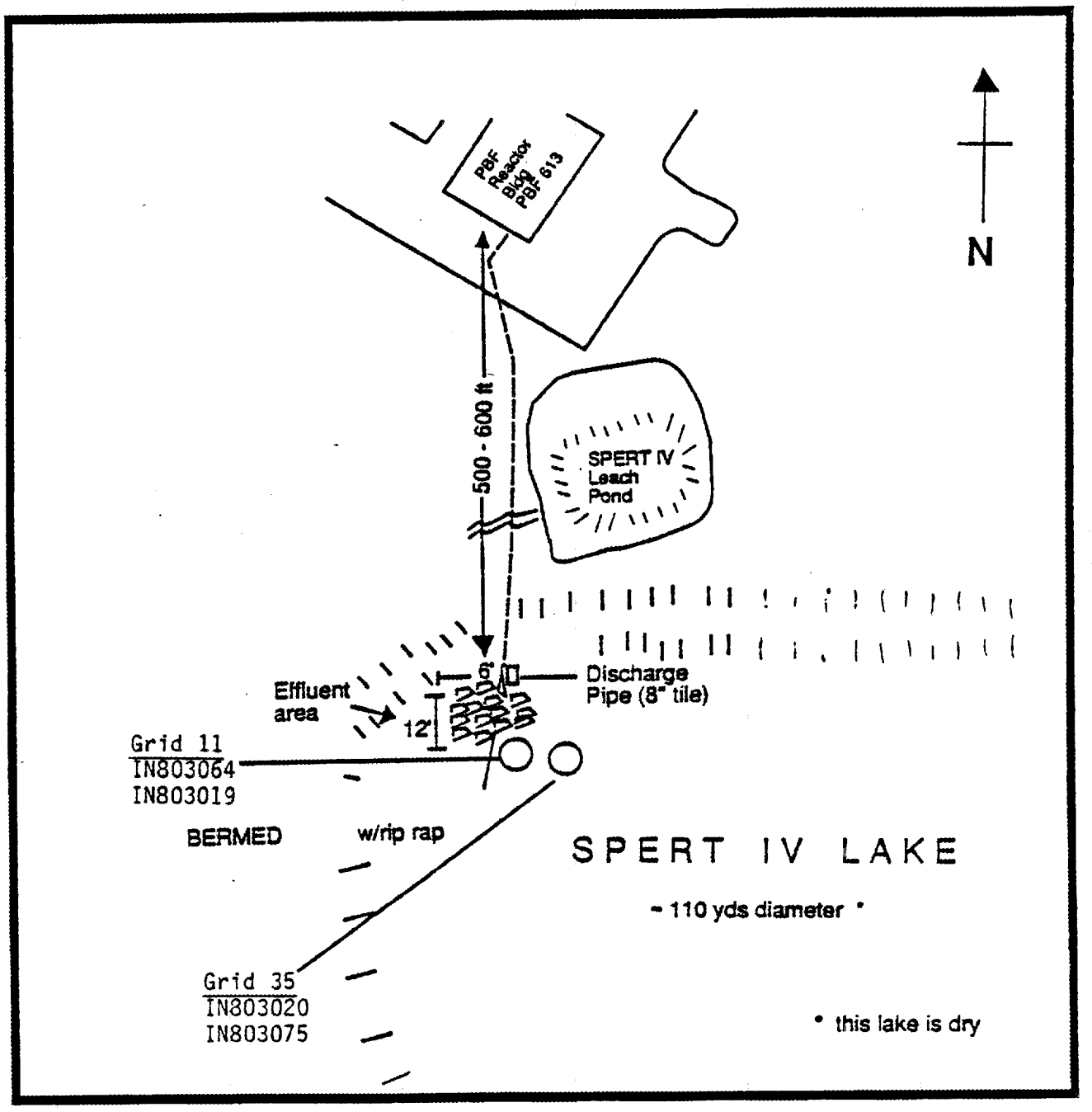


Figure 4.5c. PBF/SPERT IV Lake (Request 803)

Environmental Problem: 5
Request Number: 804

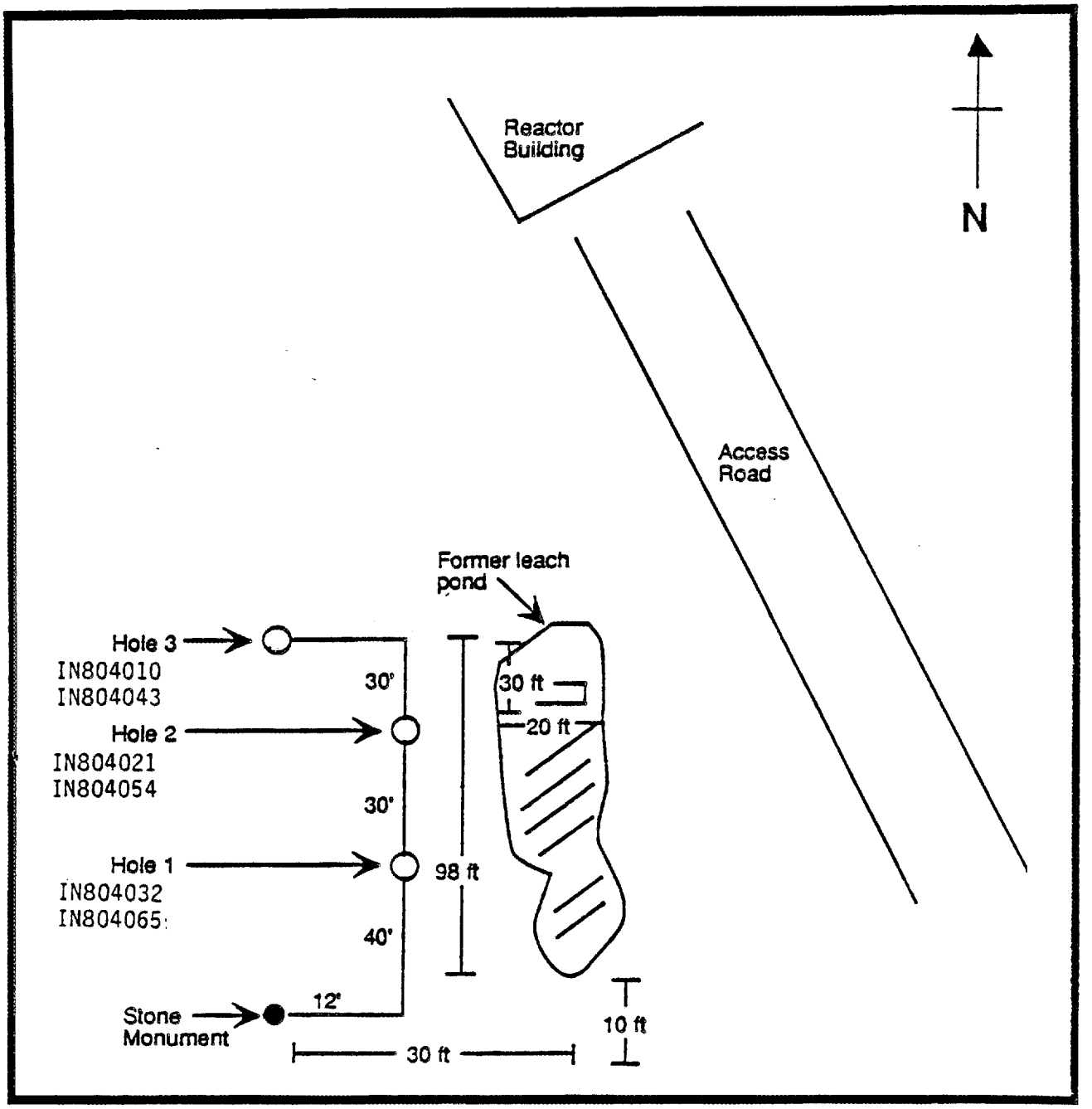


Figure 4.5d. BORAX II-V Leach Pond (Request 804)

Environmental Problem: 5
Request Number: 805

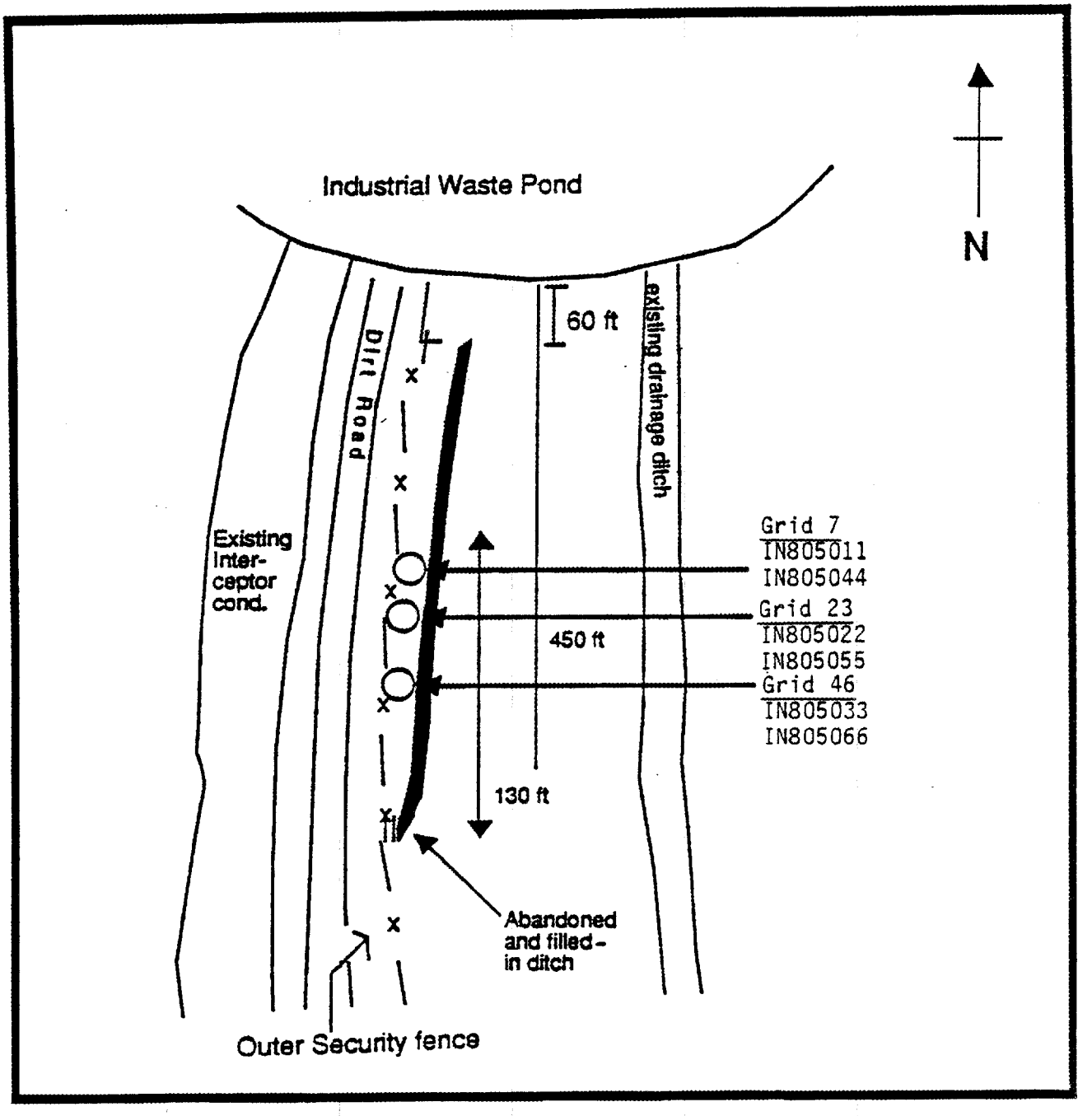


Figure 4.5e. ANL-W Abandoned and Covered Ditch (Request 805)

Environmental Problem: 5
Request Number: 806

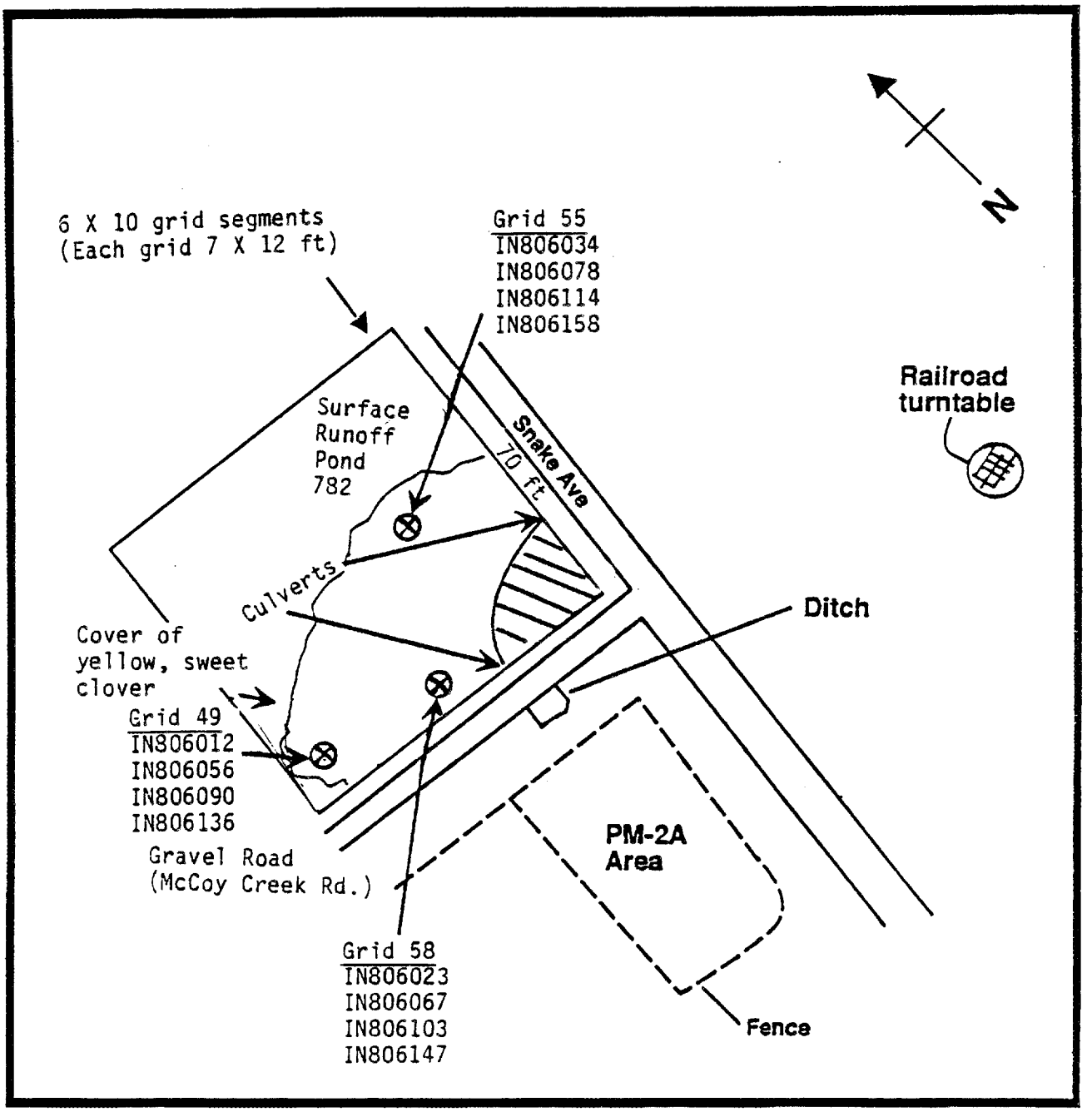


Figure 4.5f. TAN/TSF Drainage Pond (Request 806)

Environmental Problem: 5
Request Number: 807

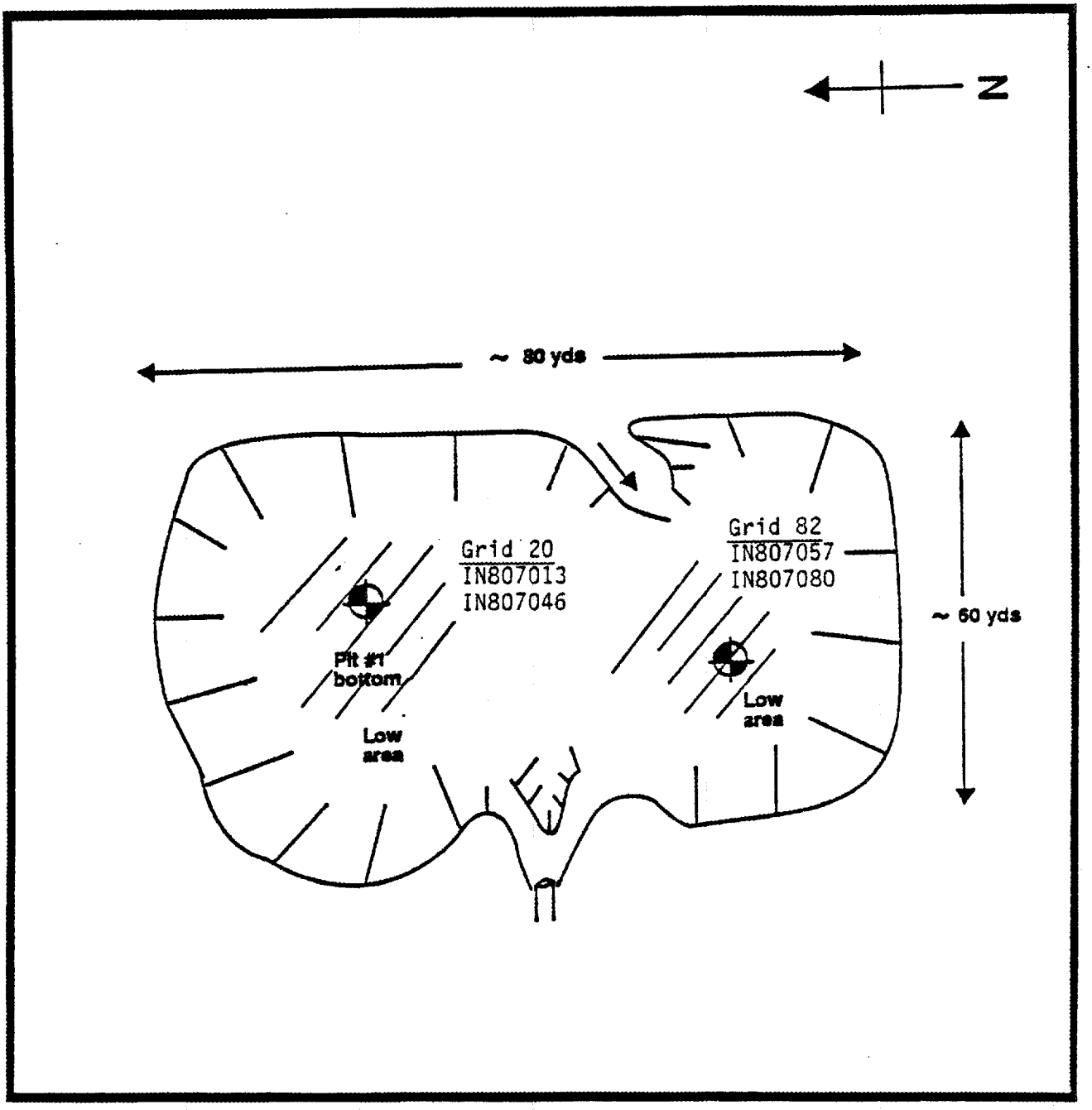


Figure 4.5g. ICPP Gravel Pit 1 (Request 807)

Environmental Problem: 5
Request Number: 808

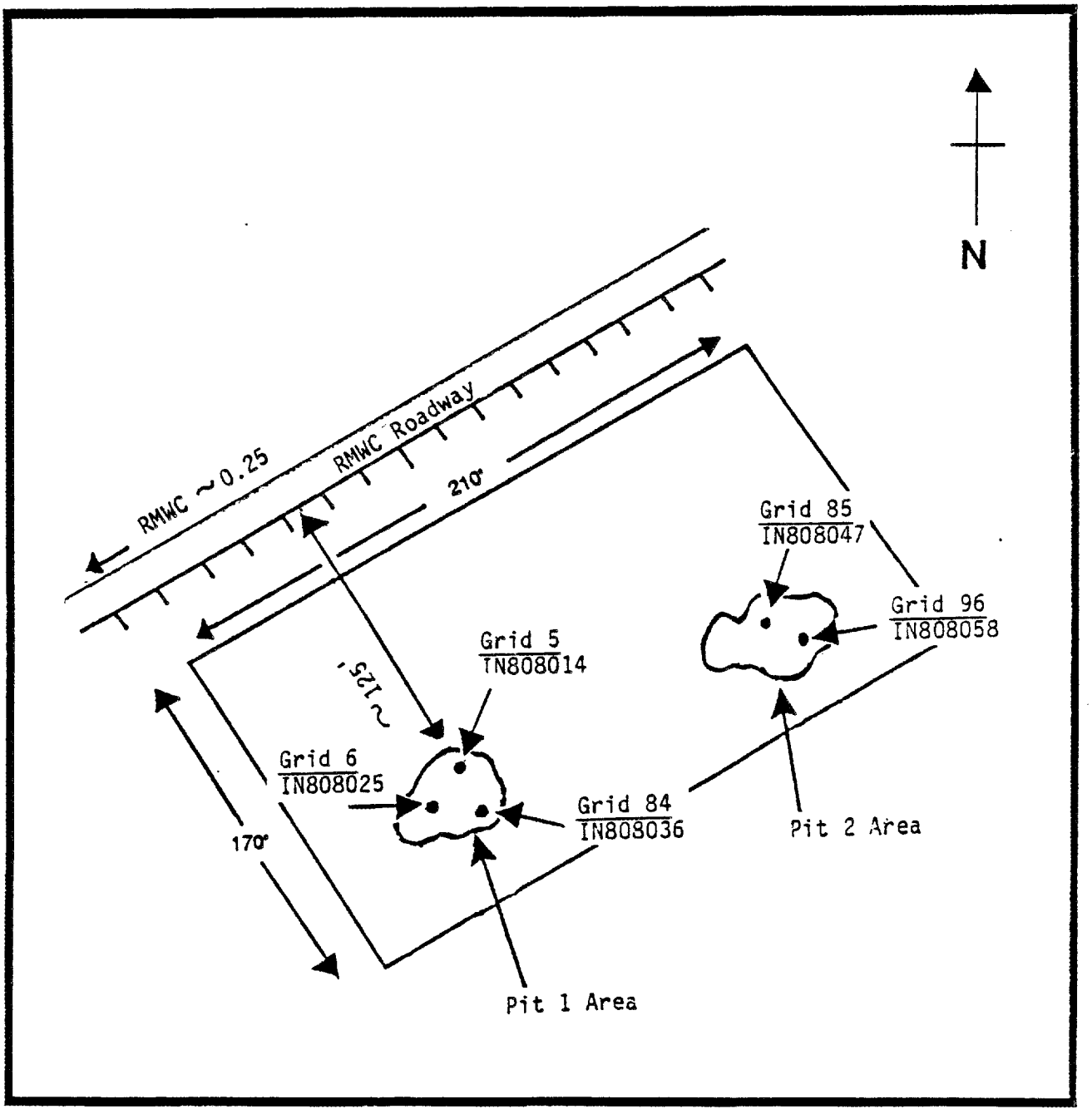


Figure 4.5h. LCCDA Pits 1 and 2 (Request 808)

Environmental Problem: 5
Request Number: 809

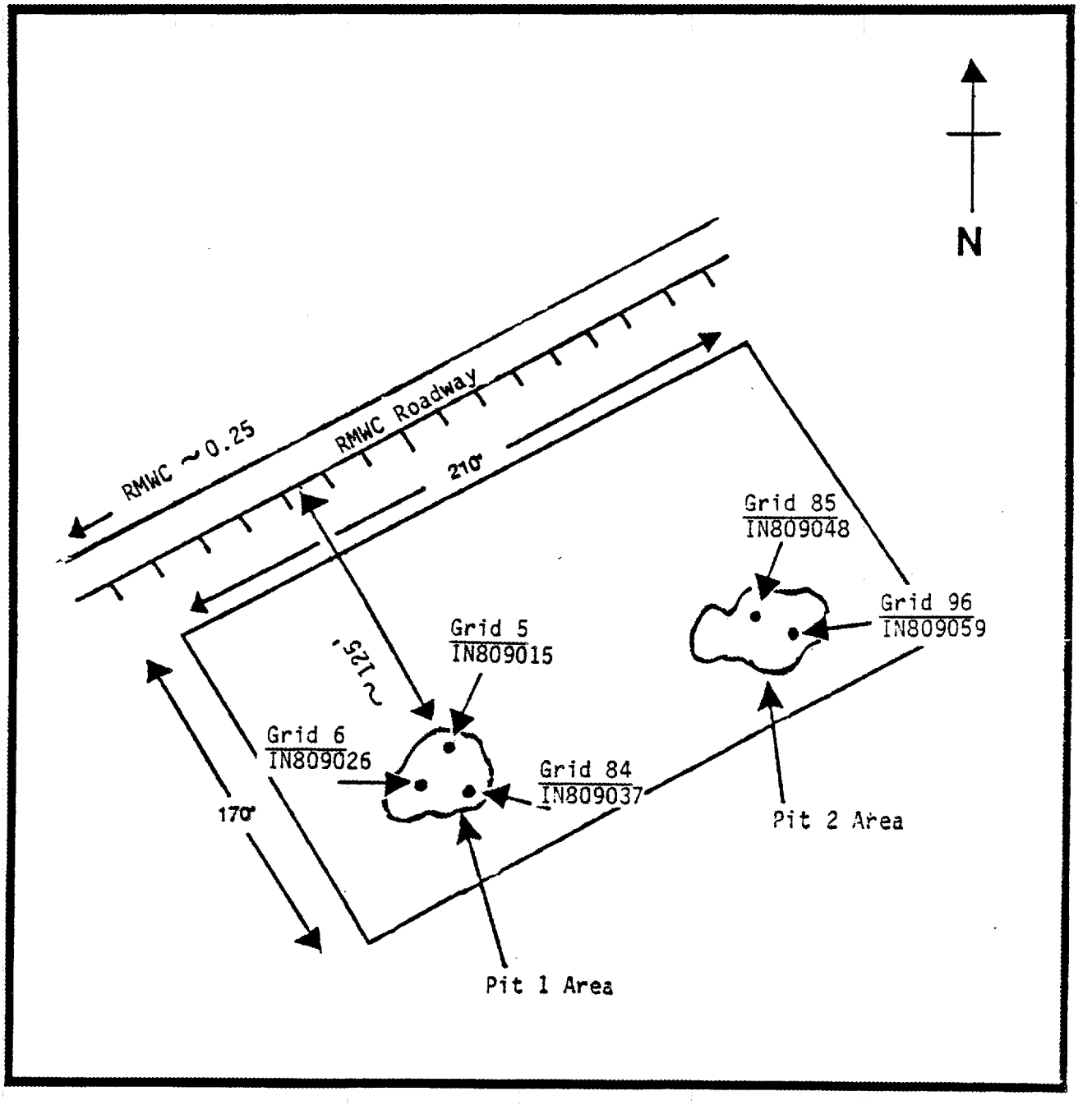


Figure 4.5i. LCCDA Pits 1 and 2 (Request 809)

Environmental Problem: 5
Request Number: 810

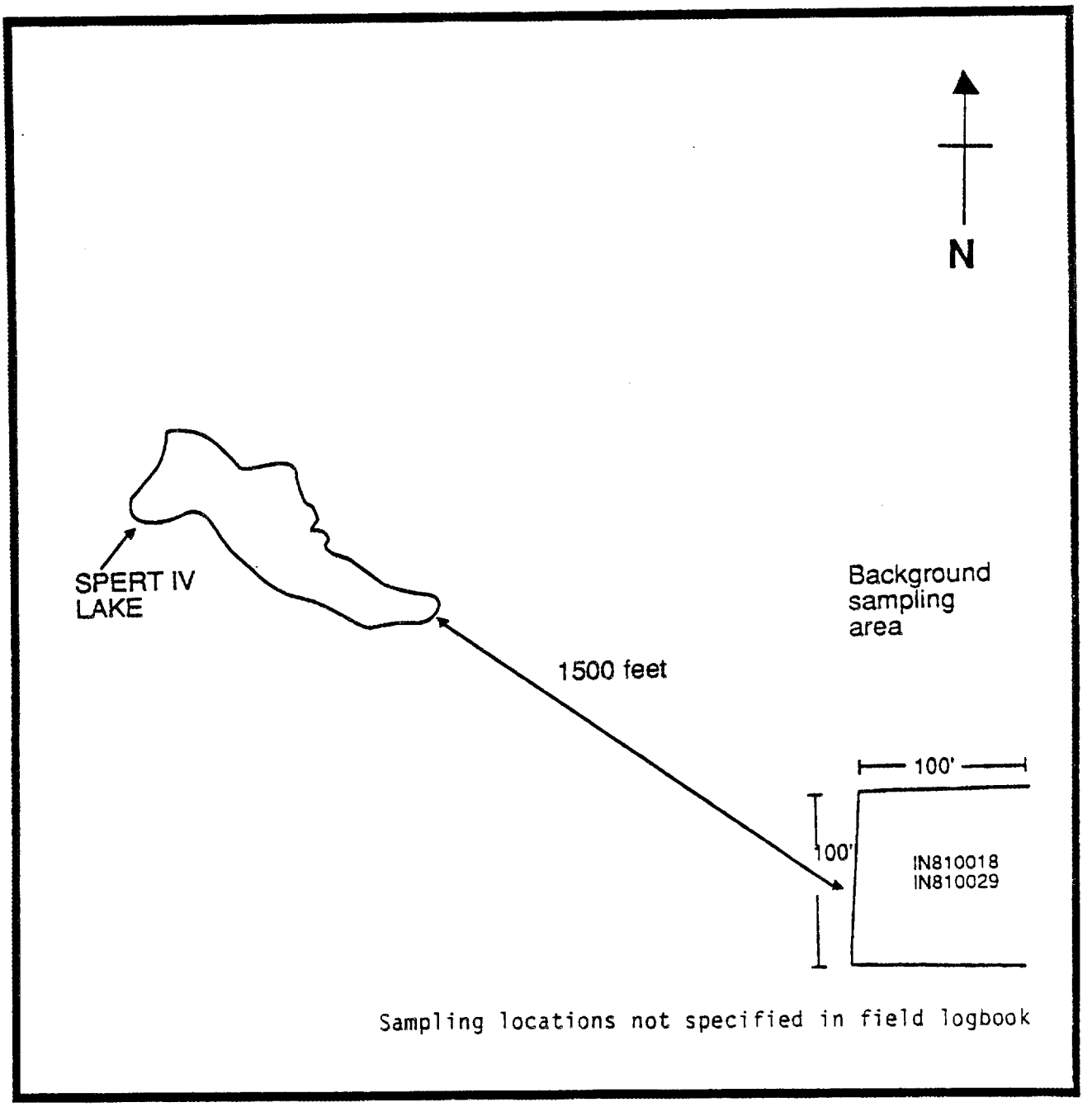


Figure 4.5j. Reference Soil (Request 810)

Environmental Problem: 5
Request Number: 811

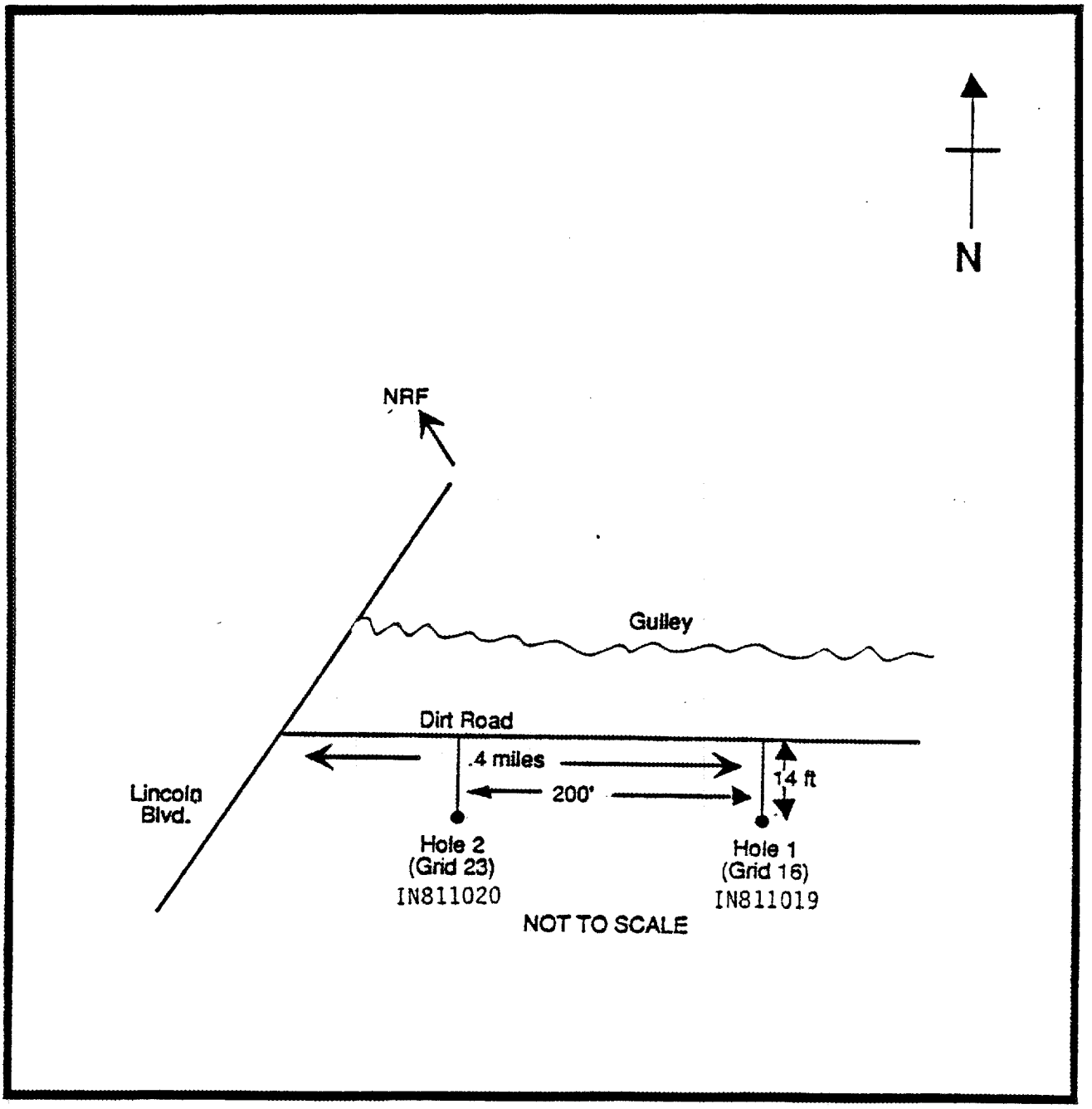


Figure 4.5k. Reference Soil (Request 811)

DRAFT DO NOT CITE

TABLE 4.2.5 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 5

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN801 | OMRE | LEACH POND | SOIL | 3 | 3 | GRAB | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 3 | 0 | 0 |
| IN802 | OMRE | LEACH POND | SOIL | 15 | 9 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 0 | 0 |
| IN803 | OMRE | LEACH POND | SOIL | 5 | 5 | S COM | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN804 | OMRE | LEACH POND | SOIL | 6 | 6 | GRAB | 0 | 0 | 6 | 6 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN805 | OMRE | LEACH POND | SOIL | 6 | 6 | S COM | 0 | 0 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 6 | 0 | 0 |
| IN806 | OMRE | LEACH POND | SOIL | 20 | 12 | GRAB | 0 | 0 | 12 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 12 | 12 |
| IN807 | OMRE | LEACH POND | SOIL | 9 | 4 | GRAB | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 |
| IN808 | OMRE | LEACH POND | SOIL | 5 | 5 | GRAB | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN809 | OMRE | LEACH POND | SOIL | 5 | 5 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 0 | 0 |
| IN810 | OMRE | LEACH POND | SOIL | 2 | 2 | BKGRN | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| IN811 | OMRE | LEACH POND | SOIL | 2 | 2 | GRAB | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| | | MED TOTAL | | 78 | 59 | | 4 | 4 | 45 | 45 | 0 | 0 | 0 | 6 | 3 | 3 | 21 | 37 | 18 | 18 |
| IN803 | OMRE | LEACH POND | AIR | 2 | 2 | QC FL | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN803 | OMRE | LEACH POND | AIR | 5 | 5 | GRAB | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MED TOTAL | | 7 | 7 | | 0 | 0 | 0 | 0 | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN806 | OMRE | LEACH POND | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| IN807 | OMRE | LEACH POND | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | | MED TOTAL | | 2 | 2 | | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 |
| | | EP TOTAL | | 87 | 68 | | 4 | 4 | 47 | 47 | 7 | 7 | 0 | 6 | 3 | 3 | 22 | 39 | 19 | 20 |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 801
LOCATION: OMRE LEACH POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN801017 | IN801028 | IN801039 | | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 8.7 | 7.7 | 7.7 | | | |
| RADS (CPM) | | 40 | 40 | 40 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN801017C IN801017C GRAB | IN801017D IN801017D GRAB | IN801017D IN801017K GRAB | IN801028C IN801017C GRAB | IN801028D IN801017D GRAB | IN801028D IN801017K GRAB |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | | 20100 | | | 19200 | |
| BARIUM | | | 247 | | | 217 | |
| BERYLLIUM | | | 1.9 E | | | 1.8 E | |
| CADMIUM | | | 0.53 B | | | 0.59 B | |
| CALCIUM | | | 71200 | | | 67800 | |
| CHROMIUM | | | 29 | | | 29 | |
| COBALT | | | 8.5 | | | 8 | |
| COPPER | | | 17 | | | 17 | |
| IRON | | | 22300 | | | 21200 | |
| LEAD | | | 6.2 B | | | 8.2 B | |
| MAGNESIUM | | | 17500 E | | | 16600 E | |
| MANGANESE | | | 494 E | | | 462 E | |
| MERCURY | | 0.03 B | | | 0.05 | | |
| NICKEL | | | 24 | | | 25 | |
| POTASSIUM | | | | 3300 | | | 4400 |
| SILVER | | | 1.2 B | | | 1.2 B | |
| SODIUM | | | 2160 | | | 901 | |
| VANADIUM | | | 50 E | | | 43 E | |
| ZINC | | | 63 | | | 66 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN801039C IN801017C GRAB | IN801039D IN801017D GRAB | IN801039D IN801017K GRAB |
|---|---|---|---|---|
| ALUMINUM | | | 17400 | |
| BARIUM | | | 201 | |
| BERYLLIUM | | | 1.7 E | |
| CADMIUM | | | 0.59 B | |
| CALCIUM | | | 76800 | |
| CHROMIUM | | | 25 | |
| COBALT | | | 6.6 B | |
| COPPER | | | 17 | |
| IRON | | | 18300 | |
| LEAD | | | 7.4 B | |
| MAGNESIUM | | | 17600 E | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 801
LOCATION: OMRE LEACH POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN801039C | IN801039D | IN801039D |
|---|---|---|---|---|
| | SDG NO: | IN801017C | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB |
| MANGANESE | | | 395 E | |
| MERCURY | | 0.03 B | | |
| NICKEL | | | 21 | |
| POTASSIUM | | | | 3500 |
| SILVER | | | 1.5 B | |
| SODIUM | | | 1010 | |
| VANADIUM | | | 42 E | |
| ZINC | | | 65 | |

| EXTRACTABLE ORGANICS (UG/KG) | SAMP NO: | IN801017B | IN801028B | IN801039B |
|---|---|---|---|---|
| | SDG NO: | IN801017B | IN801017B | IN801017B |
| | TYPE: | GRAB | GRAB | GRAB |
| BIS(2-ETHYLHEXYL)PHTHALATE | | 700 U | 720 U | 430 J |
| * POSS 5,5-DIMETHYL-2(5H)( 8.22) | | | | 1300 J |
| * POSS 5,5-DIMETHYL-2(5H)( 8.27) | | | 1200 J | |
| * PROBABLE C13 HYDROCARBO(19.83) | | | | 460 J |
| * PROBABLE C18 HYDROCARBO(22.68) | | | | 6400 J |
| * PROBABLE C18 HYDROCARBO(22.75) | | 3600 J | | |
| * UNKNOWN HYDROCARBON(28.60) | | | | 940 J |
| * UNKNOWN HYDROCARBON(31.57) | | | | 2900 J |
| * UNKNOWN HYDROCARBON(35.63) | | | | 1700 J |
| * UNKNOWN( 7.77) | | | | 600 J |
| * UNKNOWN( 8.27) | | 950 J | | |
| * UNKNOWN( 8.95) | | | | 1200 J |
| * UNKNOWN( 9.00) | | 820 J | 710 J | |
| * UNKNOWN(22.73) | | | 770 J | |
| * UNKNOWN(31.68) | | | | 1200 J |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN801017A | IN801028A | IN801039A |
|---|---|---|---|---|
| | SDG NO: | IN801017A | IN801017A | IN801017A |
| | TYPE: | GRAB | GRAB | GRAB |
| METHYLENE CHLORIDE | | 41 | 62 | 69 |
| 1,1,1-TRICHLOROETHANE | | 51 | 21 | 26 |
| * UNKNOWN( 7.47) | | | | 33 J |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 802
LOCATION: CFA MOTOR POOL POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN802041 | IN802074 | | | | |
|---|---|---|---|---|---|---|---|
| RADS (CPM) | | 100 | 100 | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN802018A | IN802029A | IN802030A | IN802041A | IN802052A | IN802063A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN514019A | IN514019A | IN514019A | IN801017A | IN522019A | IN801017A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 27 U | 70 | 50 | 44 U | 11 U | 41 U |
| METHYLENE CHLORIDE | | 80 | 260 | 180 | 33 | 41 | 38 |
| TOLUENE | | 3 J | 13 U | 12 U | 22 U | 6 U | 21 U |
| 1,1,1-TRICHLOROETHANE | | 15 | 25 | 8 J | 22 | 6 U | 21 U |
| 2-BUTANONE | | 190 | 140 | 170 | 44 U | 11 U | 41 U |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN802074A | IN802085A | IN802096A |
|---|---|---|---|---|
| | SDG NO: | IN802074A | IN801017A | IN801017A |
| | TYPE: | GRAB | GRAB | GRAB |
| ACETONE | | 45 U | 42 U | 45 U |
| METHYLENE CHLORIDE | | 460 | 170 | 100 |
| TOLUENE | | 23 U | 21 U | 23 U |
| 1,1,1-TRICHLOROETHANE | | 20 J | 11 J | 23 U |
| 2-BUTANONE | | 45 U | 42 U | 45 U |

S&A REQUEST: 803
LOCATION: PBF/SPERT IV LAKE LOWEST LYING AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN803031A | IN803031A | IN803031A | IN803031B | IN803031B | IN803042A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012C | IN803053A | IN811020A | IN301045D | IN511016K | IN301012C |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | | 14700 | | |
| ANTIMONY | | | 0.3 B | | | | |
| ARSENIC | | | | 0.83 B | | | |
| BARIUM | | | | | 191 | | |
| BERYLLIUM | | | | | 1.4 E | | |
| CADMIUM | | | | 0.59 B | | | |
| CALCIUM | | | | | 4080 | | |
| CHROMIUM | | | | | 22 | | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 803
LOCATION: PBF/SPERT IV LAKE LOWEST LYING AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: IN803031A | IN803031A | IN803031A | IN803031B | IN803031B | IN803042A |
|---|---|---|---|---|---|---|
| | SDG NO: IN301012C | IN803053A | IN811020A | IN301045D | IN511016K | IN301012C |
| | TYPE: S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| COBALT | | | | 7.3 B | | |
| COPPER | | | | 20 | | |
| IRON | | | | 20200 | | |
| LEAD | | | 12 | | | |
| MAGNESIUM | | | | 5270 E | | |
| MANGANESE | | | | 441 | | |
| MERCURY | 0.03 B | | | | | 0.02 B |
| NICKEL | | | | 24 | | |
| POTASSIUM | | | | | 3300 | |
| SELENIUM | | | 0.25 B | | | |
| SILVER | | | 0.06 U | | | |
| SODIUM | | | | 190 B | | |
| THALLIUM | | | 0.21 U | | | |
| VANADIUM | | | | 31 E | | |
| ZINC | | | | 76 | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: IN803042A | IN803042A | IN803042B | IN803042B | IN803053A | IN803053A |
|---|---|---|---|---|---|---|
| | SDG NO: IN803053A | IN811020A | IN301045D | IN511016K | IN301012C | IN803053A |
| | TYPE: S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | 13100 | | | |
| ANTIMONY | 0.46 B | | | | | 0.35 B |
| ARSENIC | | 4.5 | | | | |
| BARIUM | | | 192 | | | |
| BERYLLIUM | | | 1.5 E | | | |
| CADMIUM | | 0.6 B | | | | |
| CALCIUM | | | 6830 | | | |
| CHROMIUM | | | 20 | | | |
| COBALT | | | 7.7 | | | |
| COPPER | | | 21 | | | |
| IRON | | | 20100 | | | |
| LEAD | | 16 | | | | |
| MAGNESIUM | | | 5670 E | | | |
| MANGANESE | | | 456 | | | |
| MERCURY | | | | | 0.02 B | |
| NICKEL | | | 26 | | | |
| POTASSIUM | | | | 2800 | | |
| SELENIUM | | 0.4 B | | | | |
| SILVER | | 0.1 B | | | | |
| SODIUM | | | 185 B | | | |
| THALLIUM | | 0.32 B | | | | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 803
LOCATION: PBF/SPERT IV LAKE LOWEST LYING AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN803042A | IN803042A | IN803042B | IN803042B | IN803053A | IN803053A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN803053A | IN811020A | IN301045D | IN511016K | IN301012C | IN803053A |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| VANADIUM | | | | 29 E | | | |
| ZINC | | | | 75 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN803053A | IN803053B | IN803053B | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN811020A | IN301045D | IN511016K | | | |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | | | |
| ALUMINUM | | | 11300 | | | | |
| ANTIMONY | | | | | | | |
| ARSENIC | | 4.7 | | | | | |
| BARIUM | | | 187 | | | | |
| BERYLLIUM | | | 1.4 E | | | | |
| CADMIUM | | 0.67 B | | | | | |
| CALCIUM | | | 4460 | | | | |
| CHROMIUM | | | 18 | | | | |
| COBALT | | | 7.5 | | | | |
| COPPER | | | 20 | | | | |
| IRON | | | 18300 | | | | |
| LEAD | | 18 | | | | | |
| MAGNESIUM | | | 5050 E | | | | |
| MANGANESE | | | 475 | | | | |
| MERCURY | | | | | | | |
| NICKEL | | | 24 | | | | |
| POTASSIUM | | | | 2900 | | | |
| SELENIUM | | 0.43 B | | | | | |
| SILVER | | 0.08 B | | | | | |
| SODIUM | | | 141 B | | | | |
| THALLIUM | | 0.28 B | | | | | |
| VANADIUM | | | 26 E | | | | |
| ZINC | | | 69 | | | | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 803
LOCATION: PBF/SPERT IV LAKE LOWEST LYING AREA
MEDIUM: AIR

| SOIL GAS (UG/M3) | SAMP NO: | IN803086A | IN803097A | IN803100A | IN803111A | IN803122A |
|---|---|---|---|---|---|---|
| | SDG NO: | IN803064A | IN803064A | IN803064A | IN803064A | IN803064A |
| | TYPE: | GRAB | GRAB | GRAB | FIELD BLANK | FIELD BLANK |
| ACETONE | | 50 U | 3200 | 7300 | 940 | 860 |
| BENZENE | | 49 | 81 | 69 | 18 J | 25 U |
| CARBON TETRACHLORIDE | | 25 U | 25 U | 12 J | 25 U | 25 U |
| CHLOROBENZENE | | 8 J | 26 | 29 | 14 J | 25 U |
| CHLOROFORM | | 25 U | 370 | 200 | 45 | 27 |
| ETHYLBENZENE | | 25 U | 12 J | 58 | 25 U | 13 J |
| METHYLENE CHLORIDE | | 25 U | 14000 B | 15000 B | 2000 B | 1600 B |
| TETRACHLOROETHENE | | 40 | 61 | 61 | 28 | 25 U |
| TOLUENE | | 980 | 2700 | 3000 | 835 | 170 |
| TRICHLOROETHENE | | 25 U | 10 J | 9 J | 25 U | 25 U |
| XYLENE (TOTAL) | | 25 U | 25 U | 193 | 10 J | 63 |
| 1,1,1-TRICHLOROETHANE | | 25 U | 25 U | 26 | 25 U | 25 U |
| 2-BUTANONE | | 50 U | 920 | 430 | 67 | 50 U |
| * ALPHA PINENE(24.88) | | | | 85 J | | |
| * HEXANE(17.01) | | 38 J | | | | |
| * HEXANE(17.77) | | | 72 J | | | |
| * HEXANE(17.79) | | | | 83 J | | |
| * HEXANE(17.87) | | | | | 15 J | |
| * ISOOCTANE(21.94) | | | 108 J | | | |
| * METHYLCYCLOHEXANE(17.88) | | 31 J | | | | |
| * METHYLCYCLOHEXANE(18.61) | | | 48 J | | | |
| * TRICHLOROFLUOROMETHANE( 6.39) | | | | 6600 J | | |
| * TRICHLOROFLUOROMETHANE( 8.16) | | | | | 470 J | |
| * UNKNOWN C-2 BENZENE(30.36) | | | | | | 100 J |
| * UNKNOWN( 5.97) | | | | | | 1200 J |
| * UNKNOWN(11.72) | | | 170 J | | | |
| * UNKNOWN(12.27) | | | 170 J | | | |
| * UNKNOWN(13.97) | | 19 J | | | | |
| * UNKNOWN(14.61) | | 24 J | | | | |
| * UNKNOWN(15.26) | | 22 J | | | | |
| * UNKNOWN(19.02) | | 22 J | | | | |
| * UNKNOWN(19.61) | | | | | 13 | |
| * UNKNOWN(20.85) | | | | | 22 | |
| * UNKNOWN(21.06) | | 62 J | | | | |
| * UNKNOWN(21.29) | | | 76 J | | | |
| * UNKNOWN(21.31) | | | | 100 J | | |
| * UNKNOWN(21.39) | | | | | 42 | |
| * UNKNOWN(21.70) | | 39 J | | | | |
| * UNKNOWN(21.90) | | | | 130 J | | |
| * UNKNOWN(23.39) | | | | 130 J | | |
| * UNKNOWN(23.42) | | | 56 J | | | 24 J |
| * UNKNOWN(23.43) | | | | | 37 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 803
LOCATION: PBF/SPERT IV LAKE LOWEST LYING AREA
MEDIUM: AIR

| SOIL GAS (UG/M3) | SAMP NO: | IN803086A | IN803097A | IN803100A | IN803111A | IN803122A |
|---|---|---|---|---|---|---|
| | SDG NO: | IN803064A | IN803064A | IN803064A | IN803064A | IN803064A |
| | TYPE: | GRAB | GRAB | GRAB | FIELD BLANK | FIELD BLANK |
| * UNKNOWN(24.76) | | | | | | 23 J |
| * UNKNOWN(24.96) | | | | | 22 | |
| * UNKNOWN(25.21) | | | | | 57 | |
| * UNKNOWN(28.00) | | | | 69 J | | |
| * UNKNOWN(30.04) | | | | 69 J | | |
| * UNKNOWN(30.38) | | | | 300 J | | |
| * 2-METHYLPENTANE(16.04) | | | 42 J | | | |
| * 2,3-DIMETHYLPENTANE(19.51) | | | 48 J | | | |
| * 3-METHYLHEXANE(20.51) | | 55 J | | | | |
| * 3-METHYLHEXANE(20.76) | | | | 81 J | | |
| * 3-METHYLHEXANE(20.80) | | | 86 J | | | |

S&A REQUEST: 803
LOCATION: PBF/SPERT IV LAKE NEAR DISCHARGE
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN803019A | IN803019A | IN803019A | IN803019B | IN803019B | IN803020A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012C | IN803053A | IN811020A | IN301045D | IN511016K | IN301012C |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | | 15300 | | |
| ANTIMONY | | | 0.33 B | | | | |
| ARSENIC | | | | 3.6 | | | |
| BARIUM | | | | | 183 | | |
| BERYLLIUM | | | | | 1.6 E | | |
| CADMIUM | | | | 0.41 B | | | |
| CALCIUM | | | | | 10100 | | |
| CHROMIUM | | | | | 25 | | |
| COBALT | | | | | 8.2 | | |
| COPPER | | | | | 23 | | |
| IRON | | | | | 22100 | | |
| LEAD | | | | 14 | | | |
| MAGNESIUM | | | | | 7260 E | | |
| MANGANESE | | | | | 444 | | |
| MERCURY | | 0.03 B | | | | | 0.04 B |
| NICKEL | | | | | 26 | | |
| POTASSIUM | | | | | | 3300 | |
| SELENIUM | | | | 0.3 B | | | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 803
LOCATION: PBF/SPERT IV LAKE NEAR DISCHARGE
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN803019A | IN803019A | IN803019A | IN803019B | IN803019B | IN803020A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012C | IN803053A | IN811020A | IN301045D | IN511016K | IN301012C |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| SILVER | | | | 0.34 B | | | |
| SODIUM | | | | | 489 B | | |
| THALLIUM | | | | 0.22 B | | | |
| VANADIUM | | | | | 36 E | | |
| ZINC | | | | | 77 | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN803020A | IN803020A | IN803020B | IN803020B |
|---|---|---|---|---|---|
| | SDG NO: | IN803053A | IN811020A | IN301045D | IN511016K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | | 17000 | |
| ANTIMONY | | 0.35 B | | | |
| ARSENIC | | | 2.2 | | |
| BARIUM | | | | 216 | |
| BERYLLIUM | | | | 1.7 E | |
| CADMIUM | | | 0.51 B | | |
| CALCIUM | | | | 7300 | |
| CHROMIUM | | | | 24 | |
| COBALT | | | | 8.1 | |
| COPPER | | | | 24 | |
| IRON | | | | 22800 | |
| LEAD | | | 13 | | |
| MAGNESIUM | | | | 6840 E | |
| MANGANESE | | | | 523 | |
| MERCURY | | | | | |
| NICKEL | | | | 26 | |
| POTASSIUM | | | | | 3500 |
| SELENIUM | | | 0.2 B | | |
| SILVER | | | 0.16 B | | |
| SODIUM | | | | 546 B | |
| THALLIUM | | | 0.25 B | | |
| VANADIUM | | | | 35 E | |
| ZINC | | | | 83 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 803
LOCATION: PBF/SPERT IV LAKE NEAR DISCHARGE
MEDIUM: AIR

| SOIL GAS (UG/M3) | SAMP NO: | IN803064A | IN803075A |
|---|---|---|---|
| | SDG NO: | IN803064A | IN803064A |
| | TYPE: | GRAB | GRAB |
| ACETONE | | 1600 | 4900 |
| BENZENE | | 13 J | 21 J |
| CARBON TETRACHLORIDE | | 25 U | 6 J |
| CHLOROFORM | | 22 J | 66 |
| ETHYLBENZENE | | 25 U | 8 J |
| METHYLENE CHLORIDE | | 2400 B | 4000 B |
| TETRACHLOROETHENE | | 7 J | 21 |
| TOLUENE | | 180 | 750 |
| XYLENE (TOTAL) | | 25 U | 5 J |
| 1,1,1-TRICHLOROETHANE | | 12 J | 22 J |
| 2-BUTANONE | | 100 | 180 |
| 4-METHYL-2-PENTANONE | | 50 U | 86 |
| * HEXANE(17.83) | | 23 J | 24 J |
| * TRICHLOROFLUOROMETHANE( 7.63) | | 8600 J | |
| * TRICHLOROFLUOROMETHANE( 7.77) | | | 7.8 J |
| * UNKNOWN(11.40) | | 66 J | |
| * UNKNOWN(12.53) | | | 71 J |
| * UNKNOWN(15.50) | | | 13 J |
| * UNKNOWN(15.90) | | 14 J | 11 J |
| * UNKNOWN(16.25) | | 18 J | |
| * UNKNOWN(18.67) | | | 13 J |
| * UNKNOWN(18.73) | | 9 J | |
| * UNKNOWN(19.57) | | 11 J | |
| * UNKNOWN(20.75) | | | 35 J |
| * UNKNOWN(20.76) | | 31 J | |
| * UNKNOWN(21.25) | | 24 J | |
| * UNKNOWN(21.84) | | | 42 J |
| * UNKNOWN(21.85) | | 27 J | |
| * UNKNOWN(23.38) | | | 27 J |
| * UNKNOWN(24.81) | | | 28 J |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 804
LOCATION: BORAX II-V LEACH POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN804010 | IN804021 | IN804032 | IN804043 | IN804054 | IN804065 |
|---|---|---|---|---|---|---|---|
| RADS (CPM) | | 100 | 100 | 80 | 100 | 100 | 100 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN804010B | IN804010C | IN804010C | IN804021B | IN804021C | IN804021C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN301045D | IN511016K | IN804010B | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 12700 | | | 14500 | |
| BARIUM | | | 234 | | | 251 | |
| BERYLLIUM | | | 1.6 E | | | 1.7 E | |
| CADMIUM | | | 0.72 | | | 0.84 | |
| CALCIUM | | | 52100 | | | 57500 | |
| CHROMIUM | | | 21 | | | 26 | |
| COBALT | | | 7.2 | | | 7.2 B | |
| COPPER | | | 18 | | | 17 | |
| IRON | | | 19400 | | | 19700 | |
| LEAD | | | 8.9 B | | | 8.5 B | |
| MAGNESIUM | | | 11300 E | | | 10900 E | |
| MANGANESE | | | 440 | | | 439 | |
| MERCURY | | 0.04 B | | | 0.02 B | | |
| NICKEL | | | 22 | | | 23 | |
| POTASSIUM | | | | 2500 | | | 3100 |
| SILVER | | | 0.85 U | | | 0.94 B | |
| SODIUM | | | 1360 | | | 1310 | |
| VANADIUM | | | 31 E | | | 40 E | |
| ZINC | | | 64 | | | 64 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN804032B | IN804032C | IN804032C | IN804043B | IN804043C | IN804043C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN301045D | IN511016K | IN804010B | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 16600 | | | 19000 | |
| BARIUM | | | 270 | | | 243 | |
| BERYLLIUM | | | 1.8 E | | | 1.8 E | |
| CADMIUM | | | 0.8 | | | 0.76 | |
| CALCIUM | | | 53100 | | | 41900 | |
| CHROMIUM | | | 29 | | | 28 | |
| COBALT | | | 8.4 | | | 8 | |
| COPPER | | | 19 | | | 22 | |
| IRON | | | 23000 | | | 23600 | |
| LEAD | | | 9.6 B | | | 8.8 B | |
| MAGNESIUM | | | 12100 E | | | 12000 E | |
| MANGANESE | | | 508 | | | 458 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 804
LOCATION: BORAX II-V LEACH POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN804032B | IN804032C | IN804032C | IN804043B | IN804043C | IN804043C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN301045D | IN511016K | IN804010B | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| MERCURY | | 0.03 B | | | 0.03 B | | |
| NICKEL | | | 25 | | | 25 | |
| POTASSIUM | | | | 3100 | | | 4600 |
| SILVER | | | 0.88 U | | | 0.89 U | |
| SODIUM | | | 1340 | | | 1300 | |
| VANADIUM | | | 46 E | | | 42 E | |
| ZINC | | | 67 | | | 73 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN804054B | IN804054C | IN804054C | IN804065B | IN804065C | IN804065C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN301045D | IN511016K | IN804010B | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 16800 | | | 17700 | |
| BARIUM | | | 282 | | | 272 | |
| BERYLLIUM | | | 1.8 E | | | 2 E | |
| CADMIUM | | | 0.88 | | | 0.91 | |
| CALCIUM | | | 52600 | | | 73700 | |
| CHROMIUM | | | 25 | | | 25 | |
| COBALT | | | 8.3 | | | 8.5 | |
| COPPER | | | 22 | | | 25 | |
| IRON | | | 22400 | | | 22800 | |
| LEAD | | | 13 B | | | 11 B | |
| MAGNESIUM | | | 13200 E | | | 14200 E | |
| MANGANESE | | | 477 | | | 518 | |
| MERCURY | | 0.04 B | | | 0.03 B | | |
| NICKEL | | | 25 | | | 26 | |
| POTASSIUM | | | | 3300 | | | 3400 |
| SILVER | | | 1.1 B | | | 1.1 B | |
| SODIUM | | | 2020 | | | 1540 | |
| VANADIUM | | | 41 E | | | 38 E | |
| ZINC | | | 80 | | | 82 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 805
LOCATION: ANL-W ABANDONED AND COVERED DITCH
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN805011B | IN805011C | IN805011C | IN805022B | IN805022C | IN805022C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN301012D | IN301012K | IN522019C | IN301012D | IN301012K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | 12300 | | | 19000 | |
| BARIUM | | | 173 N | | | 143 N | |
| BERYLLIUM | | | 1.4 | | | 1.8 | |
| CADMIUM | | | 0.68 B | | | 0.67 B | |
| CALCIUM | | | 44500 * | | | 59600 * | |
| CHROMIUM | | | 22 | | | 27 | |
| COBALT | | | 11 | | | 7 B | |
| COPPER | | | 18 | | | 19 | |
| IRON | | | 22900 | | | 19500 | |
| LEAD | | | 10 B | | | 9.8 B | |
| MAGNESIUM | | | 12500 | | | 15500 | |
| MANGANESE | | | 672 | | | 396 | |
| MERCURY | | 0.02 B | | | 0.02 B | | |
| NICKEL | | | 25 | | | 24 | |
| POTASSIUM | | | | 2900 | | | 4200 |
| SILVER | | | 1.1 B | | | 0.94 U | |
| SODIUM | | | 904 | | | 780 B | |
| VANADIUM | | | 40 | | | 42 | |
| ZINC | | | 58 | | | 74 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN805033B | IN805033C | IN805033C | IN805044B | IN805044C | IN805044C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN301012D | IN301012K | IN522019C | IN301012D | IN301012K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | 13900 | | | 19200 | |
| BARIUM | | | 169 N | | | 209 N | |
| BERYLLIUM | | | 1.5 | | | 1.8 | |
| CADMIUM | | | 0.67 B | | | 0.73 B | |
| CALCIUM | | | 59500 * | | | 58300 * | |
| CHROMIUM | | | 22 | | | 29 | |
| COBALT | | | 6.1 B | | | 7.6 B | |
| COPPER | | | 16 | | | 22 | |
| IRON | | | 16100 | | | 22100 | |
| LEAD | | | 5.6 B | | | 6.7 B | |
| MAGNESIUM | | | 14300 | | | 15100 | |
| MANGANESE | | | 508 | | | 543 | |
| MERCURY | | 0.01 B | | | 0.02 B | | |
| NICKEL | | | 22 | | | 26 | |
| POTASSIUM | | | | 3200 | | | 5000 |
| SILVER | | | 0.9 B | | | 1.1 B | |
| SODIUM | | | 637 B | | | 1030 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 805
LOCATION: ANL-W ABANDONED AND COVERED DITCH
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN805033B | IN805033C | IN805033C | IN805044B | IN805044C | IN805044C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN301012D | IN301012K | IN522019C | IN301012D | IN301012K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| VANADIUM | | | 36 | | | 44 | |
| ZINC | | | 57 | | | 69 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN805055B | IN805055C | IN805055C | IN805066B | IN805066C | IN805066C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN301012D | IN301012K | IN522019C | IN301012D | IN301012K |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ALUMINUM | | | 18600 | | | 18900 | |
| BARIUM | | | 181 N | | | 183 N | |
| BERYLLIUM | | | 1.8 | | | 1.8 | |
| CADMIUM | | | 0.79 | | | 0.77 | |
| CALCIUM | | | 61300 * | | | 57600 * | |
| CHROMIUM | | | 27 | | | 27 | |
| COBALT | | | 6.9 B | | | 7.1 B | |
| COPPER | | | 19 | | | 20 | |
| IRON | | | 19800 | | | 20000 | |
| LEAD | | | 7.7 B | | | 9.4 B | |
| MAGNESIUM | | | 15000 | | | 15500 | |
| MANGANESE | | | 470 | | | 435 | |
| MERCURY | | 0.02 B | | | 0.02 B | | |
| NICKEL | | | 24 | | | 25 | |
| POTASSIUM | | | | 4200 | | | 4200 |
| SILVER | | | 1.1 B | | | 0.97 B | |
| SODIUM | | | 904 | | | 738 B | |
| VANADIUM | | | 41 | | | 42 | |
| ZINC | | | 80 | | | 111 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN805011A | IN805022A | IN805033A | IN805044A | IN805055A | IN805066A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505052A | IN301012A | IN301012A | IN301012A | IN301012A | IN301012A |
| | TYPE: | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE | S. COMPOSITE |
| ACETONE | | 25 | 12 U | 14 | 11 U | 12 U | 11 U |
| METHYLENE CHLORIDE | | 6 U | 2 BJ | 6 U | 6 U | 6 U | 1 BJ |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.28) | | | 12 BJ | | | | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 806
LOCATION: TAN/TSF DRAINAGE POND
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: IN806012 | IN806023 | IN806034 | IN806056 | IN806067 | IN806078 |
|---|---|---|---|---|---|---|
| FID/PID (PPM) | 0 | 0 | 0 | 0 | 0 | 0 |
| PH (UNITS) | 7.8 | 8.4 | 7.6 | 7.7 | 8.1 | 8.1 |
| RADS (CPM) | 100 | 100 | 100 | 100 | 100 | 100 |
| TEMPERATURE (DEG C) | | | | | | |

| FIELD MEASUREMENTS | SAMP NO: IN806090 | IN806103 | IN806114 | IN806136 | IN806147 | IN806158 |
|---|---|---|---|---|---|---|
| FID/PID (PPM) | 0 | 0 | 0 | 0 | 0 | 0 |
| PH (UNITS) | 7.7 | 7.9 | 7.2 | 7.5 | 7.8 | 8.1 |
| RADS (CPM) | 100 | 100 | 100 | 100 | 100 | 100 |
| TEMPERATURE (DEG C) | | | | | 45 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: IN806012B | IN806012C | IN806012C | IN806023B | IN806023C | IN806023C |
|---|---|---|---|---|---|---|
| | SDG NO: IN806012B | IN806012C | IN806012K | IN806012B | IN806012C | IN806012K |
| | TYPE: GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 12300 | | | 13800 | |
| ARSENIC | | 13 B | | | 13 B | |
| BARIUM | | 182 | | | 199 | |
| BERYLLIUM | | 1.6 E | | | 1.7 E | |
| CADMIUM | | 0.62 B | | | 0.79 | |
| CALCIUM | | 50600 | | | 54900 | |
| CHROMIUM | | 27 E | | | 29 E | |
| COBALT | | 7.5 | | | 8.5 | |
| COPPER | | 20 | | | 24 | |
| IRON | | 18900 | | | 20900 | |
| LEAD | | 15 B | | | 17 B | |
| MAGNESIUM | | 10800 | | | 11200 | |
| MANGANESE | | 518 E | | | 561 E | |
| MERCURY | 0.06 | | | 0.05 | | |
| NICKEL | | 26 | | | 30 | |
| POTASSIUM | | | 2400 | | | 2800 |
| SELENIUM | | 8.7 U | | | 8.6 U | |
| SILVER | | 0.72 U | | | 1 B | |
| SODIUM | | 666 B | | | 684 B | |
| VANADIUM | | 42 E | | | 44 E | |
| ZINC | | 72 | | | 88 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 806
LOCATION: TAN/TSF DRAINAGE POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN806034B | IN806034C | IN806034C | IN806056B | IN806056C | IN806056C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012B | IN806012C | IN806012K | IN806012B | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 18900 | | | 21300 | |
| ARSENIC | | | 14 B | | | 15 B | |
| BARIUM | | | 224 | | | 256 | |
| BERYLLIUM | | | 2 E | | | 2.1 E | |
| CADMIUM | | | 2.7 | | | 0.81 | |
| CALCIUM | | | 73000 | | | 77200 | |
| CHROMIUM | | | 40 E | | | 48 E | |
| COBALT | | | 10 | | | 9.9 | |
| COPPER | | | 36 | | | 28 | |
| IRON | | | 24500 | | | 25000 | |
| LEAD | | | 34 | | | 21 B | |
| MAGNESIUM | | | 13400 | | | 14600 | |
| MANGANESE | | | 676 E | | | 710 E | |
| MERCURY | | 0.08 | | | 0.06 | | |
| NICKEL | | | 40 | | | 37 | |
| POTASSIUM | | | | 4100 | | | 4300 |
| SELENIUM | | | 12 B | | | 8.7 U | |
| SILVER | | | 1.3 B | | | 1.1 B | |
| SODIUM | | | 610 B | | | 854 | |
| VANADIUM | | | 52 E | | | 61 E | |
| ZINC | | | 157 | | | 112 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN806067B | IN806067C | IN806067C | IN806078B | IN806078C | IN806078C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012B | IN806012C | IN806012K | IN806012B | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 18900 | | | 18200 | |
| ARSENIC | | | 17 B | | | 17 B | |
| BARIUM | | | 243 | | | 237 | |
| BERYLLIUM | | | 2 E | | | 2 E | |
| CADMIUM | | | 0.88 | | | 0.85 | |
| CALCIUM | | | 75300 | | | 76700 | |
| CHROMIUM | | | 83 E | | | 55 E | |
| COBALT | | | 9 | | | 9.4 | |
| COPPER | | | 26 | | | 25 | |
| IRON | | | 23500 | | | 22900 | |
| LEAD | | | 20 B | | | 18 B | |
| MAGNESIUM | | | 14200 | | | 14100 | |
| MANGANESE | | | 663 E | | | 669 E | |
| MERCURY | | 0.05 | | | 0.05 B | | |
| NICKEL | | | 36 | | | 34 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 806
LOCATION: TAN/TSF DRAINAGE POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN806067B IN806012B GRAB | IN806067C IN806012C GRAB | IN806067C IN806012K GRAB | IN806078B IN806012B GRAB | IN806078C IN806012C GRAB | IN806078C IN806012K GRAB |
|---|---|---|---|---|---|---|---|
| POTASSIUM | | | | 3900 | | | 3800 |
| SELENIUM | | | 9.4 U | | | 11 B | |
| SILVER | | | 1.2 B | | | 1.3 B | |
| SODIUM | | | 685 B | | | 751 B | |
| VANADIUM | | | 58 E | | | 55 E | |
| ZINC | | | 101 | | | 100 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN806090B IN806012B GRAB | IN806090C IN806012C GRAB | IN806090C IN806012K GRAB | IN806103B IN806012B GRAB | IN806103C IN806012C GRAB | IN806103C IN806012K GRAB |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | | 18500 | | | 16300 | |
| ARSENIC | | | 13 B | | | 15 B | |
| BARIUM | | | 253 | | | 238 | |
| BERYLLIUM | | | 2 E | | | 1.9 E | |
| CADMIUM | | | 0.74 B | | | 0.85 | |
| CALCIUM | | | 76000 | | | 76600 | |
| CHROMIUM | | | 66 E | | | 50 E | |
| COBALT | | | 9.6 | | | 8.9 | |
| COPPER | | | 26 | | | 24 | |
| IRON | | | 23800 | | | 21300 | |
| LEAD | | | 19 B | | | 15 B | |
| MAGNESIUM | | | 12500 | | | 12400 | |
| MANGANESE | | | 780 E | | | 808 E | |
| MERCURY | | 0.05 | | | 0.05 B | | |
| NICKEL | | | 37 | | | 33 | |
| POTASSIUM | | | | 3100 | | | 3200 |
| SELENIUM | | | 9.6 U | | | 9.6 U | |
| SILVER | | | 1.1 B | | | 1.1 B | |
| SODIUM | | | 559 B | | | 559 B | |
| VANADIUM | | | 50 E | | | 50 E | |
| ZINC | | | 93 | | | 80 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN806114B IN806012B GRAB | IN806114C IN806012C GRAB | IN806114C IN806012K GRAB | IN806136B IN806012B GRAB | IN806136C IN806012C GRAB | IN806136C IN806012K GRAB |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | | 15000 | | | 30400 | |
| ARSENIC | | | 15 B | | | 9.1 U | |
| BARIUM | | | 249 | | | 349 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 806
LOCATION: TAN/TSF DRAINAGE POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN806114B | IN806114C | IN806114C | IN806136B | IN806136C | IN806136C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012B | IN806012C | IN806012K | IN806012B | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| BERYLLIUM | | | 1.8 E | | | 2.2 E | |
| CADMIUM | | | 0.92 | | | 1 | |
| CALCIUM | | | 88200 | | | 17100 | |
| CHROMIUM | | | 44 E | | | 62 E | |
| COBALT | | | 9 | | | 14 | |
| COPPER | | | 22 | | | 34 | |
| IRON | | | 19800 | | | 34700 | |
| LEAD | | | 15 B | | | 24 B | |
| MAGNESIUM | | | 13700 | | | 11600 | |
| MANGANESE | | | 953 E | | | 738 E | |
| MERCURY | | 0.05 | | | 0.04 B | | |
| NICKEL | | | 33 | | | 47 | |
| POTASSIUM | | | | 2800 | | | 5000 |
| SELENIUM | | | 9.5 U | | | 9.1 U | |
| SILVER | | | 1.4 B | | | 1.3 B | |
| SODIUM | | | 692 B | | | 499 B | |
| VANADIUM | | | 47 E | | | 61 E | |
| ZINC | | | 77 | | | 129 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN806147B | IN806147C | IN806147C | IN806158B | IN806158C | IN806158C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012B | IN806012C | IN806012K | IN806012B | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 19200 | | | 23400 | |
| ARSENIC | | | 10 B | | | 9.5 U | |
| BARIUM | | | 277 | | | 301 | |
| BERYLLIUM | | | 1.8 E | | | 2 E | |
| CADMIUM | | | 0.6 B | | | 0.77 B | |
| CALCIUM | | | 35900 | | | 24100 | |
| CHROMIUM | | | 66 E | | | 56 E | |
| COBALT | | | 10 | | | 12 | |
| COPPER | | | 25 | | | 30 | |
| IRON | | | 24900 | | | 30300 | |
| LEAD | | | 18 B | | | 21 B | |
| MAGNESIUM | | | 9750 | | | 10400 | |
| MANGANESE | | | 716 E | | | 729 E | |
| MERCURY | | 0.04 B | | | 0.05 B | | |
| NICKEL | | | 36 | | | 42 | |
| POTASSIUM | | | | 3500 | | | 3700 |
| SELENIUM | | | 9.4 U | | | 9.5 U | |
| SILVER | | | 0.87 B | | | 1 B | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 806
LOCATION: TAN/TSF DRAINAGE POND
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN806147B | IN806147C | IN806147C | IN806158B | IN806158C | IN806158C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012B | IN806012C | IN806012K | IN806012B | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| SODIUM | | | 648 B | | | 438 B | |
| VANADIUM | | | 53 E | | | 52 E | |
| ZINC | | | 88 | | | 108 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN806034A | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012A | | | | | |
| | TYPE: | GRAB | | | | | |
| * UNKNOWN(25.27) | | 5 J | | | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN806012D | IN806023D | IN806034D | IN806056D | IN806067D | IN806078D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8794-A | LLL8794-A | LLL8794-A | LLL8794-A | LLL8794-A | LLL8794-A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CS-137 | | 150 | 1900 | 6300 | 260 | 130 | 98 |
| K-40 | | 15000 | 17000 | 16000 | 16000 | 15000 | 15000 |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN806090D | IN806103D | IN806114D | IN806136D | IN806147D | IN806158D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8794-A | LLL8794-B | LLL8794-B | LLL8794-B | LLL8794-B | LLL8794-B |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CS-137 | | 70 U | 130 | 70 U | 70 U | 80 U | 150 |
| K-40 | | 13000 | 13000 | 15000 | 18000 | 19000 | 18000 |

S&A REQUEST: 806
LOCATION: TAN/TSF DRAINAGE POND
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN806216E | IN806216F | IN806216F |
|---|---|---|---|---|
| | SDG NO: | IN501014D | IN401013I | IN401013K |
| | TYPE: | RINSATE | RINSATE | RINSATE |
| ALUMINUM | | | 431 | |
| BARIUM | | | 14 B | |
| CADMIUM | | | 1.1 B | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 806
LOCATION: TAN/TSF DRAINAGE POND
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN806216E | IN806216F | IN806216F | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN501014D | IN401013I | IN401013K | | | |
| | TYPE: | RINSATE | RINSATE | RINSATE | | | |
| CALCIUM | | | 1490 B | | | | |
| CHROMIUM | | | 6.6 B | | | | |
| COPPER | | | 25 | | | | |
| IRON | | | 808 | | | | |
| MAGNESIUM | | | 251 B | | | | |
| MANGANESE | | | 17 | | | | |
| MERCURY | | 0.04 B | | | | | |
| NICKEL | | | 12 B | | | | |
| POTASSIUM | | | | 600 B | | | |
| SODIUM | | | 516 B | | | | |
| ZINC | | | 69 | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN806216A | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN401024B | | | | | |
| | TYPE: | RINSATE | | | | | |
| ACETONE | | 7 BJ | | | | | |

S&A REQUEST: 807
LOCATION: ICPP GRAVEL PIT 1
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN807013 | IN807046 | IN807057 | IN807080 | | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0 | | 0.8 | 0 | | |
| HNU (PPM) | | 0.5 | 0.5 | | | | |
| RADS (CPM) | | 100 | 100 | 100 | 100 | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN807013C | IN807013C | IN807046B | IN807046C | IN807046C | IN807057C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012C | IN806012K | IN806012B | IN806012C | IN806012K | IN806012C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 5600 | | | 25100 | | 7780 |
| ANTIMONY | | 4.6 BN | | | 4.4 UN | | 4.2 UN |
| BARIUM | | 108 | | | 184 | | 119 |
| BERYLLIUM | | 0.92 E | | | 1.7 E | | 1.2 E |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 807
LOCATION: ICPP GRAVEL PIT 1
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN807013C | IN807013C | IN807046B | IN807046C | IN807046C | IN807057C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012C | IN806012K | IN806012B | IN806012C | IN806012K | IN806012C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CADMIUM | | 0.42 B | | | 0.34 B | | 0.44 B |
| CALCIUM | | 11000 | | | 5470 | | 25600 |
| CHROMIUM | | 20 E | | | 34 E | | 21 E |
| COBALT | | 4.6 B | | | 9.4 | | 4.8 B |
| COPPER | | 14 | | | 26 | | 15 |
| IRON | | 11300 | | | 25800 | | 14400 |
| LEAD | | 8.7 B | | | 15 B | | 8.8 B |
| MAGNESIUM | | 3950 | | | 7860 | | 5070 |
| MANGANESE | | 155 E | | | 543 E | | 186 E |
| MERCURY | | | | 0.04 | | | |
| NICKEL | | 20 | | | 29 | | 19 |
| POTASSIUM | | | 990 | | | 4200 | |
| SODIUM | | 270 B | | | 587 B | | 282 B |
| VANADIUM | | 24 E | | | 44 E | | 33 E |
| ZINC | | 42 | | | 81 | | 54 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN807057C | IN807080B | IN807080C | IN807080C | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012K | IN806012B | IN806012C | IN806012K | | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | | |
| ALUMINUM | | | | 6110 | | | |
| ANTIMONY | | | | 5 BN | | | |
| BARIUM | | | | 105 | | | |
| BERYLLIUM | | | | 1 E | | | |
| CADMIUM | | | | 0.41 B | | | |
| CALCIUM | | | | 14000 | | | |
| CHROMIUM | | | | 22 E | | | |
| COBALT | | | | 4 B | | | |
| COPPER | | | | 16 | | | |
| IRON | | | | 11400 | | | |
| LEAD | | | | 10 B | | | |
| MAGNESIUM | | | | 3560 | | | |
| MANGANESE | | | | 140 E | | | |
| MERCURY | | | 0.05 | | | | |
| NICKEL | | | | 18 | | | |
| POTASSIUM | | 1700 | | | 1200 | | |
| SODIUM | | | | 271 B | | | |
| VANADIUM | | | | 32 E | | | |
| ZINC | | | | 42 | | | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 807
LOCATION: ICPP GRAVEL PIT 1
MEDIUM: SOIL

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN807046D | IN807046E | IN807046F | IN807080D | IN807080E | IN807080F |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8795 | LLL8795 | LLL8795 | LLL8795 | LLL8795 | LLL8795 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CS-137 | | | 30 U | | | 85 | |
| GROSS ALPHA | | 4600 | | | 6100 | | |
| GROSS BETA | | 6900 | | | 5500 | | |
| H-3 | | | | 1200 | | | 1100 |
| K-40 | | | 13000 | | | 21000 | |
| MN-54 | | | 34 | | | | |

S&A REQUEST: 807
LOCATION: ICPP GRAVEL PIT 1
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN807104E | IN807104F | IN807104F |
|---|---|---|---|---|
| | SDG NO: | IN501014D | IN401013I | IN401013K |
| | TYPE: | RINSATE | RINSATE | RINSATE |
| ALUMINUM | | | 1180 | |
| BARIUM | | | 25 B | |
| CALCIUM | | | 3880 B | |
| CHROMIUM | | | 8.4 B | |
| COPPER | | | 83 | |
| IRON | | | 1460 | |
| MAGNESIUM | | | 707 B | |
| MANGANESE | | | 29 | |
| MERCURY | | 0.04 B | | |
| NICKEL | | | 8.7 B | |
| POTASSIUM | | | | 480 B |
| SODIUM | | | 4360 B | |
| ZINC | | | 240 | |

| RADIOCHEMISTRY (PCI/L) | SAMP NO: | IN807104F | IN807104G |
|---|---|---|---|
| | SDG NO: | LLL8795 | LLL8795 |
| | TYPE: | RINSATE | RINSATE |
| GROSS ALPHA | | | 7 |
| GROSS BETA | | | 25 |
| H-3 | | 2600 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 808
LOCATION: LCCDA PITS 1 AND 2
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN808014 | IN808025 | IN808036 | IN808047 | IN808058 |
|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 2.7 | 2.5 | 2.8 | 2 | 1.8 |
| PH (UNITS) | | 5.8 | 8.5 | 8.1 | 8.5 | 8.1 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN808014A | IN808014B | IN808014B | IN808025A | IN808025B | IN808025B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN514019D | IN514019K | IN804010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 15900 | | | 19500 | |
| BARIUM | | | 283 | | | 290 | |
| BERYLLIUM | | | 1.7 | | | 1.8 | |
| CADMIUM | | | 0.29 B | | | 0.15 B | |
| CALCIUM | | | 63400 * | | | 39800 * | |
| CHROMIUM | | | 24 | | | 30 | |
| COBALT | | | 7.9 B | | | 9.4 | |
| COPPER | | | 20 | | | 23 | |
| IRON | | | 20900 | | | 27700 | |
| LEAD | | | 11 B | | | 9.6 B | |
| MAGNESIUM | | | 12200 | | | 12800 | |
| MANGANESE | | | 430 N | | | 514 N | |
| MERCURY | | 0.04 B | | | 0.06 | | |
| NICKEL | | | 22 | | | 27 | |
| POTASSIUM | | | | 3000 | | | 3900 |
| SILVER | | | 0.95 U | | | 0.91 U | |
| SODIUM | | | 2250 | | | 1390 | |
| VANADIUM | | | 38 | | | 45 | |
| ZINC | | | 53 | | | 68 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN808036A | IN808036B | IN808036B | IN808047A | IN808047B | IN808047B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN514019D | IN514019K | IN804010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 17600 | | | 16500 | |
| BARIUM | | | 262 | | | 215 | |
| BERYLLIUM | | | 1.9 | | | 1.6 | |
| CADMIUM | | | 0.37 B | | | 0.26 B | |
| CALCIUM | | | 81700 * | | | 33000 * | |
| CHROMIUM | | | 26 | | | 27 | |
| COBALT | | | 9.6 | | | 8.3 | |
| COPPER | | | 24 | | | 23 | |
| IRON | | | 23800 | | | 22800 | |
| LEAD | | | 6.3 B | | | 6.5 B | |
| MAGNESIUM | | | 11600 | | | 12100 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 808
LOCATION: LCCDA PITS 1 AND 2
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN808036A | IN808036B | IN808036B | IN808047A | IN808047B | IN808047B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN514019D | IN514019K | IN804010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| MANGANESE | | | 602 N | | | 482 N | |
| MERCURY | | 0.03 B | | | 0.02 B | | |
| NICKEL | | | 26 | | | 25 | |
| POTASSIUM | | | | 3400 | | | 3300 |
| SILVER | | | 0.98 B | | | 0.89 U | |
| SODIUM | | | 1940 | | | 1710 | |
| VANADIUM | | | 39 | | | 41 | |
| ZINC | | | 67 | | | 67 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN808058A | IN808058B | IN808058B |
|---|---|---|---|---|
| | SDG NO: | IN804010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB |
| ALUMINUM | | | 18800 | |
| BARIUM | | | 231 | |
| BERYLLIUM | | | 1.8 | |
| CADMIUM | | | 0.42 B | |
| CALCIUM | | | 44000 * | |
| CHROMIUM | | | 26 | |
| COBALT | | | 8.5 | |
| COPPER | | | 27 | |
| IRON | | | 24600 | |
| LEAD | | | 6.7 B | |
| MAGNESIUM | | | 9470 | |
| MANGANESE | | | 545 N | |
| MERCURY | | 0.02 B | | |
| NICKEL | | | 26 | |
| POTASSIUM | | | | 4400 |
| SILVER | | | 0.97 B | |
| SODIUM | | | 1520 | |
| VANADIUM | | | 39 | |
| ZINC | | | 78 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 809
LOCATION: LCCDA PITS 1 AND 2
MEDIUM: SOIL

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN809015A | IN809026A | IN809037A | IN809048A | IN809059A |
|---|---|---|---|---|---|---|
| | SDG NO: | IN505052A | IN505052A | IN505052A | IN505052A | IN511050A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 34 | 46 | 19 | 11 U | 12 U |
| METHYLENE CHLORIDE | | 4 BJ | 6 B | 3 BJ | 3 BJ | 6 U |
| * 1,1,2-TRICHL-1,2,2-TRIF(11.31) | | | 7 BJ | | | |
| * 1,1,2-TRICHL-1,2,2-TRIF(11.32) | | | | 9 BJ | 8 BJ | |
| * 1,1,2-TRICHL-1,2,2-TRIF(11.33) | | 7 BJ | | | | |

S&A REQUEST: 810
LOCATION: SPERT IV LAKE - BACKGROUND SAMPLE
MEDIUM: SOIL

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN810018C | IN810029C |
|---|---|---|---|
| | SDG NO: | IN511016D | IN511016D |
| | TYPE: | BACKGROUND | BACKGROUND |
| CHLORIDE | | 1.4 | 10 |
| FLUORIDE | | 2.5 | 2.2 |
| NITRATE-N | | 0.61 | 6.3 |
| O-PHOSPHATE-P | | 0.62 | 1.3 |
| SULFATE | | 5.3 | 14 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN810018A | IN810018A | IN810018A | IN810018B | IN810018B | IN810029A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012C | IN803053A | IN811020A | IN301045D | IN511016K | IN301012C |
| | TYPE: | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND |
| ALUMINUM | | | | | 9130 | | |
| ANTIMONY | | | 0.37 B | | | | |
| ARSENIC | | | | 6.2 | | | |
| BARIUM | | | | | 178 | | |
| BERYLLIUM | | | | | 1.3 E | | |
| CADMIUM | | | | 0.58 B | | | |
| CALCIUM | | | | | 22300 | | |
| CHROMIUM | | | | | 18 | | |
| COBALT | | | | | 7 B | | |
| COPPER | | | | | 19 | | |
| IRON | | | | | 17600 | | |
| LEAD | | | | 12 | | | |
| MAGNESIUM | | | | | 6830 E | | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 810
LOCATION: SPERT IV LAKE - BACKGROUND SAMPLE
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN810018A | IN810018A | IN810018A | IN810018B | IN810018B | IN810029A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012C | IN803053A | IN811020A | IN301045D | IN511016K | IN301012C |
| | TYPE: | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND |
| MANGANESE | | | | | 394 | | |
| MERCURY | | 0.03 B | | | | | 0.02 B |
| NICKEL | | | | | 22 | | |
| POTASSIUM | | | | | | 1800 | |
| SELENIUM | | | | 0.34 B | | | |
| SILVER | | | | 0.24 B | | | |
| SODIUM | | | | | 375 B | | |
| THALLIUM | | | | 0.27 B | | | |
| VANADIUM | | | | | 24 E | | |
| ZINC | | | | | 52 | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN810029A | IN810029A | IN810029B | IN810029B |
|---|---|---|---|---|---|
| | SDG NO: | IN803053A | IN811020A | IN301045D | IN511016K |
| | TYPE: | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND |
| ALUMINUM | | | | 7030 | |
| ANTIMONY | | 0.31 B | | | |
| ARSENIC | | | 5.2 | | |
| BARIUM | | | | 163 | |
| BERYLLIUM | | | | 1.3 E | |
| CADMIUM | | | 1.3 | | |
| CALCIUM | | | | 34000 | |
| CHROMIUM | | | | 14 | |
| COBALT | | | | 5.7 B | |
| COPPER | | | | 16 | |
| IRON | | | | 12900 | |
| LEAD | | | 9.8 | | |
| MAGNESIUM | | | | 6790 E | |
| MANGANESE | | | | 279 | |
| MERCURY | | | | | |
| NICKEL | | | | 18 | |
| POTASSIUM | | | | | 1600 |
| SELENIUM | | | 0.42 B | | |
| SILVER | | | 1.5 B | | |
| SODIUM | | | | 565 B | |
| THALLIUM | | | 0.21 U | | |
| VANADIUM | | | | 23 E | |
| ZINC | | | | 47 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 810
LOCATION: SPERT IV LAKE - BACKGROUND SAMPLE
MEDIUM: SOIL

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN810018D | IN810018E | IN810018F | IN810018G | IN810029D | IN810029E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8656 | LLL8656 | LLL8656 | LLL8656 | LLL8656 | LLL8656 |
| | TYPE: | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND | BACKGROUND |
| CS-137 | | | 190 | | | | 92 |
| EU-155 | | | 76 | | | | 8 |
| GROSS ALPHA | | 6900 | | | | 4500 | |
| GROSS BETA | | 6300 | | | | 4600 | |
| H-3 | | | | | 82 | | |
| K-40 | | | 18000 | | | | 19000 |
| SR-TOT | | | | 240 | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN810029F | IN810029G |
|---|---|---|---|
| | SDG NO: | LLL8656 | LLL8656 |
| | TYPE: | BACKGROUND | BACKGROUND |
| CS-137 | | | |
| EU-155 | | | |
| GROSS ALPHA | | | 71 |
| GROSS BETA | | | |
| H-3 | | | |
| K-40 | | 70 | |
| SR-TOT | | | |

S&A REQUEST: 811
LOCATION: STREAM BOTTOM
MEDIUM: SOIL

| ANIONS AND CYANIDE (MG/KG) | SAMP NO: | IN811019C | IN811020C |
|---|---|---|---|
| | SDG NO: | IN517045F | IN517045F |
| | TYPE: | GRAB | GRAB |
| CHLORIDE | | 5.3 | 140 |
| FLUORIDE | | 1 | 1 |
| NITRATE-N | | 1.4 N | 2.7 N |
| O-PHOSPHATE-P | | 0.33 U | 1.2 |
| SULFATE | | 6.1 N | 17 N |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5 DRAFT DO NOT CITE
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 811
LOCATION: STREAM BOTTOM
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN811019A | IN811019A | IN811019A | IN811019B | IN811019B | IN811020A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012C | IN803053A | IN811020A | IN301045D | IN511016K | IN301012C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | | 10200 | | |
| ANTIMONY | | | 0.27 B | | | | |
| ARSENIC | | | | 3.8 | | | |
| BARIUM | | | | | 159 | | |
| BERYLLIUM | | | | | 1.3 E | | |
| CADMIUM | | | | 0.61 B | | | |
| CALCIUM | | | | | 24200 | | |
| CHROMIUM | | | | | 24 | | |
| COBALT | | | | | 6.3 B | | |
| COPPER | | | | | 16 | | |
| IRON | | | | | 16000 | | |
| LEAD | | | | 14 | | | |
| MAGNESIUM | | | | | 7480 E | | |
| MANGANESE | | | | | 236 | | |
| MERCURY | | 0.03 B | | | | | 0.02 B |
| NICKEL | | | | | 26 | | |
| POTASSIUM | | | | | | 1800 | |
| SELENIUM | | | | 0.29 B | | | |
| SILVER | | | | 0.22 B | | | |
| SODIUM | | | | | 419 B | | |
| VANADIUM | | | | | 31 E | | |
| ZINC | | | | | 82 | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN811020A | IN811020A | IN811020B | IN811020B |
|---|---|---|---|---|---|
| | SDG NO: | IN803053A | IN811020A | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | | 12200 | |
| ANTIMONY | | 0.31 B | | | |
| ARSENIC | | | 3.8 | | |
| BARIUM | | | | 180 | |
| BERYLLIUM | | | | 1.4 E | |
| CADMIUM | | | 0.71 B | | |
| CALCIUM | | | | 15900 | |
| CHROMIUM | | | | 23 | |
| COBALT | | | | 7 B | |
| COPPER | | | | 19 | |
| IRON | | | | 18100 | |
| LEAD | | | 14 | | |
| MAGNESIUM | | | | 7350 E | |
| MANGANESE | | | | 288 | |

TABLE 4.3.5 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 5
PERCOLATION UNITS AND DITCHES

S&A REQUEST: 811
LOCATION: STREAM BOTTOM
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN811020A | IN811020A | IN811020B | IN811020B |
|---|---|---|---|---|---|
| | SDG NO: | IN803053A | IN811020A | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB |
| MERCURY | | | 1 | | |
| NICKEL | | | | 27 | |
| POTASSIUM | | | | | 2500 |
| SELENIUM | | | 0.37 B | | |
| SILVER | | | 0.21 B | | |
| SODIUM | | | | 424 B | |
| VANADIUM | | | | 29 E | |
| ZINC | | | | 102 | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN811019D | IN811019E | IN811019F | IN811019G | IN811020D | IN811020E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8684 | LLL8684 | LLL8684 | LLL8684 | LLL8684 | LLL8684 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CS-137 | | | 160 | | | | 300 |
| GROSS ALPHA | | 3300 | | | | 6400 | |
| GROSS BETA | | 6200 | | | | 6900 | |
| H-3 | | | | | 1500 | | |
| K-40 | | | 18000 | | | | 18000 |
| SR-TOT | | | | 150 | | | |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN811020F | IN811020G |
|---|---|---|---|
| | SDG NO: | LLL8684 | LLL8684 |
| | TYPE: | GRAB | GRAB |
| CS-137 | | | |
| GROSS ALPHA | | | -300 |
| GROSS BETA | | | |
| H-3 | | | |
| K-40 | | 150 | |
| SR-TOT | | | |

## 4.11 Environmental Problem 6: Injection Wells

**Request Numbers:** 812 and 813
**Requester:** Sichelstiel/Levitan
**Finding and Basis:** Eight inactive injection wells located at TEN/IET, TAN/LOFT, TAN/WRRTF, TAN/TSF, TRA, PBF (2), and ICPP were used to dispose of liquid wastes containing hazardous chemicals and radioactive constituents and may have contaminated the unsaturated zone and groundwater. The practice of using injection wells as a method for disposal of undesirable liquid wastes was commonly used at the INEL. These wastes were injected into the subsurface either into the unsaturated zone of highly fractured basalt or alluvial interbeds and/or into groundwater--specifically perched water zones or the Snake River Plain aquifer (the major unconfined aquifer unit). The soils and rock of the unsaturated zone and pore water may have been affected by these past practices. The wastes may have adsorbed to the soils and subsequently desorbed due to natural infiltration and/or recharge from perched water.

### 4.11.1 Sampling and Analysis Objectives

**Statement:** Soil and water samples were to be collected at the ICPP injection well perimeter to determine if various contaminants were present in the unsaturated zone. Soils samples were to be collected from the alluvial interbeds associated with the perforated sections of the well. Water samples were to be obtained from a newly installed stainless steel monitoring well at the injection well perimeter.

**Supporting Information:** The water table aquifer is known to have received liquid wastes that contaminated the aquifer. The two alluvial interbeds from 140-170 ft and 200-225 ft were to be sampled to determine the presence of contaminants. Dated information (mid-1970s) refers to the 200- to 225-ft zone as "the Upper Aquifer." This unit could have been saturated due to influx of liquids from the injection well or another, possibly natural, occurrence, such as a

perched aquifer. Regardless of the cause, it was recommended that a well be installed and screened at the 215- to 225-ft depth. If significant pore water is present in the 140- to 170-ft zone, a staged lysimeter should be installed to sample potentially contaminated pore water within the vadose zone.

### 4.11.2 Sampling and Analytical Design

#### 4.11.2.1 Sampling Design

**Request 812: ICPP Injection Well (Soil) (Fig. 4.6a)** According to the ORNL Sampling Team Leader (27FEB89), this request was deleted from the INEL Sampling and Analysis Plan by discussion with K. Knight and J. Boda of DOE Headquarters because of the prohibitive costs of drilling and installation for the required well. This request was not included in the schedule in Section 8 of the INEL Sampling and Analysis Plan.

Four grab soil samples were to have been collected from a borehole at the ICPP injection well perimeter. The borehole was to have been placed on the perimeter of the injection well, approximately 50 ft from the protective covers/safety railing of the well. Drilling was to be accomplished via rotary methods and samples were to be taken with a split spoon. Two grab samples were to be collected at the interbedded alluvium (140-170 ft) and two samples at the upper aquifer (200-225 ft), including samples near the basalt layer. A 4-in. stainless steel 316 well screened in the upper aquifer (225 ft) and a staged lysimeter clustered with the well within the alluvial soil (based on highest moisture content, as observed) were to have been installed.

**Request 813: ICPP Injection Well (Water) (Fig. 4.6b)** According to the ORNL Sampling Team Leader (27FEB89), this request was deleted from the INEL Sampling and Analysis Plan by discussion with K. Knight and J. Boda of DOE Headquarters because of the prohibitive costs of drilling and installation of the

required well. This request was not included in the schedule in Section 8 of the INEL Sampling and Analysis Plan.

Three grab water samples were to have been collected from the newly installed stainless steel monitoring well (Request 812). Samples were to have been collected with a bailer after well development and purging three to five well volumes (based on borehole diameter) or after the field parameters (pH, specific conductivity, and temperature) stabilized to within 2% between well volumes.

#### 4.11.2.2 Analytical Design

**Request 812:** The field parameters to have been measured were pH, temperature, specific conductivity, and HNu (PID). Parameters to have been analyzed were, ICP metals, AA mercury, AA chromium (total), TCLP metals, gross alpha, gross beta, gamma scan, strontium-90, and tritium oxide.

**Request 813:** The parameters to have been measured for Request 813 included pH, temperature, specific conductivity, and HNu (PID). Parameters to have been analyzed included ICP metals; AA mercury; AA chromium (hexavalent); anions (sulfate, nitrate-N, fluoride); gross alpha; gross beta; gamma scan; strontium-90; and tritium (total).

### 4.11.3 Field and Analytical Data

Field Data:

**Request 812:** *According to the ORNL Sampling Team Leader (27FEB89) Request 812 was deleted from the INEL Sampling and Analysis Plan by discussion with K. Knight and J. Boda of DOE Headquarters because of the prohibitive cost of well installation.*

**Request 813:** *According to the ORNL Sampling Team Leader (27FEB89) Request 813 was deleted from the INEL Sampling and Analysis Plan by discussion with K. Knight and J. Boda of DOE Headquarters because of the prohibitive cost of well installation.*

**Field Data Evaluation:**

**Request 812:** NA.

**Request 813:** NA.

**Analytical Data:**

**Request 812:** *According to the ORNL Sampling Team Leader (27FEB89) Request 812 was deleted from the INEL Sampling and Analysis Plan by discussion with K. Knight and J. Boda of DOE Headquarters because of the prohibitive cost of well installation.*

**Request 813:** According to the ORNL Sampling Team Leader (27FEB89) Request 813 was deleted from the INEL Sampling and Analysis Plan by discussion with K. Knight and J. Boda of DOE Headquarters because of the prohibitive cost of well installation.

**Analytical Data Evaluation:**

**Request 812:** NA.

**Request 813:** NA.

### 4.11.4 Limitations and Qualifications

Date Quality Level:

Request 812: NA.

Request 813: NA.

Field Data:

Request 812: NA.

Request 813: NA.

Analytical Data:

Request 812: NA.

Request 813: NA.

Environmental Problem: 6
Request Number: 812

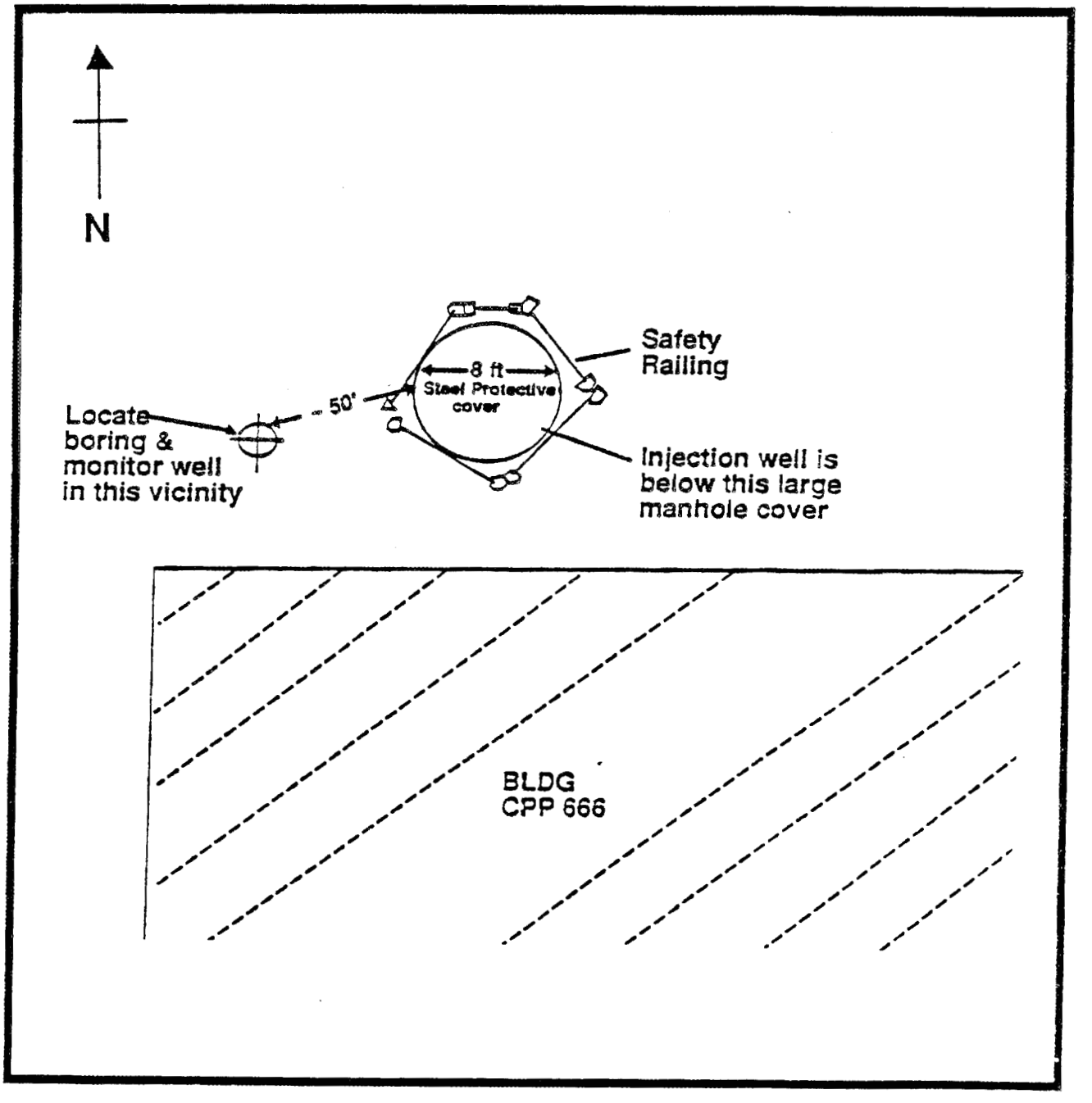


Figure 4.6a. ICPP Injection Well (Request 812)

Environmental Problem: 6
Request Number: 813

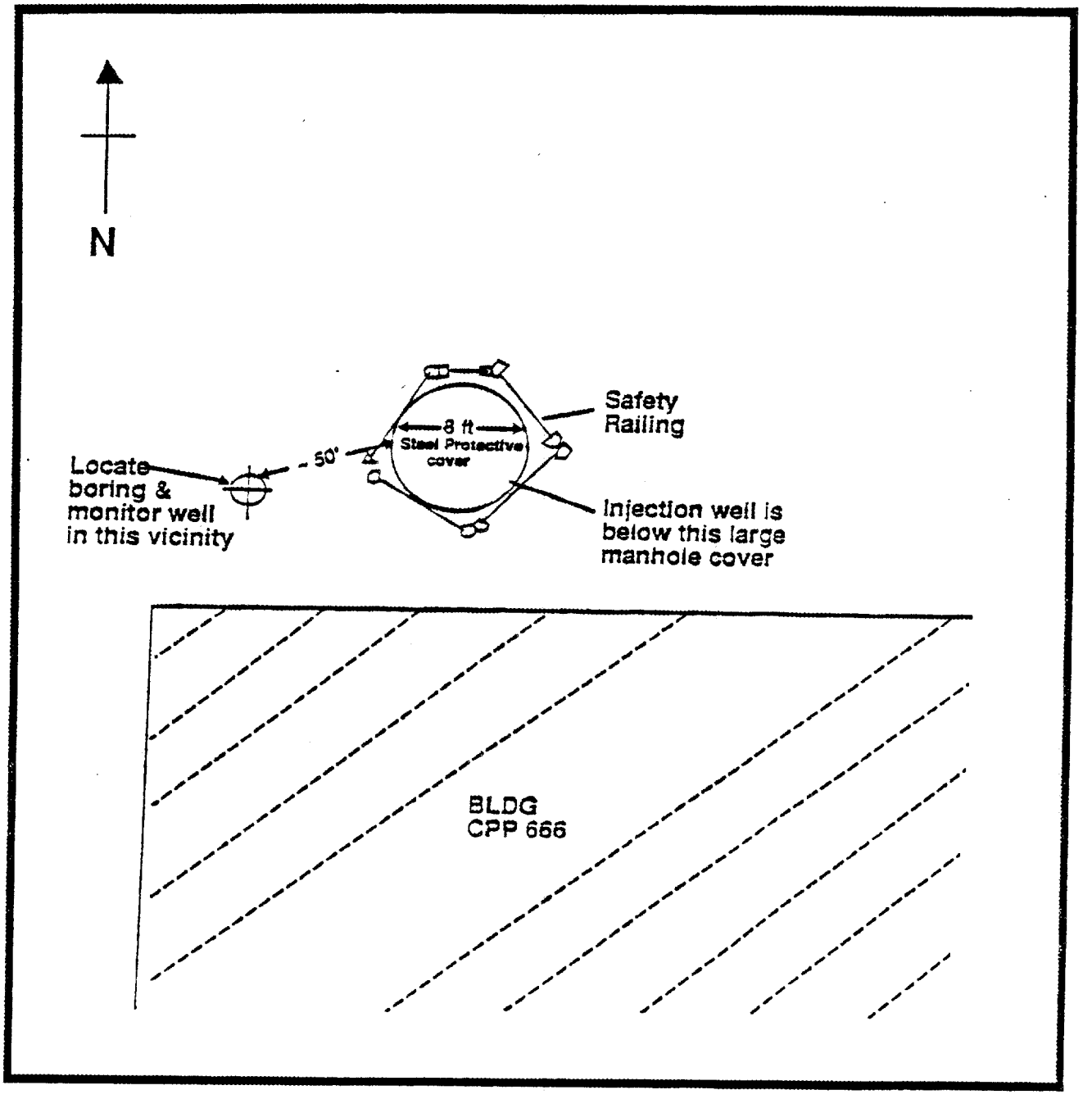


Figure 4.6b. ICPP Injection Well (Request 813)

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TABLE 4.2.6 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 6

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN812 | ICPP | INJ. WELL | SOIL | 4 | 0 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | MED TOTAL | 4 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | EP TOTAL | 4 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## 4.12 Environmental Problem 7: Landfills

**Request Numbers:** 814, 815, 816, 817, 818, and 819.

**Requester:** Levitan/Sichelstiel.

**Finding and Basis:** Inactive landfills and surface storage areas at the INEL were operated in such a manner that the chemical wastes they potentially received may be a source of contamination to the unsaturated zone and groundwater. Thirty-three inactive landfills and storage areas have been identified at the INEL. These sites include landfills, burn pits, rubble piles, and exposed storage areas. In general, these sites did not have any engineered containment systems such as liners or caps. Additionally, there was little control over nonradioactive wastes that were disposed of at these sites. In some cases, records indicate that chemical wastes, such as solvents and waste oils, were disposed of at these sites. As a result, precipitation and surface runoff could migrate through the wastes, and contaminants could leach into the subsurface environment. These sites were evaluated based on their use and design and the volumes and types of wastes they are known or suspected to have received. As a result, 15 sites were noted to be of particular environmental concern. Six sites were recommended for sampling and analysis.

### 4.12.1 Sampling and Analysis Objectives

**Statement:** Soil samples were to be collected at specified landfills and surface storage areas to determine whether various contaminants were present.

**Supporting Information:** Please see the individual requests for supporting information relating to the landfills sampled for this environmental problem.

### 4.12.2 Sampling and Analytical Design

#### 4.12.2.1 Sampling Design

**Request 814: TAN/WRRTF Burn Pit (Fig. 4.7a).** Twelve grab soil samples were to be collected from four locations at three depths in the TAN/WRRTF burn pit (Sampling Method: Reference E5.2.3) to determine if concentrations of volatile organics, PCBs, metals, and possibly dioxins in the soils at the former WRRTF burn pit were above detectable limits.

The site originally consisted of three pits that were operated from 1958 to 1966 or 1967. They were side-by-side and had dimensions of 20 ft x 200 ft, 40 ft x 200 ft, and 50 ft x 250 ft. These pits also received liquid petroleum product wastes until 1961 or 1962 when a fourth, smaller pit was dug. The smaller waste oil pit was 30 ft x 50 ft x 1.5 ft deep. The waste oil pit may have also received janitorial cleaning materials, but there is no evidence of significant chemical wastes.

The three large pits were operated as cut-and-fill landfills. Each time wastes were disposed of into the pits, they were burned. As a pit began to fill with rubble, it was covered and another pit was opened. The burn pits took all garbage and burnable debris generated at the entire TAN area. No records were kept of the material disposed of at the landfill, but it is suspected that waste fuel oils from boiler operations, waste oil from equipment maintenance, zinc bromide from hot shop windows and the alcohol used to clean it out, and waste Stoddard solvent from parts cleaning went into the waste oil pit. It is estimated that 250 gal. of waste oil and Stoddard solvent were generated each year from the auto mechanics shop at TSF, but it is unknown how much was disposed of into the pit and how much remained after burning. Janitorial cleaning materials may also have been placed in the pits, but there is no evidence of significant chemical wastes being disposed of. Waste oils may have included hydraulic fluids that may have contained PCBs (which can form dioxins when combusted).

The burn pits have been covered with native topsoil, although two 100-ft-long x 30-ft-wide depressions were apparent at the time of the Survey where material has settled. Based on the use of these burn pits and the fact that there is insufficient capping or lining to prevent leaching into the subsurface, there is a potential for contaminants to be released into the soil.

The area of concern consisted of two depressions, with a total area of approximately 600 $m^2$. The area of interest was approximately 1900 $m^2$ (106 x 18 m). The area was to be divided into 80 grid segments that were 24 $m^2$ each (2.25 x 10.6 m). Four segments were to be randomly selected for sampling with a straight auger at three depths: from 5 to 7 ft, 10 to 12 ft, and 15 to 17 ft.

The Sampling Team arrived on-site 14JUL88 at 0930 under clear, sunny skies. The temperature was approximately 85$^{o}$F and winds were from the south, gusting from 35 to 40 mph. After dividing the area into 80, 2.25 x 10.6 m segments, the team set pin flags on the grids for Health Physicist approval for the team's Safe Work permit. The area was scanned for radiation and read 100 to 120 cpm. The team then randomly selected the four segments for sampling with a straight auger at the requested depths. A yellow wooden post, 4 x 4 in. x 4 ft tall, served as a reference corner (northwest). The temperature of the soil was not recorded as a field measurement because of the heat generated by the friction of the auger (Field Method: References E4.5.1 for temperature and E4.5.2 for pH). Although the field logbook noted that DOE HQ requested that sample aliquots for PCBs and pesticides not be collected for Environmental Problem 3, PCB and pesticide aliquots for Request 814 were collected, shipped, and analyzed before this decision was communicated to the field. (Data resulting from these analyses are addressed in Sect. 4.12.3.)

Field dirt covered the burn pit. At grid 25, the team collected sample IN814012 from the 5 to 7 ft depth at 1043 and sample IN814056 from the 10 to 12 ft depth at 1115. Sample IN814090 was not collected from the 15 to 17 ft depth of

grid 25 because of auger refusal at 12 ft. At grid 36, the team collected sample IN814023 from the 5 to 7 ft depth at 1254, sample IN814067 from the 10 to 12 ft depth at 1330, and sample IN814103 from the 15 to 17 ft depth at 1415. The samples had the appearance of brown, clayey fill dirt or soil. At grid 37, the team collected sample IN814034 from the 5 to 7 ft depth at 1445, sample IN814078 from the 10 to 12 ft depth at 1525, and sample IN814114 from the 15 to 17 ft depth at 1558. These samples had the appearance of brown clay. QC rinsate sample IN814136 was collected at 1620.

For the second day's sampling, the Sampling Team arrived on-site at 0945 on 15JUL88 under sunny skies, with a temperature of approximately 75$^{o}$F, and winds from the north between 0 and 5 mph. On the first attempt at grid 45, an open cavern was discovered. After moving the drilling rig 7 ft to the west, the team resumed drilling. At grid 45, the team collected sample IN814045 from the 5 to 7 ft depth at 1018, sample IN814089 from the 10 to 12 ft depth at 1055, and sample IN814125 from the 15 to 17 ft depth at 1130.

**Request 815: CFA Landfill I (Fig. 4.7b).** Twenty grab soil samples were to be collected from five locations at the CFA landfill at four depths (Sampling Method: Reference E5.2.3) to determine whether volatiles, organics, pesticides, PCBs, and metals were present in soils in the vicinity of the CFA Landfill I at concentrations above detectable levels.

The CFA Landfill I was operated from 1951 (or possibly from the 1940s during the Navy's use of the INEL) to 1970. It was operated as a cut-and-fill, although portions may have been located in gravel pits. Little is known about the operation of CFA Landfill I. It was about 10 acres in size and may have included an incinerator. The first part of the landfill was a borrow pit that received mainly construction debris and ash from the incinerator. Trenches were developed later that received mainly incinerator ash, construction debris, and paper. The materials were then covered.

Receipt of radioactive materials at the landfill was always tightly controlled, but there was less concern over chemically hazardous materials. Materials came from all facilities except TAN, which used its own burn pit. After 1967, when the TAN/WRRTF burn pit was abandoned, garbage from TAN was disposed of at CFA Landfill I. There are no records on the volumes of materials disposed of at Landfill I; however, based on waste produced at various facilities, it is believed that the landfill received at least 200 gal. per year of waste paints, thinner, solvents, and probably a variety of other chemicals, including metals. It was reported that pesticides, including Round-up, Spike-80, OSMO Plastic, and PCP, were disposed of in the landfill. Waste oils such as hydraulic fluids, which may also have been disposed of in the landfill, may have contained PCBs. (Per direction of K. Knight of DOE Headquarters, samples for pesticides and PCBs were not to be collected.)

The INEL Sampling and Analysis Plan noted that if it was not possible to drill through the landfill, the team could use a magnetometer and terrain conductivity meter to find the edge of the landfill and drill directionally underneath it. The team was to divide the approximately 2100 $m^2$ area into 100 grid segments. Sample depths were changed from those requested in the plan to agree with breaks in the drill rods per the ORNL Assistant Field Team Leader.

The Sampling Team arrived on-site 18JUL88. The sky was sunny and clear. The temperature was approximately 95$^{o}$F, and winds were from the northwest between 15 and 20 mph. The surface of the landfill consisted of fill, alluvial gravel, sagebrush, and desert grasses. Construction debris (wood, nails, etc.) was scattered on the surface of the site. After receipt of the work permit from INEL, the team began drilling at grid 10. At 1550, sample IN815013 (grid 10) was collected from the 8 and 9 ft depth. Sample material for the metals and the pH measurement was taken from auger cuttings (Field Method: References E4.5.1 for temperature and E4.5.2 fo pH). Sample IN815068 (grid 10) was collected from the 13 to 15 ft depth at 1604. The team observed topsoil from 0 to 2 ft and gravel fill to 10 ft at grid 10.

The Sampling Team arrived on-site 19JUL88 for the second day's sampling. Sample IN815115 (grid 10) was collected from the 18 to 20 ft depth at 1838. Sample IN815160 (grid 10) could not be collected from the 23 to 25 ft depth because of auger refusal at 23 ft. At 0916, the Sampling Team set up on grid 13. Sample IN815024 (grid 13), medium to fine gray sand mixed with 1-in. sized gravel, was collected from the 8 to 10 ft depth at 0936. Sample IN815079 (grid 13), fine to medium light to medium gray sand with ground-up 1-in. sized gravel, was collected from the 13 to 15 ft depth at 0953. This sample was slightly damp toward the bottom. Sample IN815126 (grid 13) was collected from the 18 to 20 ft depth at 1010. This sample, sandier than the previous one at 13 ft, was fine to medium grain and was light-brown to medium-gray. There was very little gravel and no visible foreign substances. Although the drill rig hit basalt at 23 ft 5 in., enough material was obtained at 1024 for a volatile aliquot for sample IN815171 (grid 13). The material was fine clayey sand with ground-up gravel. Aliquots for the mercury and metals samples were taken from cuttings on the auger flight and bit from the bottom of the hole. At grid 17, sample IN815035 was collected from the 8 to 10 ft depth at 1102. The material was slightly damp, fine to medium gray sand and 1 in. gravel. Although the split spoon was hard to sink at 13 ft, sample IN815080 was collected from the 13 to 15 ft depth at 1121. The sand was still damp and mixed with gravel. There was a black coating on some gravel and the sand grains were soft. Because basalt was hit at 16 ft at 1127, samples IN815137 and -182 could not be collected. At grid 40, sample IN815056 was collected from the 8 to 10 ft depth of grid 40 at 1253. The sample material was gray, fine-medium sand mixed with 1 in. gravel. Sample IN815104 was collected from the 13 to 15 ft depth at 1310. Because this sample contained larger gravel (1 1/2 in.) and less sand than the sample at 13 ft, the split spoon was not full. Cuttings were obtained from this depth to fill the metals sample bottles. Because the auger hit bedrock at 17 ft 6 in., samples IN815159 and -206 were not collected. At grid 22, sample IN815046 was collected from the 8 to 10 ft depth at 1354. Sample IN815091 was collected from the 13 to 15 ft depth at 1408. The hole at this grid contained a lot of gravel. Split-

spoon material was supplemented by cuttings from the auger for the metals sample. Because the drill hit basalt at 17 ft, samples IN815148 and -193 were not collected. QC rinsate sample IN815217 was collected at 1424.

**Request 816: CFA Landfill II (Fig. 4.7c).** Twenty grab soil samples were to be collected from the CFA Landfill II at four depths (Sampling Method: Reference E5.2.3) to determine whether volatile organics, pesticides, PCBs, and metals were present in soils underneath the CFA Landfill II in concentrations above detectable levels.

The CFA Landfill II was operated from 1970 to 1982. The landfill occupied an approximately 10-acre portion of a 37-acre gravel pit. Portions of the landfill were operated as cut-and-fill; in other areas, construction-type debris was dumped into the excavated gravel pit. Wastes were generally accepted on a case-by-case basis. Hazardous wastes were disposed of by excavating a hole deeper than the trench at the working face. The waste was put in the hole and, through normal landfill operations, 8 to 15 ft of ordinary wastes were placed on top. A portion of Landfill II is still used for disposal of construction debris and asbestos.

Wastes were received from throughout the INEL. Although there are no records on the volumes of materials that went into the landfill before 1971, the Industrial Waste Management Information System lists materials disposed of after that date. It is estimated that total hazardous materials reaching the landfill were between 5,500 to 8,250 gal. per year. Materials included waste; paint; paint thinners; solvents (acetone, carbon tetrachloride, Stoddard solvent); chromates; mercury, waste oil; resins; and other chemicals. It was reported that pesticides, including Round-up, Spike-80, OSMO Plastic, and PCP, were disposed of in the landfill. Some waste oils, such as hydraulic fluid, may have contained PCBs.

A magnetometer and terrain conductivity meter were to be used to determine the feasibility of drilling through the landfill. If drilling through the landfill was not feasible, then the team was to drill directionally underneath the landfill from the perimeter. The objective was to sample the landfill. The area of concern was underneath the landfill. If physical conditions permitted, samples were to be collected from the top of the landfill; if not, samples were to be collected from the landfill perimeter. As applicable, the team was to grid the top of the landfill into 100 segments and select 5 segments at random for sampling or grid the landfill perimeter into 100 segments around the perimeter as close to the landfill toe/edge as possible. If sampling from the north and east sides (landfill toe), the team was to collect grab samples at 1 to 3 ft, 5 to 7 ft, 10 to 12 ft, and 15 to 17 ft with a straight auger. If sampling at the south and west sides or from the landfill top, the team was to collect samples at 10 to 12 ft, 15 to 17 ft, 20 to 22 ft, and 25 to 27 ft with a straight auger. Field measurements for temperature were not made due to the influence of heat from drill auger friction. Per K. Knight of DOE Headquarters, aliquots for pesticides and PCBs were not collected for Request 816.

The Sampling Team arrived on-site 21JUL88 at 1005. The sky was sunny and clear, the temperature was between 80$^{o}$ and 85F, and the wind was from the northeast between 5 and 10 mph. The surface of the landfill was fill and gravel cover brought from the Lost River valley. Desert grasses (crusted wheat) were planted. A radiation scan of the area and cuttings showed 40 cpm. At grid 13, the drillers smelled an odor from the hole at 5 ft; the TIP reading was 0. At 6 ft to 7 ft, the drill went through toilet paper and recently disposed of raw sewage, which had not decomposed, possibly because of the arid climate. Sample IN816014 was collected from the 8 to 10 ft depth at 1034. There were no cuttings from 9 to 12 ft. Sample IN816069 was collected from the 13 to 15 ft depth at 1044. The sample material at 13 ft was mostly gray fine-to-medium sand with very minor gravel. The pH was taken at each sampling depth (Field Method: References E4.5.1 for temperature and E4.5.2 for pH). Sample IN816116, from the 18 to 20 ft depth was collected at 1100. The sample material

contained sand mixed with wire, plastics, spark plugs, and miscellaneous material. It appeared that this area was too new to be a part of the old landfill. The drillers hit bedrock/basalt at 24 ft. Sample IN816161 was collected from the 23 to 24 ft depth at 1122. The sample material was clayey gray sand and still contained some wire and other debris. The sample was to the right of contact and contained some basaltic material.

The Sampling Team began drilling on grid 33 at 1225 at the 3 ft depth. The temperature was approximately 90°F and winds were from the southwest between 5 and 10 mph. Sample IN816025 was collected from the 8 to 19 ft depth at 1245. It contained gravel, sand, and foreign material. From 8 to 10 ft, the drillers reported smelling chlorine. A TIP reading was 50 while the auger was turning at ground level. The auger then brought up rags smelling of some solvent. The TIP still read 0 at breathing level, but jumped to between 30 and 40 one foot off the ground. The radiation scans around the hole read 40 cpm. At 13 ft, the wind changed and the odor was stronger. The TIP read 80 at the hole, but still dissipated at breathing level. The highest TIP reading of 105 was at the surface of the hole when pulling the auger out. It was 1.4 at the breathing level when the auger was still. The reading dropped to 0. Sample IN816070 was collected from the 13 to 15 ft depth at 1305. This sample contained rags, paper products, and gray sand. Sample IN816127, which contained rags, paper products, plastic, and glass, was collected from the 18 to 20 ft depth at 1332. Because the drill struck bedrock at 22 ft, sample IN816172 could not be collected.

At grid 53, the TIP readings at the hole at 5 ft and 8 ft were 0. The metals sample had to be supplemented with cuttings because the auger kept hitting rags and paper, affording very little sample in the split spoon. Sample IN816036 was collected from the 8 to 10 ft depth of grid 53 at 1420. Sample IN816081 was collected from the 13 to 15 ft depth at 1432. There was still some smell of solvent. The TIP reading was between 2 and 5 at the hole when drilling, but 0 at breathing level. Sample IN816138 was collected from the 18 to 20 ft depth at

1500. Sample IN816183 was collected from the 23 to 25 ft depth at 1530. All samples contained sand, paper, rags, glass, plastic, etc.

At grid 73, sample IN816047 was collected from the 3 to 5 ft depth at 1552. The sample was small due to debris in the hole. The volatile bottle sample came from the split spoon; the other samples came from auger cuttings. The team augered to 8 ft. The TIP reading was from 0 to 1 at the hole. The team stopped for the day at 1605.

When the Sampling Team arrived at grid 73 at 0815 on 21JUL88, the temperature was between 85$^{o}$ and 90$^{o}$F, winds were from 0 to 5 mph, and the sky was sunny and clear. According to safety personnel, team members were to wash before lunch and shower before leaving for the day. Sample IN816092 was collected from the 8 to 10 ft depth of grid 73 at 0827. Because bedrock was hit at 14 1/2 ft, samples IN816149 and -194 were not collected. The MK Safety Supervisor arrived to check compliance with the Safe Work permit. Although instructions in the original work permit requested that the team members rope off the area and wear coveralls, this information could not be read on the copies. After the team secured rope and posts from the DOE Survey Office and roped off the area, they continued the work. The MK Safety Supervisor left when drilling started on grid 93. Sample IN816058 was collected from the 0 to 1 ft depth at 0940 because this hole was at the north end of the landfill and bedrock was fairly shallow. The sample was gray sand and gravel with very little debris. Sample IN816105 was collected from the 3 to 5 ft depth at 0953 and contained sand and gravel. TIP readings were taken during drilling. The TIP reading, which was 0, was taken every 3 to 5 ft. Radiation scanning of cuttings read 40 cpm. Sample IN816150, from 8 to 10 ft, was collected at 1004 and showed sand, but not much debris. The TIP reading was 0. Sample IN816207 was collected from the 13 to 15 ft depth at 1024. The samples at 18 ft were not taken. Although the team drilled and collected split spoon samples to 20 ft, they never hit bedrock or clay zone at contact. Drilling stopped at 1035. QC rinsate sample IN816218 was taken at 1056.

**Request 817: BORAX Trash Dump (Fig. 4.7d).** Sixteen grab soil samples were to be collected from four locations at four depths from the BORAX trash dump (Sampling Method: Reference E5.2.3) to determine whether volatile organics, PCBs, and metals were present in the soils surrounding the BORAX trash dump at concentrations greater than detection limits.

The BORAX trash dump, estimated to be 240 ft x 120 ft x 6 ft deep, was situated on a steep but short slope. The dump was used for the disposal of construction debris during the original construction of the BORAX reactor in 1953 and during modifications to the reactor, between experiments, until 1964. Asbestos is known to have been disposed of in the dump, although the volume is unknown. The landfill was not reported to have received other hazardous materials; however, it was probably loosely controlled with regard to chemical hazards.

Small quantities of hazardous chemicals were used during BORAX operations, including corrosives. PCBs were probably used in turbine lubrication oil, and transformer dielectric fluid and solvents may have been used during metal fabrication. Lead pieces were observed throughout the BORAX facility. It is possible that some of these contaminants may have been disposed of at the trash dump. After activities at BORAX ceased, asbestos was removed from the trash dump and disposed of at the CFA landfill. Presently, the trash dump is covered with soil and planted with crested wheatgrass. However, debris such as construction material, rubble, rebar, and tires is visible along the landfill edge.

A magnetometer and terrain conductivity meter were to be used to determine the feasibility of drilling through the landfill. If drilling through the landfill was not feasible, then the team was to drill directionally underneath the landfill from the perimeter. The objective was to sample the landfill. The area of concern was under the landfill. If physical conditions permitted, samples were to be collected from the top of the landfill; if not, samples were to be collected

from the landfill perimeter. As appropriate, the team was to grid the landfill into 80 segments and randomly select four segments for sampling, or grid the landfill perimeter, which was approximately 618 $m^2$, into 80 segments around the perimeter as close to the landfill as possible and select four segments at random. The team was to collect grab samples at 1 to 3 ft, 5 to 7 ft, 10 to 12 ft, and 15 to 17 ft using a straight auger if sampling from the periphery. If sampling from the landfill top, they were to collect samples at 5 to 7 ft, 10 to 12 ft, and 20 to 22 ft. Field measurements for temperature were not taken due to the influence of heat from drill auger friction. Per K. Knight of DOE Headquarters, aliquots for pesticides and PCBs were not to be collected for Request 817.

The Sampling Team arrived on-site on 21JUL 88. Under a sunny, clear sky, the temperature was 95$^{o}$F and winds were 5 mph. After dividing the landfill area into an 80 segment grid, the team randomly selected grids 17, 37, 57, and 77 for sampling. Sample IN817059 (grid 17) was collected from grid 17 at a depth of 5 to 7 ft at 1000. The soil consistency was clay; basalt and concrete were present. Grid 17 samples IN817015, IN817093, and IN817139 were not collected because of auger refusal at the planned depths. Sample IN817060 (grid 37) was collected from the 5 to 7 ft depth at 1310. Again, the soil consistency was clay, and basalt was present. Samples IN817026, IN817106, and IN817140 were not collected from grid 37 because of auger refusal at the planned depths. At grid 57, sample IN817071 was collected from the 5 to 7 ft depth at 1335. The soil was dry. Sample IN817117 (grid 57) was collected from the 10 to 12 ft depth at 1405. This soil was also dry. Sample IN817151 (grid 57) was collected from the 15 to 17 ft depth at 1428. The soil was dry and there were a few rocks. Sample IN817037 was not collected from grid 57 because of auger refusal at the planned depth. Samples IN817048, IN817082, IN817128, and IN817162 were not collected from grid 77 because of auger refusal at the planned depths. The area was filled with sparse concrete blocks (1 cu ft) and with some basalt rocks. QC rinsate sample IN817173 was collected at 1600.

**Request 818: ANL-W Burn Pits (Fig. 4.7e).** Twelve grab soil samples were to be collected from four locations at three depths in the ANL-W burn pit (Sampling Method: Reference E5.2.3) to determine whether concentrations of volatile organics, PCBs, metals, and possibly dioxins in the soils at the former ANL-W Burn Pits 2 and 3 are above detectable limits.

Three burn pits are located at ANL-W, two side by side about 300 ft north of the north outer fence and one between the security fences on the north side. Although they may have been used as early as 1960, it is known for certain that they were in use in 1965. Use was terminated in 1970, shortly before open burning was banned at the INEL. The facility was operated as a cut-and-fill. Trenches were excavated and combustible wastes burned. In addition, petroleum products (oil, hydraulic fluids) and organic wastes (including toluene, xylene, hexone, isopropyl alcohol, butylcellulose, tributylphosphate, and mineral oil) were disposed of in the burn pit. Hydraulic fluids may have contained PCBs which when burned can form dioxins. The organic wastes were discharged between 1965 and 1970, and a total of 150 gal. has been estimated. Materials were dumped into the pits and burned the same day. It has been estimated from employee recollections that this occurred once per week. The pits were then covered with native soil.

The sizes of the pits are unknown, but depressions where the material has settled are 6 ft wide and 60 to 90 ft long. Test pits have been dug across a portion of the burn pits. The waste materials begin 2 ft below the surface and extend to 6 ft below. Plastic sheeting, steel wool, electric conduit with wires, metal pipe, cinder blocks, wood, scrap metal, and rubber gaskets and gloves were observed in the pits during the Survey. Based on the condition of these materials, it was concluded that some of the burns were incomplete.

The team was to divide the area into an 80-segment grid and then randomly select four segments for sampling with a straight auger. The samples were to be collected from 5 to 7 ft, 10 to 12 ft, and 15 to 17 ft. Temperature and pH

measurements were to be taken (Field Method: References E4.5.1 for temperature and E4.5.2 for pH). Temperature measurements were not made, however, because heat generated by auger friction was expected to affect the readings. Although the field logbook noted that DOE HQ requested that sample aliquots for PCBs and pesticides not be collected for Environmental Problem 3, PCB and pesticide aliquots for Request 814 were collected, shipped, and analyzed before this decision was communicated to the field. Data resulting from these analyses are addressed in Sect. 4.12.3.

The Sampling Team arrived on-site 20JUN88. Under sunny, clear skies, winds were from the southwest at approximately 5 to 10 mph and the temperature was 85$^{o}$F. The INEL Sampling and Analysis Plan illustration was not similar to what actually existed in the area. The team divided the area, which was 380 ft by 60 ft wide, into 80 grid segments and began to drill the first hole at 1115. However, at 3 ft below the surface, the drill would go no further. Although they moved the hole back to the west 2 ft and tried drilling again, they met refusal again on the second hole at 27 in. At 1314, sample IN818016 (grid 18) was collected from the cuttings at the 17 in. depth. At 1322, the second hole was started at grid 20. An ANL-E backhoe operator had dug a trench perpendicular to the contaminated trench, revealing that the hole at grid 20 was located directly over one of two pits in the area. Because the drill hit refusal at 12 in., the team moved the drill rig 3 ft to the southwest and tried drilling again. After a second refusal at this location, the team moved the hole 10 ft to the west and 2 ft to the north from the second hole at grid 18 and started drilling at 1354. A rock was hit 2 ft below the surface, and the drill rig did not have enough power to break through the rock. After hitting refusal again in the third hole at 6 in., the team moved the rig 21 ft to the west and 18 ft to the south from the original grid location at grid 18. The team started drilling the fourth hole and hit auger refusal at 39 in. Therefore, sample IN818027 (grid 20) was collected at 1400 from the cuttings at the 0 to 39 in. depth. The team began drilling at grid 5 and hit auger refusal at 37 in. Sample IN818038 (grid 5) was collected from cuttings at the 37 in. depth at 1430. At grid 73, auger

refusal occurred at 1515 at 46 in. Sample IN818049 (grid 73) was collected from the cuttings at the 0 to 46 in. depth.

The team tried drilling two other holes in the area; however, because these holes were no deeper than the first one drilled at grid 73, the team stopped drilling at 1538 after collecting only the four samples described above. Samples IN818050, IN818061, IN818072, IN818083, IN818094, IN818107, IN818118, and IN818129 were not collected because of auger refusal. All samples were collected from the auger cuttings instead of from the split spoon. No samples were collected below 4 ft for this request.

**Request 819: PBF Disposal Pit/Burial Area (Fig 4.7f).** Four grab soil and four soil gas samples were to be collected at the disposal pit/burial pit area north of the PBF reactor (Sampling Method: References E5.2 and E5.4) to determine if contaminants were present at concentrations above detection limits within the soil.

This disposal pit, which may be part of a larger, more extensive burial pit, was located 600 ft north of the PBF Reactor Building. The pit was situated on the central edge of a much larger rubble pile. It appears that trucked wastes were disposed of in this 75 ft x 45 ft x 10 ft deep pit. The pit contained two open 55-gallon drums, two dozen 5-gallon buckets, and a dozen paint cans; all were rusted and partially crushed.

The area was approximately 375 $m^2$. The Sampling Team was to divide the area into an 80-segment grid and randomly select four segments for sampling. They were to collect one grab sample at 3 to 5 ft below the bottom of each of the four areas of the exposed pit using either a shovel or a posthole digger. One foot from each soil sample, they were to auger a 2 in. x 4 ft hole and cap it for 24 hours. They then were to remove the cap and place a thermal desorption tube in each hole, cap the hole, and draw 2 to 4 L of air through

the tubes. Temperature and pH measurements were to be taken (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team was officially escorted by the Health Physicist and arrived on-site at 1330 on 27JUN88. Under partly cloudy skies, the wind was approximately 10 mph. A scan with the Ludlum meter revealed only normal readings (150 cpm) of surface and sample material. The burial pit contained visible debris of plywood, aluminum cans, 55 gal. drums, rusted fence and cable, glass, and concrete. The pit was sparsely vegetated with sagebrush and desert grasses. The surface above the pit was covered with lava boulders.

The sample holes were not dug to the specified 5 ft depth because rock was encountered. The soil gas portion of this request was not completed because the soil was sandy, and auger holes were unachievable. Instead, grab soil samples for volatiles analyses were collected. Also, sample locations were chosen systematically because the debris in the pit made it difficult to grid.

Samples IN819017 (grid 50), IN819028 (grid 36), IN819039 (grid 40), and IN819084 (grid 50) were collected approximately 2 ft below the surface, where rock was encountered. Samples IN819051 (grid 24), IN819062 (grid 36), and IN819073 (grid 40) were collected 2.5 ft below the surface. The soil was sandy and buff colored. Sample IN819040 (grid 50) was not collected because the bottles were forgotten.

#### 4.12.2.2 Analytical Design

**Request 814:** Field parameter measurements requested included pH and temperature. Parameters to be analyzed included volatiles, PCBs (and dioxins if PCBs were detected), ICP metals, and AA mercury.

**Request 815:** Field parameters requested included pH and temperature. Parameters to be analyzed included volatiles; pesticides (Round-up, Spike-80,

OSMO Plastic, PCP); PCBs; ICP metals; and AA mercury. (Pesticides and PCBs aliquots were not collected/analyzed per DOE request.)

**Request 816.** Field parameters requested included pH and temperature. Parameters analyzed included volatiles; pesticides (Round-up, Spike-80, OSMO Plastic, PCP); PCBs; ICP metals; and AA mercury. (Pesticides and PCBs aliquots were not collected/analyzed per DOE request.)

**Request 817.** Field parameters requested included pH and temperature. Parameters analyzed included volatiles, PCBs, ICP metals, and AA mercury. (PCBs aliquots were not collected/analyzed per DOE request.)

**Request 818.** Field parameters requested included pH and temperature. Parameters analyzed included volatiles, PCBs (and dioxins if PCBs were detected), ICP metals, and AA mercury.

**Request 819.** Field parameters requested included pH, temperature, and HNU (PID). Parameters analyzed included volatiles (soil gas samples only), ICP metals, and AA mercury (soil only). (Soil gas samples were not collected; grab samples were collected for volatiles analysis instead.)

### 4.12.3 Field and Analytical Data

**Field Data:**

**Request 814:** *The field data are presented in Table 4.3.7. The pH ranged from 7.6 to 8.1 for the four samples taken at three depths. The 15 to 17 ft depth sample from grid 25 was not taken because the auger could not penetrate beyond 12 ft. On the average, the shallow samples (5-7 ft) had the highest pH which was 7.9. PID readings were taken but all the samples showed no measurable organic vapors.*

**Request 815:** *The field data are presented in Table 4.3.7. Twenty samples were requested; five depth samples from four areas were to be collected and analyzed. Of the 20, thirteen were collected; the others could not be collected because basalt was encountered. Of the pH values shown in Table 4.3.7, the first five sample numbers (IN815013 through -057) represent the samples from the 8-10 ft depths of grids 10, 13, 17, 22, and 40, respectively. The second continuing series of samples (IN815068 through -104) represents the numbers from the 13-15 ft depths and corresponds sequentially to the same grid numbers [i.e., the corresponding depth sample for the 8-10 ft depth of IN815013 (Grid 10) is IN815068]. The next two samples (IN815115 and -126) are from the 18-20 ft depth of the first two grids (grids 10 and 13). Sample IN815171 was the deepest sample obtained from grid 13 between the 23 to 23 ft 5 in. depth rather than from the 23-25 ft. The depth limitation was caused by the basalt rock underlying the soil.*

*The pH ranged from 7.8 to 9. Eleven of the 13 pH readings were 8 or above; and only one sample (8-10 ft depth of grid 13) had a pH above 8 (i.e. ).*

**Request 816:** *The field data are presented in Table 4.3.7. Four sample depths from five grid sites were to be collected. Seventeen samples were collected. The uncollected samples were from the deepest sample depth from grid 33 and the two deepest depth samples from grid 73. From the lowest sample number of IN816014 to IN816058, the grids are sequentially 13, 33, 53, 73, and 93 and are the topmost samples. Because grids 13, 33, and 53 were from the south sector, the topmost samples were from the 8-10 ft depth. Grids 73 and 93 represent the north sector and the samples were taken from either the 0-1 ft (grid 93) or the 3-5 ft (grid 73) depths. The next five sample identification numbers (IN816069 through -105) represent the next depth samples for the grids listed above. The next depth increments are represented by samples IN816116 through -150; the missing sample is from grid 73. The last three depths are the deepest with samples from grids 33 and 73 not taken due to basalt bedrock.*

*The pH ranged from 6.2 to 8.1. The pH of 6.2 was from the 13-15 ft depth sample of grid 13. Overall, the samples from grid 13, which were taken from the lower depths, showed the lowest pH (pH range 6.2 to 7.3); the samples from grid 93, taken from the shallower depth, showed the highest pH (pH range 7.9 to 8.1).*

**Request 817:** *The field data are presented in Table 4.3.7. Twelve samples were to be collected because sampling proceeded from the top of the landfill. Five samples were collected; only from grid 17 was it possible to obtain the three depth samples--IN817071, -117, and -151. The pH ranged from 7.3 to 7.5. Only the topmost samples (5-7 ft) were collected from grids 17 and 37; the pH readings of these samples were 7.3. No sample was obtained from grid 77 because auger refusal was encountered above the first sampling depth. No temperature measurements were taken because of interference from heat generated by auger friction.*

**Request 818:** *The field data are presented in Table 4.3.7. Twelve samples were to be collected; four samples were collected from the shallowest depth of the four grid sites. Auger refusal prevented sampling the deeper depths. No pH or temperature measurements were taken.*

**Request 819:** *The field data are presented in Table 4.3.7. Originally, four soil samples and four soil gas samples were to be collected. The soil gas sampling was modified to collect soil grab samples for volatiles because the holes would not remain open for the soil gas tubes to be inserted for collection of the gas samples. Measurements requested included pH, temperature, and PID. None of these measurements were taken; instead a radiation scan was made and recorded as 150 cpm. Samples were collected from the surface at approximately 30 in. and not the 3-5 ft depth; this was dictated by obstacles encountered below the 30 in. depth. Samples were collected from grids 24, 36, 40, and 50 for ICP metals and AA mercury. No sample was collected from grid 24 for the volatile analysis.*

Field Data Evaluation:

Request 814: Although temperature measurements were requested, they were not recorded because the heat generated by augering would give false temperature readings. The instruments to measure pH and organic vapor were calibrated prior to field use and the measurements are reliable.

Request 815: Because the instrument was calibrated prior to field use, the readings are reliable. The difference between the recommended depths of the INEL Sampling and Analysis Plan and the actual sampling depth was dictated by the length of the auger bit. Taking samples from the 8-10 ft depth rather than the 10-12 ft depth greatly facilitated sampling and saved time. Temperature readings were not taken/recorded because the drilling operation generated heat and sample temperatures were artificially increased.

Request 816: Because the instrument was calibrated prior to field use, the readings are reliable. For grid 93, the shallowest sample was from the 0-1 ft depth; the requested depth from the INEL Sampling and Analysis Plan was 1-3 ft to be followed by 5-7 ft. The second depth of the sample from grid 93 was 3-5 ft. Request sample depths 10 ft and deeper were 2 ft less than the requested depth (i.e., 3-10 rather than 10-12 ft); these depths were to conform to the auger bit length, which greatly facilitated sampling and saved time.

Request 817: Because the instrument was calibrated prior to field use, the readings are reliable. The reduced number of samples reflect refusal of the auger to penetrate deeper. No temperature readings were taken because samples were heated by the friction generated by augering.

Request 818: No pH or temperature readings were taken from the four collected samples because the auger could not penetrate to the requested depths. For the shallowest samples, it was 37 in.; the deepest penetration was 46 in.

Samples were taken from the auger cuttings rather than from split spoon sampling.

**Request 819:** Because no pH, temperature, or PID measurements were taken, evaluation is not applicable. The radiation scan instrument was calibrated prior to field use and the results are reliable.

**Analytical Data:**

**Request 814:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.7. Of the 20 metals detected, only arsenic was below the CRDL in all 11 samples. Of the metals of interest detected, barium ranged from 187 to 252 mg/kg; beryllium, 1.7 to 2.1 mg/kg; cadmium, 0.82 to 2.1 mg/kg; chromium, 30 to 37 mg/kg; copper, 21 to 112 mg/kg; lead was 34 mg/kg; mercury ranged from 0.05 to 0.09 mg/kg; nickel, 26 to 42 mg/kg; silver, 1.6 to 2.7 mg/kg; and zinc, 82 to 344 mg/kg. Toxic metals of interest not listed in Table 4.3.7 were below the IDL for the samples tested.*

*PCBs and other extractables. Analytical results for PCBs and other extractables are presented in Table 4.3.7. Eleven compounds in the dioxins/furans category were detected in sample IN814114, six in sample IN814023, four in IN814089, and one in sample IN814034. None were detected in the other seven soil samples from these burn pits. The highest concentration of any of these compounds was 0.21 ppb of HXCDF in sample IN814114.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.7. From one to four compounds were detected in each of the 11 soil samples for this request. Methylene chloride was detected in all samples with measured concentrations ranging from 210 ppb to 770 ppb. In sample IN814056, the concentration was out of range of the instrument and was*

*estimated at 1400 ppb. Toluene was detected in two samples in concentrations below the detection limit. All but one sample contained detectable 1,1,1-trichloroethane in concentrations ranging from below the detection limit to 140 ppb.*

Request 815:

*Metals. Analytical data for metals in soil are presented in Table 4.3.7. Of the 20 metals detected, the following 3 metals of interest to the Survey--lead, selenium, and silver--were below the CRDL in all 13 samples. Of the metals of interest detected, barium ranged from 80 to 287 mg/kg; beryllium, 0.88 to 1.4 mg/kg; cadmium, 0.74 to 0.76 mg/kg; chromium, 8 to 32 mg/kg; copper, 10 to 17 mg/kg; mercury, 0.04 to 0.18 mg/kg; nickel, 10 to 28 mg/kg; and zinc, 34 to 73 mg/kg. Toxic metals of interest not listed in Table 4.3.7 were below the IDL for the samples tested.*

*PCBs and other extractables. Pesticides and PCBs aliquots were not collected/analyzed for this request per K. Knight of DOE Headquarters.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.7. There were 13 soil samples collected for this request. The number of volatile organic compounds detected in particular samples ranged from zero to four. There were three unknowns and three tentatively identified compounds in this set of samples. Only acetone was identified in measurable quantities (highest was 19 ppb) in any of the samples. Estimated concentrations of other compounds were always below 50 ppb.*

Request 816:

*Metals. Analytical data for metals in soil are presented in Table 4.3.7. Of the 22 metals detected, the following 2 metals of interest to the Survey were below the CRDL in all 17 samples: arsenic and selenium. Of the metals of interest*

*detected, antimony ranged from 23 to 30 mg/kg; barium, 70 to 390 mg/kg; beryllium, 0.98 to 2.3 mg/kg; cadmium, 0.81 to 1.7 mg/kg; chromium, 14 to 48 mg/kg; copper, 10 to 40 mg/kg; lead, 48 to 28,000 mg/kg; mercury, 0.05 to 0.17 mg/kg; nickel, 12 to 36 mg/kg; silver was 2.2 mg/kg; and zinc ranged from 36 to 137 mg/kg. Because thallium was below the IDL, it is not listed in Table 4.3.7.*

*PCBs and other extractables. Pesticides and PCBs aliquots were not collected/analyzed for this request per K. Knight of DOE Headquarters.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.7. From one to 17 compounds were identified in particular samples of the 17 soil samples taken for this request. Methylene chloride was present in all samples and in some of the method blanks. The highest measured concentration of methylene chloride was 400 ppb, and the highest estimated concentration (out of calibration range of the instrument) was 640 ppb. Toluene was present in some samples, with the highest (measured) concentration of 240 ppb in sample IN816092. Some 1,1,1-trichloroethane was present in all but one sample, and also in some method blanks. The highest measured concentrations were 270 ppb in sample IN816070 and 220 ppb in sample IN816092. Some 2-butanone also appeared in excess of 100 ppb in some samples. Three TICs were present in estimated concentrations over 1000 ppb (the highest was 3-corene, in an estimated concentration of 15,000 ppb). Two of those cases occurred in sample IN816092 and the other in sample IN816070. Those two samples contained the greatest number of detectable volatile organic compounds and also tended to have the high concentrations of such compounds when compared with other samples for this request.*

Request 817:

*Metals. Analytical data for metals in soil are presented in Table 4.3.7. Of the 19 metals detected, 3 metals of interest to the Survey--cadmium, lead, and silver--were below the CRDL in all five samples. Of the metals of interest*

*detected, barium ranged from 220 to 273 mg/kg; beryllium, 1.7 to 2 mg/kg; chromium, 23 to 29 mg/kg; copper, 18 to 21 mg/kg; mercury, 0.05 to 0.91 mg/kg; nickel, 22 to 25 mg/kg; and zinc, 60 to 101 mg/kg. Toxic metals of interest not listed in Table 4.3.7 were below the IDL for the samples tested.*

*PCBs and other extractables. Pesticides and PCBs aliquots were not collected/analyzed for this request per K. Knight of DOE Headquarters.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.7. From two to four compounds were identified in particular samples of the five soil samples taken for this request. Methylene chloride was measured in all samples in concentrations ranging from 110 to 630 ppb. Toluene was detected below the detection limit in two samples. Some 1,1,1-trichloroethane was measured in all samples in concentrations ranging from 23 to 78 ppb.*

**Request 818:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.7. Of the 19 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all four samples: cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 172 to 220 mg/kg; beryllium, 1.5 to 1.6 mg/kg; chromium, 17 to 21 mg/kg; copper, 14 to 20 mg/kg; mercury was 0.06 mg/kg; nickel ranged from 20 to 30 mg/kg; and zinc, 52 to 61 mg/kg. Toxic metals of interest not listed in Table 4.3.7 were below the IDL for the samples tested.*

*PCBs and other extractables. Analytical results for PCBs and other extractables are presented in Table 4.3.7. OCDD was detected in two of the four soil samples taken from these burn pits. HPCDD and HPCDF were also detected in sample IN818038. The highest concentration of any of these compounds was 0.064 ppb of OCDD in sample IN818038.*

*Volatile organics.* *Analytical results for volatile organic compounds are presented in Table 4.3.7. From two to six compounds were identified in particular samples of the four samples taken for this request. Chloroform was identified below the detection limit in one sample. Methylene chloride was measured in all four samples in concentrations ranging from 200 to 310 ppb. Toluene was identified below the detection limit in two samples. Some 1,1,1-trichloroethane was detected in two samples with the highest measured concentration being 13 ppb. All samples contained 2-butanone (highest concentration was 160 ppb).*

**Request 819:**

*Metals.* *Analytical data for metals in soil are presented in Table 4.3.7. Of the 20 metals detected, mercury was the only metal of interest to the Survey below the CRDL in all four samples. Of the metals of interest detected, antimony was 11 mg/kg; barium ranged from 166 to 234 mg/kg; beryllium, 1.3 to 1.6 mg/kg; cadmium was 7.9 mg/kg; chromium ranged from 2 to 42 mg/kg; copper, 18 to 73 mg/kg; lead, 30 to 56 mg/kg; nickel, 24 to 30 mg/kg; silver was 1.6 mg/kg; and zinc ranged from 60 to 875 mg/kg. Toxic metals of interest not listed in Table 4.3.7 were below the IDL for the samples tested.*

*Volatile organics.* *Analytical results for volatile organic compounds are presented in Table 4.3.7. Three compounds were detected in each of the three soil samples taken for this request. Methylene chloride was present in all three samples (highest concentration at 29 ppb) and also in the method blank. Toluene was present below the detection limit in one sample. TICs were present in concentrations of 11 ppb or less.*

Analytical Data Evaluation:

Request 814:

Metals. Ten metals of interest--barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc--were detected above the CRDL or the IDL for this request. Mercury concentrations ranged from 0.05 to 0.09 mg/kg.

PCBs and other extractables. Several compounds in the dioxins/furans category were present in some of the samples for this request. The highest concentration of any of these compounds was 0.21 ppb.

Volatile organics. Methylene chloride was detected in all samples with the highest concentration being an estimated 1400 ppb. Toluene was detected in two samples in concentrations below the detection limit. Some 1,1,1-trichloroethane was found in all but one sample.

Request 815:

Metals. Eight metals of interest--barium, beryllium, cadmium, chromium, copper, mercury, nickel, and zinc--were detected above the CRDL or the IDL for this request. Of the 13 samples, only one contained 0.18 mg/kg of mercury; the remaining 12 were below 0.06 mg/kg.

PCBs and other extractables. NA.

Volatile organics. Only acetone was identified in measurable quantities. The highest measured or estimated concentration of any compound in these samples was 45 ppb of an unknown.

**Request 816:**

Metals. Eleven metals of interest--antimony, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request. One sample contained mercury at 0.17 mg/kg, 5 samples ranged from 0.07 to 0.10, and 11 samples were less than 0.06 mg/kg.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride and 1,1,1-trichloroethane were present in all samples and in some of the method blanks. Toluene was present in some samples. Samples IN816070 and IN816092 contained the greatest number of detectable volatile organic compounds and also tended to have the highest concentrations of such compounds when compared with other samples for this request.

**Request 817:**

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request. Of the five samples analyzed for mercury, three contained between 0.56 and 0.91 mg/kg, one was 0.08, and one was 0.05 mg/kg.

PCBs and other extractables. NA.

Volatile organics. Methylene chloride was measured in all samples in concentrations up to 630 ppb. Toluene was detected below the detection limit in two samples. Some 1,1,1-trichloroethane was measured in all samples in concentrations up to 78 ppb.

Request 818:

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request. Mercury concentrations were all below 0.06 mg/kg. Only one sample was above the CRDL.

PCBs and other extractables. Compounds in the dioxins/furans category were detected in two of the four samples from these burn pits. The highest concentration of any of these compounds was 0.064 ppb of OCDD in sample IN818038.

Volatile organics. Chloroform and toluene were identified below the detection limit, but neither compound was identified in all samples. Methylene chloride was measured in all four samples in concentrations up to 310 ppb. Two samples contained 1,1,1-trichloroethane. All samples contained 2-butanone.

Request 819:

Metals. Eleven metals of interest--antimony, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request. Mercury ranged from 0.02 to 0.03 which is below the CRDL.

Volatile organics. Methylene chloride was present in all three samples (highest concentration at 29 ppb) and also in the blank. Toluene was present below the detection limit in one sample.

### 4.12.4 Limitations and Qualifications

**Data Quality Level:**

**Request 814:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is I.

**Request 815:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is I.

**Request 816:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level is I.

**Request 817:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level rating is I.

**Request 818:** The sampling design was rated Quality Level I. The field sampling was rated Quality Level II. The overall analytical Quality Level rating is I.

**Request 819:** The sampling design was rated Quality Level I. The field sampling was rated Quality Level II. The overall analytical Quality Level rating was I.

**Field Data:**

**Request 814:** Both the sampling design and the sampling were rated Quality Level I.

**Request 815:** Both the sampling design and the sampling were rated Quality Level I.

**Request 816:** The field sampling did not explain the sampling depths selected which did not conform to the Sampling and Analysis Plan. Because the shallow

depths could not be related to the auger bit lengths for time or facilitating sampling, the Quality Level assignment of II was made.

**Request 817:** Both the sampling design and the sampling were rated Quality Level I.

**Request 818:** It was possible to take pH readings of the cuttings and the readings were noted in the log record. Because the samples were collected from shallow depths, more material could have been taken if the measurement of pH was limited by quantity. For these reasons, a Quality Level of II is assigned.

**Request 819:** No requested field measurements were taken and no explanation was offered for not collecting the sample for volatile analysis from one of the sample sites. For these two reasons, a Quality Level of II is assigned.

**Analytical Data:**

**Request 814:**

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level II. Analytical results for AA metals were Quality Level I. For antimony, the percent recovery for spikes fell within the 30 to 70% range and the reported result was less than the IDL, indicating the possibility of a false negative.

PCBs and other extractables. Compounds in the dioxin/furan category were found in samples for Request 814. These data were given an overall Quality Level rating of II because of the semi-quantitative nature of the analysis.

Volatile organics. These data are of Quality Level III because there was no matrix spike or serial dilution in this sample data group.

**Request 815:**

Metals. Analytical results for ICP metals were Quality Level I except for lead at Quality Level III. Analytical results for AA metals were Quality Level I. For lead, the positive value for the solid Laboratory Control Sample was outside the lower control limit, indicating the possibility of a false negative.

PCBs and other extractables. NA.

Volatile organics. These data are of Quality Level I for positively identified compounds. Specifically identified TICs are of Quality Level II and unknown TIC data are assigned a Quality Level of III. Volatile organic compounds were often below detection limits and were often detected in blank samples.

**Request 816:**

Metals. (Samples IN816014 through -105) Analytical results for ICP metals were Quality Level I except for lead at Quality Level III. Analytical results for AA metals were Quality Level I. For lead, the positive value for the solid Laboratory Control Sample was outside the lower control limit, indicating the possibility of a false negative.

(Samples IN816116 through -207) Analytical results for ICP metals were Quality Level I except for antimony and lead at Quality Level III. Analytical results for AA metals were Quality Level I. For antimony, the calibration verification result was less than 90% and the element was not detected in the sample. For lead, the positive value for the Laboratory Control Sample was outside the lower control limit, indicating the possibility of a false negative.

PCBs and other extractables. NA.

Volatile organics. These data are of Quality Level I for positively identified compounds. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Request 817:

Metals. Analytical results for ICP metals were Quality Level I except for antimony and lead at Quality Level III. Analytical results for AA metals were Quality Level I. For antimony, the calibration verification result was less than 90% and the element was not detected in the sample. For lead, the positive value for the solid Laboratory Control Sample was outside the lower control limit, indicating the possibility of a false negative.

PCBs and other extractables. NA.

Volatile organics. These data are of Quality Level I for positively identified compounds. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Request 818:

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level III. Analytical results for AA metals were Quality Level I. For antimony, the percent recovery for spikes fell within the 30 to 70% range and the reported result was less than the IDL, indicating the possibility of a false negative.

PCBs and other extractables. Compounds in the dioxin/furan category were found in samples for Request 818. These data were given an overall Quality Level rating of II because of the semi-quantitative nature of the analysis.

Volatile organics. These data are of Quality Level I for positively identified compounds. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

Request 819:

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level III. Analytical results for AA metals were Quality Level I. For antimony, the percent recovery for spike was less than 30% and the reported sampling results were less than the IDL, indicating severe analytical deficiencies.

Volatile organics. These data are of Quality Level I for positively identified compounds. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III. Volatile organic compounds were often below detection limits and were often detected in blank samples.

Environmental Problem: 7
Request Number: 814

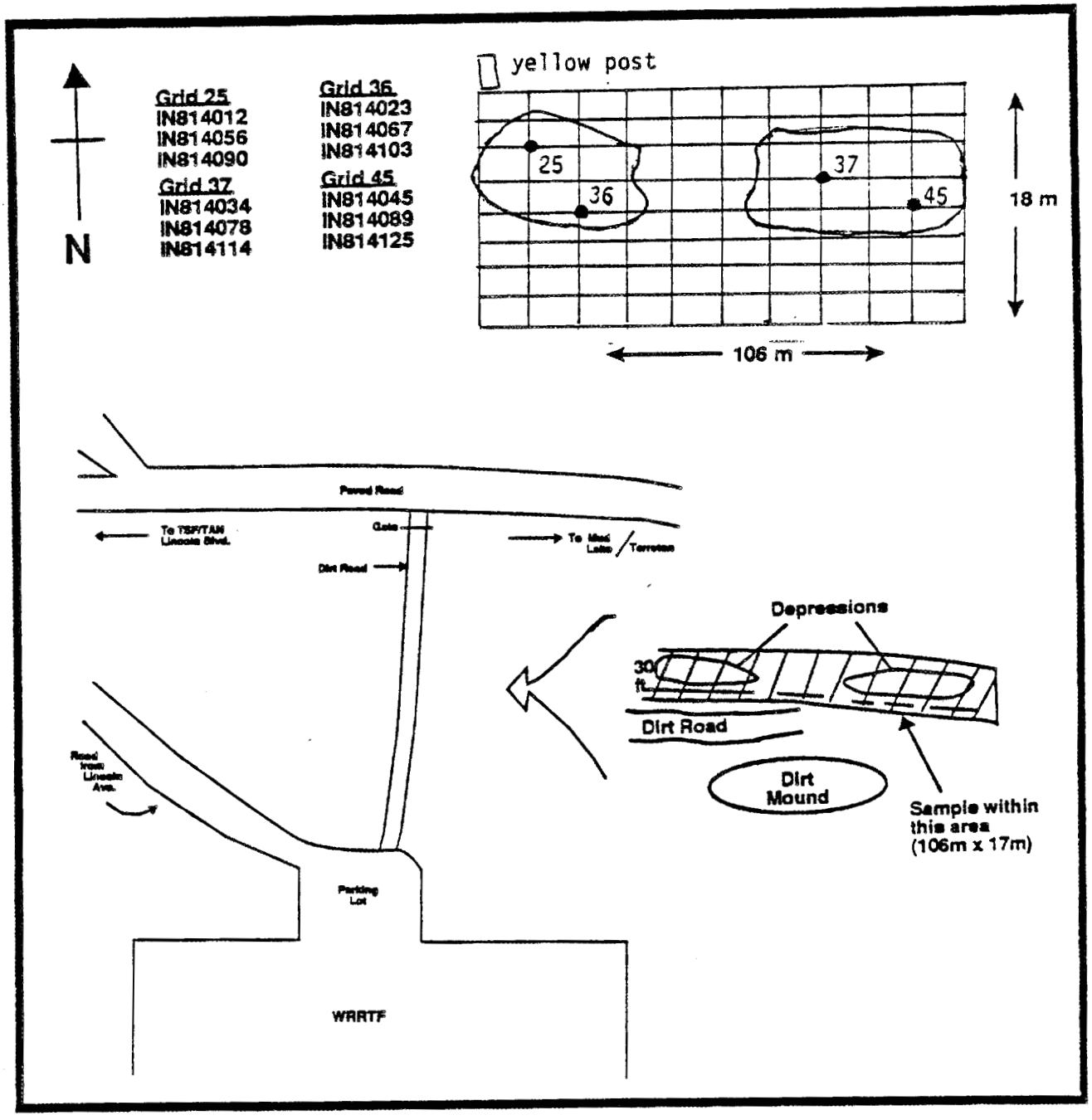


Figure 4.7a. TAN/WRRTF Burn Pit (Request 814)

Environmental Problem: 7
Request Number: 815

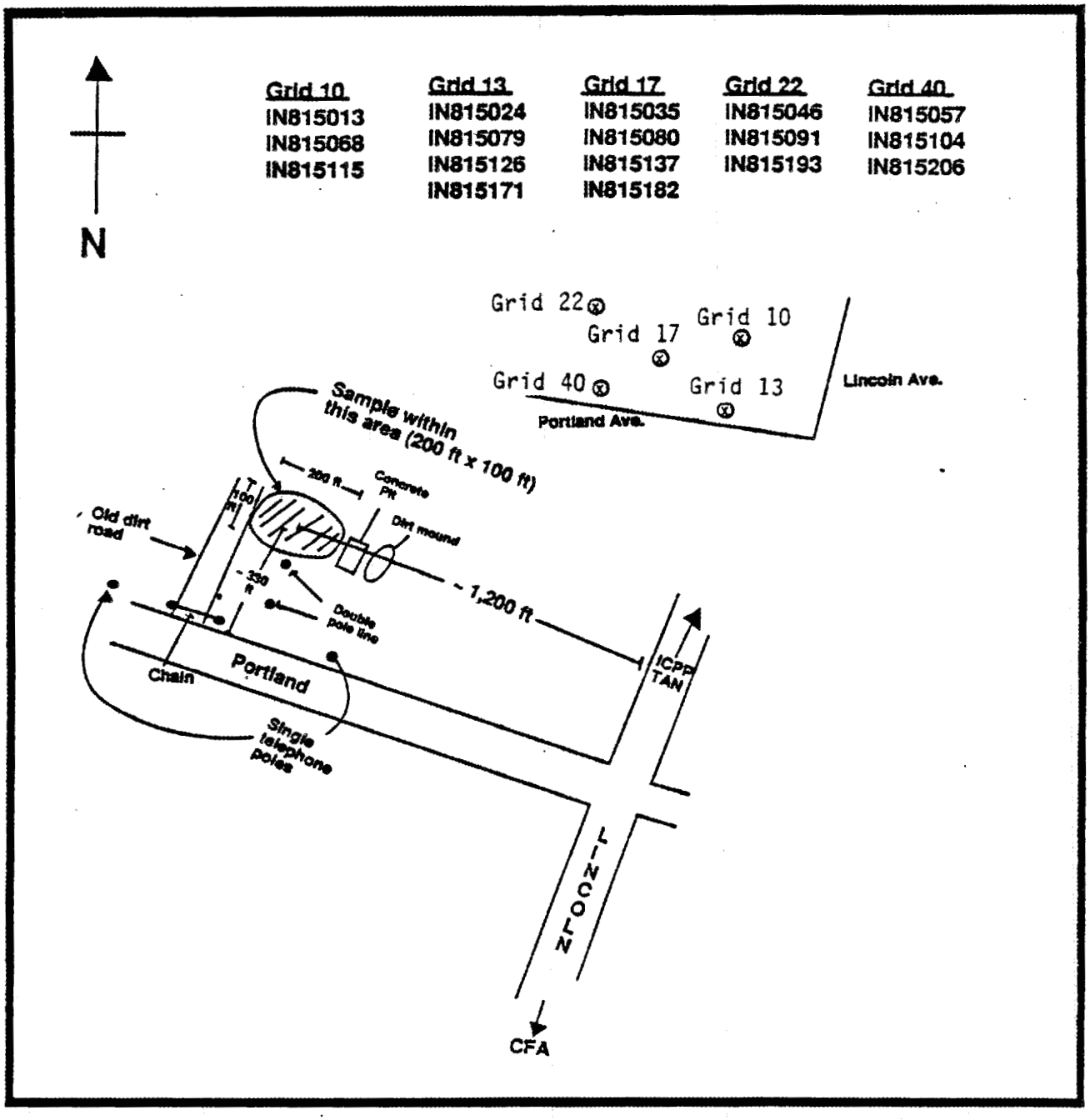


Figure 4.7b. CFA Landfill I (Request 815)

Environmental Problem: 7
Request Number: 816

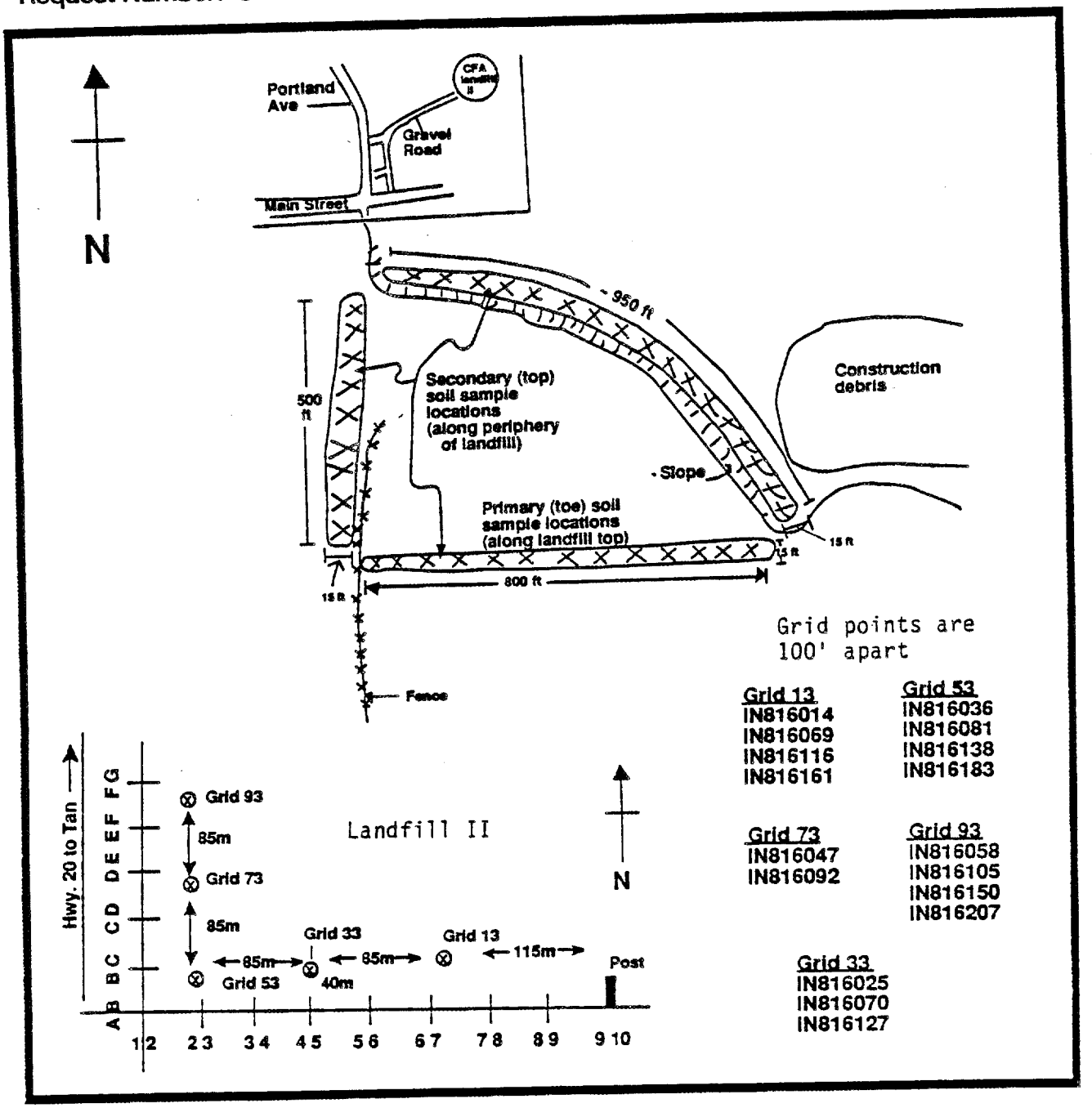


Figure 4.7c. CFA Landfill II (Request 816)

Environmental Problem: 7
Request Number: 817

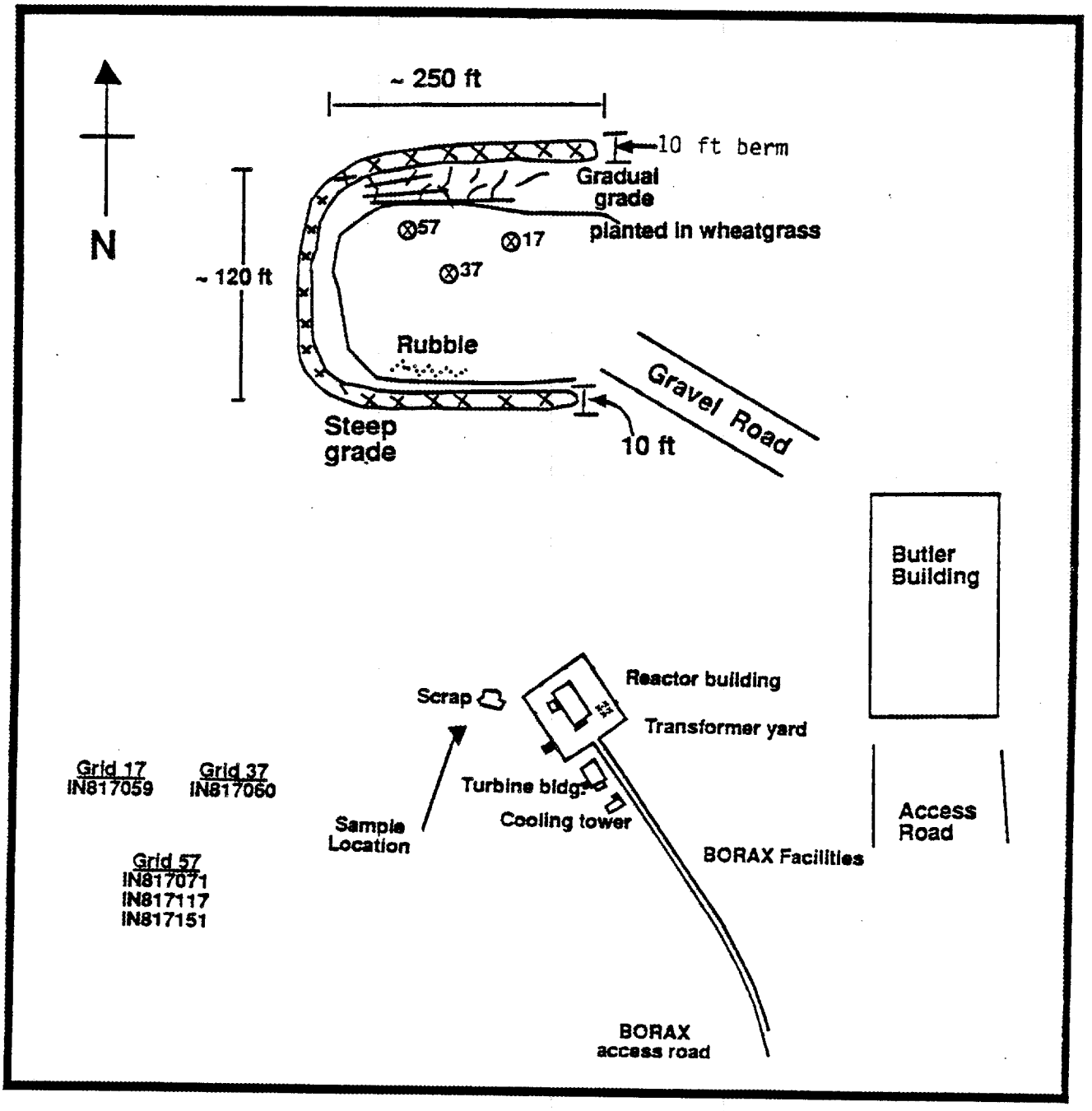


Figure 4.7d. Borax Trash Dump (Request 817)

Environmental Problem: 7
Request Number: 818

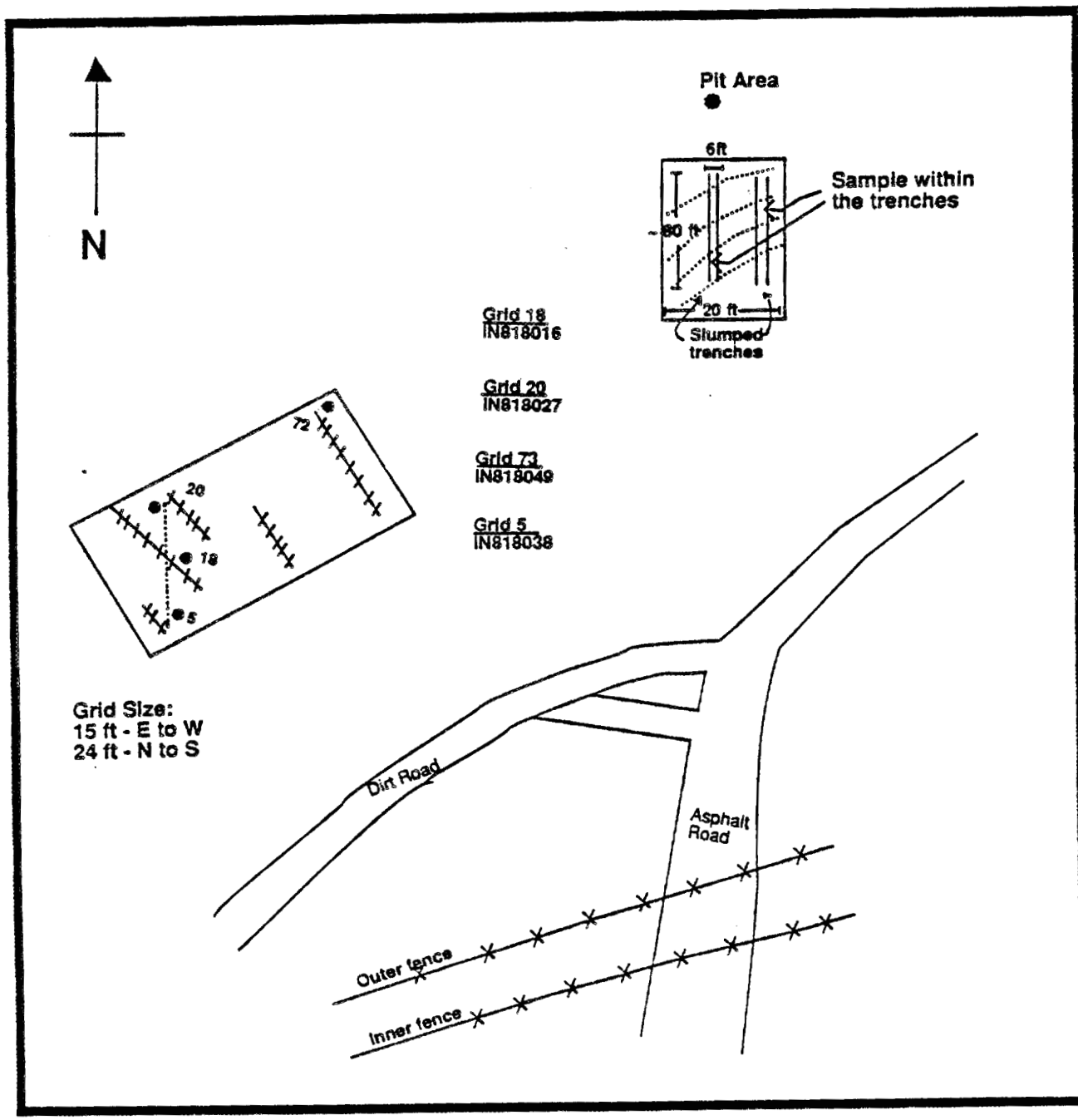


Figure 4.7e. ANL-W Burn Pits (Request 818)

Environmental Problem: 7
Request Number: 819

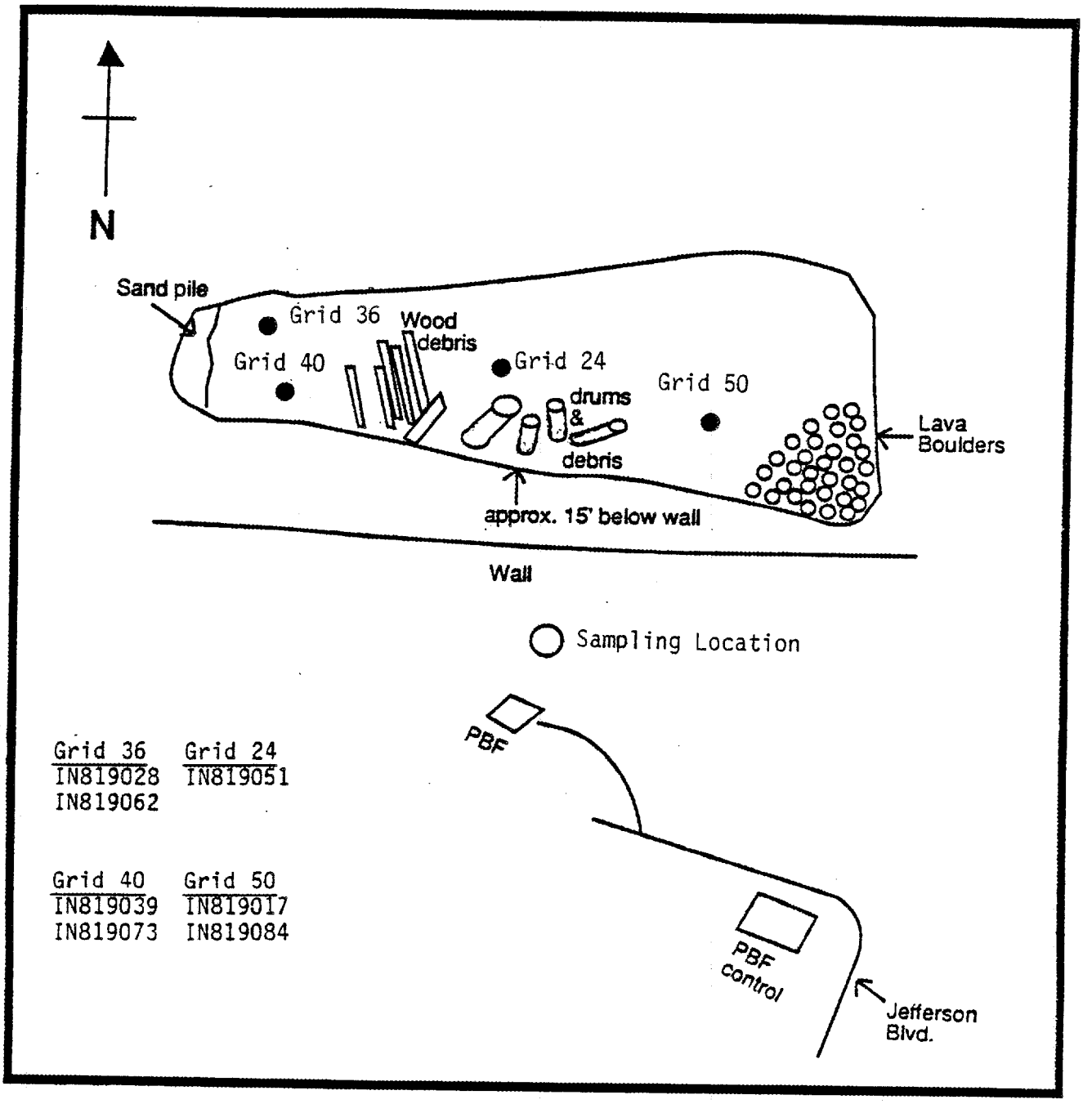


Figure 4.7f. PBF Disposal Pit/Burial Area (Request 819)

TABLE 4.2.7 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 7

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN814 | TAN/HRRTF | BURN PITS | SOIL | 12 | 11 | GRAB | 0 | 0 | 11 | 11 | 0 | 0 | 4 | 11 | 0 | 0 | 11 | 11 | 0 | 0 |
| IN815 | TAN/HRRTF | BURN PITS | SOIL | 20 | 13 | GRAB | 0 | 0 | 13 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 13 | 0 | 0 |
| IN816 | TAN/HRRTF | BURN PITS | SOIL | 20 | 17 | GRAB | 0 | 0 | 17 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 17 | 0 | 0 |
| IN817 | TAN/HRRTF | BURN PITS | SOIL | 16 | 5 | GRAB | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 |
| IN818 | TAN/HRRTF | BURN PITS | SOIL | 12 | 4 | GRAB | 0 | 0 | 4 | 4 | 0 | 0 | 2 | 4 | 0 | 0 | 4 | 4 | 0 | 0 |
| IN819 | TAN/HRRTF | BURN PITS | SOIL | 7 | 7 | GRAB | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 |
| | | MED TOTAL | | 87 | 57 | | 0 | 0 | 54 | 54 | 0 | 0 | 6 | 15 | 0 | 0 | 52 | 53 | 0 | 0 |
| IN819 | TAN/HRRTF | BURN PITS | AIR | 1 | 0 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MED TOTAL | | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN814 | TAN/HRRTF | BURN PITS | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| IN815 | TAN/HRRTF | BURN PITS | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| IN816 | TAN/HRRTF | BURN PITS | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| IN817 | TAN/HRRTF | BURN PITS | SUR WATER | 1 | 1 | QC RN | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| | | MED TOTAL | | 4 | 4 | | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 4 | 0 | 0 |
| | | EP TOTAL | | 92 | 61 | | 0 | 0 | 58 | 58 | 0 | 0 | 6 | 16 | 0 | 0 | 56 | 57 | 0 | 0 |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 LANDFILLS

DRAFT DO NOT CITE

S&A REQUEST: 814
LOCATION: TAN/WRRTF BURN PITS
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN814012 | IN814023 | IN814034 | IN814045 | IN814056 | IN814067 |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0 | 0 | 0 | 0 | 0 | 0 |
| PH (UNITS) | | 8.1 | 7.9 | 7.9 | 7.6 | 7.8 | 7.6 |

| FIELD MEASUREMENTS | SAMP NO: | IN814078 | IN814089 | IN814103 | IN814114 | IN814125 | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0 | 0 | 0 | 0 | 0 | |
| PH (UNITS) | | 7.8 | 7.8 | 7.8 | 7.7 | 8.1 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN814012D | IN814012E | IN814012E | IN814023D | IN814023E | IN814023E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012D | IN801017D | IN801017K | IN814012D | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 17600 | | | 20000 | |
| ARSENIC | | | 11 B | | | 12 B | |
| BARIUM | | | 212 | | | 221 | |
| BERYLLIUM | | | 1.9 E | | | 2 E | |
| CADMIUM | | | 1.3 | | | 1.4 | |
| CALCIUM | | | 99600 | | | 102000 | |
| CHROMIUM | | | 31 | | | 33 | |
| COBALT | | | 7.8 | | | 7.6 B | |
| COPPER | | | 27 | | | 27 | |
| IRON | | | 22500 | | | 22000 | |
| LEAD | | | 23 B | | | 14 B | |
| MAGNESIUM | | | 14100 E | | | 14600 E | |
| MANGANESE | | | 466 E | | | 481 E | |
| MERCURY | | 0.07 | | | 0.07 | | |
| NICKEL | | | 33 | | | 34 | |
| POTASSIUM | | | | 2400 | | | 3200 |
| SILVER | | | 1.6 | | | 1.5 B | |
| SODIUM | | | 1220 | | | 1230 | |
| VANADIUM | | | 46 E | | | 53 E | |
| ZINC | | | 111 | | | 114 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN814034D | IN814034E | IN814034E | IN814045D | IN814045E | IN814045E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012D | IN801017D | IN801017K | IN814012D | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 20100 | | | 21900 | |
| ARSENIC | | | 11 B | | | 11 B | |
| BARIUM | | | 229 | | | 234 | |
| BERYLLIUM | | | 2 E | | | 2.1 E | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7
LANDFILLS

S&A REQUEST: 814
LOCATION: TAN/WRRTF BURN PITS
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN814034D | IN814034E | IN814034E | IN814045D | IN814045E | IN814045E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012D | IN801017D | IN801017K | IN814012D | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CADMIUM | | | 1.5 | | | 2.1 | |
| CALCIUM | | | 98700 | | | 101000 | |
| CHROMIUM | | | 34 | | | 36 | |
| COBALT | | | 7.9 | | | 7.9 | |
| COPPER | | | 28 | | | 27 | |
| IRON | | | 22200 | | | 22700 | |
| LEAD | | | 14 B | | | 16 B | |
| MAGNESIUM | | | 14400 E | | | 14400 E | |
| MANGANESE | | | 487 E | | | 474 E | |
| MERCURY | | 0.09 | | | 0.08 | | |
| NICKEL | | | 34 | | | 35 | |
| POTASSIUM | | | | 3600 | | | 3700 |
| SILVER | | | 1.7 | | | 1.5 B | |
| SODIUM | | | 1130 | | | 1250 | |
| VANADIUM | | | 53 E | | | 58 E | |
| ZINC | | | 119 | | | 117 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN814056D | IN814056E | IN814056E | IN814067D | IN814067E | IN814067E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012D | IN801017D | IN801017K | IN814012D | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 19900 | | | 19500 | |
| ARSENIC | | | 9 U | | | 9.3 B | |
| BARIUM | | | 252 | | | 236 | |
| BERYLLIUM | | | 1.9 E | | | 2 E | |
| CADMIUM | | | 1.1 | | | 1.1 | |
| CALCIUM | | | 85200 | | | 91800 | |
| CHROMIUM | | | 35 | | | 33 | |
| COBALT | | | 8.7 | | | 7.9 | |
| COPPER | | | 112 | | | 27 | |
| IRON | | | 25000 | | | 22300 | |
| LEAD | | | 17 B | | | 16 B | |
| MAGNESIUM | | | 13900 E | | | 14000 E | |
| MANGANESE | | | 517 E | | | 475 E | |
| MERCURY | | 0.07 | | | 0.08 | | |
| NICKEL | | | 42 | | | 34 | |
| POTASSIUM | | | | 3400 | | | 3500 |
| SILVER | | | 2.2 | | | 1.4 B | |
| SODIUM | | | 1190 | | | 1160 | |
| VANADIUM | | | 55 E | | | 52 E | |
| ZINC | | | 119 | | | 113 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 LANDFILLS

DRAFT DO NOT CITE

S&A REQUEST: 814
LOCATION: TAN/WRRTF BURN PITS
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN814078D | IN814078E | IN814078E | IN814089D | IN814089E | IN814089E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012D | IN801017D | IN801017K | IN814012D | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 19500 | | | 18000 | |
| ARSENIC | | | 9.4 B | | | 9.4 U | |
| BARIUM | | | 221 | | | 227 | |
| BERYLLIUM | | | 2 E | | | 1.9 E | |
| CADMIUM | | | 0.96 | | | 0.98 | |
| CALCIUM | | | 97200 | | | 87700 | |
| CHROMIUM | | | 33 | | | 33 | |
| COBALT | | | 7.7 | | | 8 | |
| COPPER | | | 27 | | | 28 | |
| IRON | | | 22000 | | | 21900 | |
| LEAD | | | 16 B | | | 15 B | |
| MAGNESIUM | | | 14100 E | | | 13600 E | |
| MANGANESE | | | 480 E | | | 455 E | |
| MERCURY | | 0.09 | | | 0.06 | | |
| NICKEL | | | 34 | | | 32 | |
| POTASSIUM | | | | 3400 | | | 3200 |
| SILVER | | | 1.3 B | | | 1.3 B | |
| SODIUM | | | 1130 | | | 968 | |
| VANADIUM | | | 51 E | | | 53 E | |
| ZINC | | | 118 | | | 107 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN814103D | IN814103E | IN814103E | IN814114D | IN814114E | IN814114E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012D | IN801017D | IN801017K | IN814012D | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 15900 | | | 20100 | |
| ARSENIC | | | 9.1 B | | | 10 U | |
| BARIUM | | | 205 | | | 237 | |
| BERYLLIUM | | | 1.8 E | | | 2 E | |
| CADMIUM | | | 1 | | | 1.1 | |
| CALCIUM | | | 88000 | | | 90800 | |
| CHROMIUM | | | 30 | | | 37 | |
| COBALT | | | 7.9 | | | 8.4 | |
| COPPER | | | 31 | | | 39 | |
| IRON | | | 22300 | | | 25000 | |
| LEAD | | | 16 B | | | 34 | |
| MAGNESIUM | | | 13900 E | | | 14300 E | |
| MANGANESE | | | 450 E | | | 503 E | |
| MERCURY | | 0.06 | | | 0.08 | | |
| NICKEL | | | 33 | | | 37 | |
| POTASSIUM | | | | 2300 | | | 3900 |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7
LANDFILLS

S&A REQUEST: 814
LOCATION: TAN/WRRTF BURN PITS
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN814103D | IN814103E | IN814103E | IN814114D | IN814114E | IN814114E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012D | IN801017D | IN801017K | IN814012D | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| SILVER | | | 1.9 | | | 2.7 | |
| SODIUM | | | 1180 | | | 1250 | |
| VANADIUM | | | 46 E | | | 58 E | |
| ZINC | | | 344 | | | 142 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN814125D | IN814125E | IN814125E |
|---|---|---|---|---|
| | SDG NO: | IN814012D | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB |
| ALUMINUM | | | 14300 | |
| ARSENIC | | | 9.5 B | |
| BARIUM | | | 187 | |
| BERYLLIUM | | | 1.7 E | |
| CADMIUM | | | 0.82 | |
| CALCIUM | | | 97200 | |
| CHROMIUM | | | 30 | |
| COBALT | | | 6.3 B | |
| COPPER | | | 21 | |
| IRON | | | 17500 | |
| LEAD | | | 9.5 B | |
| MAGNESIUM | | | 14600 E | |
| MANGANESE | | 0.05 | 399 E | |
| MERCURY | | | 26 | |
| NICKEL | | | | 2800 |
| POTASSIUM | | | 1.3 B | |
| SILVER | | | 882 | |
| SODIUM | | | 46 E | |
| VANADIUM | | | 82 | |
| ZINC | | | | |

| PCBS & OTHER EXTRACTABLES (NG/G) | SAMP NO: | IN814012C | IN814023C | IN814034C | IN814045C | IN814056C | IN814067C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012C | IN814012C | IN814012C | IN814012C | IN814012C | IN814012C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| HPCDD | | 0.029 U | 0.006 | 0.019 U | 0.03 U | 0.049 U | 0.023 U |
| HPCDF | | 0.015 U | 0.003 | 0.008 U | 0.019 U | 0.021 U | 0.018 U |
| HXCDD | | 0.018 U | 0.006 | 0.017 U | 0.02 U | 0.017 U | 0.02 U |
| HXCDF | | 0.014 U | 0.004 | 0.012 U | 0.027 U | 0.022 U | 0.013 U |
| OCDD | | 0.21 U | 0.013 | 0.03 | 0.048 U | 0.08 U | 0.093 U |
| OCDF | | 0.13 U | 0.023 | 0.036 U | 0.066 U | 0.086 U | 0.079 U |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 814
LOCATION: TAN/WRRTF BURN PITS
MEDIUM: SOIL

| PCBS & OTHER EXTRACTABLES (NG/G) | SAMP NO: | IN814012C | IN814023C | IN814034C | IN814045C | IN814056C | IN814067C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012C | IN814012C | IN814012C | IN814012C | IN814012C | IN814012C |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| PCDD | | 0.034 U | 0.011 U | 0.031 U | 0.035 U | 0.035 U | 0.022 U |
| PCDF | | 0.018 U | 0.003 U | 0.017 U | 0.02 U | 0.029 U | 0.009 U |
| TCDD-TOT | | 0.053 U | 0.021 U | 0.04 U | 0.054 U | 0.043 U | 0.029 U |
| TCDF-TOT | | 0.023 U | 0.01 U | 0.03 U | 0.048 U | 0.052 U | 0.022 U |
| 2378-TCDF | | 0.023 U | 0.01 U | 0.03 U | 0.048 U | 0.052 U | 0.022 U |

| PCBS & OTHER EXTRACTABLES (NG/G) | SAMP NO: | IN814078C | IN814089C | IN814103C | IN814114C | IN814125C | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012C | IN814012C | IN814012C | IN814012C | IN814012C | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | |
| HPCDD | | 0.019 U | 0.005 | 0.023 U | 0.017 | 0.009 U | |
| HPCDF | | 0.009 U | 0.01 U | 0.018 U | 0.062 | 0.002 U | |
| HXCDD | | 0.016 U | 0.018 U | 0.018 U | 0.046 | 0.006 U | |
| HXCDF | | 0.01 U | 0.005 | 0.008 U | 0.21 | 0.003 U | |
| OCDD | | 0.16 U | 0.013 | 0.17 U | 0.022 | 0.022 U | |
| OCDF | | 0.065 U | 0.013 | 0.14 U | 0.024 | 0.012 U | |
| PCDD | | 0.051 U | 0.011 U | 0.005 U | 0.055 | 0.031 U | |
| PCDF | | 0.014 U | 0.005 U | 0.005 U | 0.13 | 0.015 U | |
| TCDD-TOT | | 0.04 U | 0.032 U | 0.064 U | 0.071 | 0.021 U | |
| TCDF-TOT | | 0.037 U | 0.017 U | 0.014 U | 0.16 | 0.012 U | |
| 2378-TCDF | | 0.037 U | 0.017 U | 0.014 U | 0.036 | 0.012 U | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN814012A | IN814023A | IN814034A | IN814045A | IN814056A | IN814067A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017A | IN801017A | IN801017A | IN801017A | IN801017A | IN801017A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| METHYLENE CHLORIDE | | 260 | 720 | 620 | 390 | 1400 E | 280 |
| TOLUENE | | 6 J | 19 U | 20 U | 21 U | 20 U | 20 U |
| TRICHLOROETHENE | | 21 U | 19 U | 20 U | 21 U | 20 U | 20 U |
| 1,1,1-TRICHLOROETHANE | | 45 | 35 | 27 | 140 | 62 | 57 |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN814078A | IN814089A | IN814103A | IN814114A | IN814125A | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017A | IN801017A | IN801017A | IN801017A | IN801017A | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | |
| METHYLENE CHLORIDE | | 770 | 370 | 570 | 420 | 210 | |
| TOLUENE | | 5 J | 19 U | 21 U | 20 U | 21 U | |
| TRICHLOROETHENE | | 6 J | 19 U | 21 U | 20 U | 21 U | |
| 1,1,1-TRICHLOROETHANE | | 42 | 30 | 19 J | 20 U | 46 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 814
LOCATION: TAN/WRRTF BURN PITS
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN814136G | IN814136H | IN814136H | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN501014D | IN401013I | IN401013K | | | |
| | TYPE: | RINSATE | RINSATE | RINSATE | | | |
| ALUMINUM | | | 858 | | | | |
| BARIUM | | | 74 B | | | | |
| BERYLLIUM | | | 1.5 B | | | | |
| CALCIUM | | | 27700 | | | | |
| CHROMIUM | | | 9.5 B | | | | |
| COPPER | | | 255 | | | | |
| IRON | | | 1140 | | | | |
| MAGNESIUM | | | 7750 | | | | |
| MANGANESE | | | 33 | | | | |
| MERCURY | | 0.04 B | | | | | |
| POTASSIUM | | | | 1900 B | | | |
| SODIUM | | | 7140 | | | | |
| VANADIUM | | | 9.5 B | | | | |
| ZINC | | | 471 | | | | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN814136C | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN802074A | | | | | |
| | TYPE: | RINSATE | | | | | |
| ACETONE | | 50 | | | | | |
| METHYLENE CHLORIDE | | 17 B | | | | | |
| 1,1,1-TRICHLOROETHANE | | 3 BJ | | | | | |

S&A REQUEST: 815
LOCATION: CFA LANDFILL 1
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN815013 | IN815024 | IN815035 | IN815046 | IN815057 | IN815068 |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.8 | 9 | 8.4 | 8.6 | 8.2 | 8.1 |

| FIELD MEASUREMENTS | SAMP NO: | IN815079 | IN815080 | IN815091 | IN815104 | IN815115 | IN815126 |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 8.7 | 8.3 | 8.5 | 8.2 | 8.2 | 7.9 |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 815
LOCATION: CFA LANDFILL 1
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN815171 |
|---|---|---|
| PH (UNITS) | | 8.8 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815013G | IN815013H | IN815013H | IN815024G | IN815024H | IN815024H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 8720 | | | 5060 | |
| BARIUM | | | 155 | | | 93 | |
| BERYLLIUM | | | 1.1 | | | 0.89 | |
| CADMIUM | | | 0.74 | | | 0.54 B | |
| CALCIUM | | | 40500 | | | 36100 | |
| CHROMIUM | | | 23 | | | 18 | |
| COBALT | | | 4.9 B | | | 3.3 B | |
| COPPER | | | 15 | | | 12 | |
| IRON | | | 14200 | | | 10300 | |
| LEAD | | | 4.1 U | | | 4.6 B | |
| MAGNESIUM | | | 7610 | | | 4440 | |
| MANGANESE | | | 238 | | | 154 | |
| MERCURY | | 0.04 B | | | 0.06 | | |
| NICKEL | | | 23 | | | 16 | |
| POTASSIUM | | | | 1200 | | | 730 |
| SELENIUM | | | 6.9 U | | | 6.5 U | |
| SILVER | | | 0.86 B | | | 0.87 B | |
| SODIUM | | | 654 B | | | 376 B | |
| VANADIUM | | | 30 E | | | 23 E | |
| ZINC | | | 71 | | | 47 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815035G | IN815035H | IN815035H | IN815046G | IN815046H | IN815046H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 6560 | | | 4310 | |
| BARIUM | | | 128 | | | 93 | |
| BERYLLIUM | | | 0.99 | | | 0.88 | |
| CADMIUM | | | 0.49 B | | | 0.4 B | |
| CALCIUM | | | 24500 | | | 38700 | |
| CHROMIUM | | | 18 | | | 14 | |
| COBALT | | | 4 B | | | 2.8 B | |
| COPPER | | | 14 | | | 10 | |
| IRON | | | 12500 | | | 9170 | |
| LEAD | | | 4.5 U | | | 4.2 U | |
| MAGNESIUM | | | 4330 | | | 3720 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 815
LOCATION: CFA LANDFILL 1
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815035G | IN815035H | IN815035H | IN815046G | IN815046H | IN815046H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| MANGANESE | | | 154 | | | 133 | |
| MERCURY | | 0.04 | | | 0.05 | | |
| NICKEL | | | 17 | | | 13 | |
| POTASSIUM | | | | 970 | | | 870 |
| SELENIUM | | | 7.5 U | | | 8.8 B | |
| SILVER | | | 0.9 U | | | 0.84 U | |
| SODIUM | | | 251 B | | | 295 B | |
| VANADIUM | | | 30 E | | | 23 E | |
| ZINC | | | 54 | | | 39 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815057G | IN815057H | IN815057H | IN815068G | IN815068H | IN815068H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 5070 | | | 8010 | |
| BARIUM | | | 96 | | | 171 | |
| BERYLLIUM | | | 1 | | | 1.1 | |
| CADMIUM | | | 0.64 B | | | 0.67 B | |
| CALCIUM | | | 56300 | | | 33600 | |
| CHROMIUM | | | 20 | | | 20 | |
| COBALT | | | 4.1 B | | | 4.7 B | |
| COPPER | | | 13 | | | 15 | |
| IRON | | | 12200 | | | 13900 | |
| LEAD | | | 4.4 U | | | 5.6 B | |
| MAGNESIUM | | | 5250 | | | 6740 | |
| MANGANESE | | | 149 | | | 223 | |
| MERCURY | | 0.05 B | | | 0.04 | | |
| NICKEL | | | 18 | | | 20 | |
| POTASSIUM | | | | 1000 | | | 1500 |
| SELENIUM | | | 7.3 U | | | 7.4 B | |
| SILVER | | | 0.87 U | | | 0.87 U | |
| SODIUM | | | 320 B | | | 549 B | |
| VANADIUM | | | 27 E | | | 37 E | |
| ZINC | | | 49 | | | 59 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815079G | IN815079H | IN815079H | IN815080G | IN815080H | IN815080H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 4660 | | | 6380 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 815
LOCATION: CFA LANDFILL 1
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815079G | IN815079H | IN815079H | IN815080G | IN815080H | IN815080H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| BARIUM | | | 85 | | | 134 | |
| BERYLLIUM | | | 0.98 | | | 1 | |
| CADMIUM | | | 0.48 B | | | 0.56 B | |
| CALCIUM | | | 51600 | | | 34000 | |
| CHROMIUM | | | 17 | | | 25 | |
| COBALT | | | 2.9 B | | | 4.2 B | |
| COPPER | | | 12 | | | 14 | |
| IRON | | | 9550 | | | 12300 | |
| LEAD | | | 4.4 U | | | 5.4 B | |
| MAGNESIUM | | | 3960 | | | 4620 | |
| MANGANESE | | | 137 | | | 169 | |
| MERCURY | | 0.04 | | | 0.18 | | |
| NICKEL | | | 14 | | | 21 | |
| POTASSIUM | | | | 1000 | | | 1300 |
| SELENIUM | | | 11 B | | | 7.2 U | |
| SILVER | | | 0.87 U | | | 0.98 B | |
| SODIUM | | | 383 B | | | 260 B | |
| VANADIUM | | | 24 E | | | 29 E | |
| ZINC | | | 37 | | | 51 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815091G | IN815091H | IN815091H | IN815104G | IN815104H | IN815104H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 2970 | | | 7650 | |
| BARIUM | | | 80 | | | 137 | |
| BERYLLIUM | | | 0.71 B | | | 1 | |
| CADMIUM | | | 0.76 | | | 0.59 B | |
| CALCIUM | | | 17700 | | | 26600 | |
| CHROMIUM | | | 8 | | | 22 | |
| COBALT | | | 1.7 B | | | 4.4 B | |
| COPPER | | | 12 | | | 14 | |
| IRON | | | 5900 | | | 13800 | |
| LEAD | | | 4.3 U | | | 6.1 B | |
| MAGNESIUM | | | 2000 | | | 4940 | |
| MANGANESE | | | 67 | | | 185 | |
| MERCURY | | 0.04 | | | 0.04 | | |
| NICKEL | | | 10 | | | 19 | |
| POTASSIUM | | | | 650 B | | | 1600 |
| SELENIUM | | | 7.7 B | | | 6.9 U | |
| SILVER | | | 0.86 U | | | 0.82 U | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 815
LOCATION: CFA LANDFILL 1
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815091G | IN815091H | IN815091H | IN815104G | IN815104H | IN815104H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| SODIUM | | | 182 B | | | 276 B | |
| VANADIUM | | | 22 E | | | 33 E | |
| ZINC | | | 34 | | | 53 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815115G | IN815115H | IN815115H | IN815126G | IN815126H | IN815126H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 13700 | | | 14800 | |
| BARIUM | | | 287 | | | 242 | |
| BERYLLIUM | | | 1.3 | | | 1.4 | |
| CADMIUM | | | 0.76 B | | | 0.74 B | |
| CALCIUM | | | 31800 | | | 16500 | |
| CHROMIUM | | | 32 | | | 29 | |
| COBALT | | | 12 | | | 7 B | |
| COPPER | | | 17 | | | 16 | |
| IRON | | | 28300 | | | 19700 | |
| LEAD | | | 5.8 B | | | 7.7 B | |
| MAGNESIUM | | | 11700 | | | 6820 | |
| MANGANESE | | | 551 | | | 422 | |
| MERCURY | | 0.03 B | | | 0.04 B | | |
| NICKEL | | | 28 | | | 24 | |
| POTASSIUM | | | | 2300 | | | 3100 |
| SELENIUM | | | 7.7 U | | | 7.5 U | |
| SILVER | | | 1.5 B | | | 1 B | |
| SODIUM | | | 1380 | | | 664 B | |
| VANADIUM | | | 48 E | | | 44 E | |
| ZINC | | | 64 | | | 64 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815171G | IN815171H | IN815171H |
|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB |
| ALUMINUM | | | 10500 | |
| BARIUM | | | 176 | |
| BERYLLIUM | | | 1.2 | |
| CADMIUM | | | 0.75 | |
| CALCIUM | | | 30400 | |
| CHROMIUM | | | 25 | |
| COBALT | | | 5.7 B | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 815
LOCATION: CFA LANDFILL 1
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN815171G | IN815171H | IN815171H | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN815013G | IN815013H | IN815013K | | | |
| | TYPE: | GRAB | GRAB | GRAB | | | |
| COPPER | | | 17 | | | | |
| IRON | | | 16700 | | | | |
| LEAD | | | 6.2 B | | | | |
| MAGNESIUM | | | 6870 | | | | |
| MANGANESE | | | 260 | | | | |
| MERCURY | | 0.04 B | | | | | |
| NICKEL | | | 23 | | | | |
| POTASSIUM | | | | 2600 | | | |
| SELENIUM | | | 7.4 U | | | | |
| SILVER | | | 0.89 U | | | | |
| SODIUM | | | 667 B | | | | |
| VANADIUM | | | 33 E | | | | |
| ZINC | | | 73 | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN815013A | IN815024A | IN815035A | IN815046A | IN815057A | IN815068A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012A | IN806012A | IN806012A | IN806012A | IN806012A | IN806012A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 10 U | 19 B | 7 BJ | 10 U | 10 U | 12 B |
| 2-HEXANONE | | 5 BJ | 4 BJ | 10 U | 10 U | 10 U | 10 U |
| 4-METHYL-2-PENTANONE | | 5 BJ | 3 BJ | 2 BJ | 10 U | 10 U | 10 U |
| * UNKNOWN(13.88) | | | | | | | |
| * UNKNOWN(13.91) | | | | | 23 J | 16 J | |
| * UNKNOWN(13.94) | | | | | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.32) | | 6 J | | 5 J | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.35) | | | | | | | 5 J |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.36) | | | 5 J | | 6 J | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN815079A | IN815080A | IN815091A | IN815104A | IN815115A | IN815126A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012A | IN806012A | IN806012A | IN806012A | IN806012A | IN806012A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 11 U | 10 U | 5 BJ | 10 U | 19 B | 6 BJ |
| 2-HEXANONE | | 11 U | 10 U | 10 U | 10 U | 11 U | 12 U |
| 4-METHYL-2-PENTANONE | | 11 U | 10 U | 10 U | 10 U | 11 U | 12 U |
| * UNKNOWN(13.88) | | | | | 23 J | | |
| * UNKNOWN(13.91) | | | 17 J | 45 J | | | |
| * UNKNOWN(13.94) | | | | | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.32) | | | | | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.35) | | | | | | | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 815
LOCATION: CFA LANDFILL 1
MEDIUM: SOIL

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN815079A | IN815080A | IN815091A | IN815104A | IN815115A | IN815126A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN806012A | IN806012A | IN806012A | IN806012A | IN806012A | IN806012A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.36) | | | | | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN815171A |
|---|---|---|
| | SDG NO: | IN806012A |
| | TYPE: | GRAB |
| ACETONE | | 12 U |
| 2-HEXANONE | | 12 U |
| 4-METHYL-2-PENTANONE | | 12 U |
| * UNKNOWN(13.88) | | |
| * UNKNOWN(13.91) | | |
| * UNKNOWN(13.94) | | 9 J |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.32) | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.35) | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.36) | | |

S&A REQUEST: 815
LOCATION: CFA LANDFILL 1
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN815217F | IN815217G |
|---|---|---|---|
| | SDG NO: | IN501014D | IN402014I |
| | TYPE: | RINSATE | RINSATE |
| BERYLLIUM | | | 0.46 B |
| MERCURY | | 0.03 B | |
| SODIUM | | | 292 B |
| ZINC | | | 19 B |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN815217A |
|---|---|---|
| | SDG NO: | IN401024B |
| | TYPE: | RINSATE |
| ACETONE | | 11 B |
| TOLUENE | | 4 J |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN816014 | IN816025 | IN816036 | IN816047 | IN816058 | IN816069 |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.3 | 7.3 | 7.8 | 8.1 | 7.9 | 6.2 |

| FIELD MEASUREMENTS | SAMP NO: | IN816070 | IN816081 | IN816092 | IN816105 | IN816116 | IN816127 |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.5 | 7.6 | 6.7 | 8 | 6.6 | 6.8 |

| FIELD MEASUREMENTS | SAMP NO: | IN816138 | IN816150 | IN816161 | IN816183 | IN816207 | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 6.6 | 8.1 | 7.1 | 6.7 | 8.1 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816014G | IN816014H | IN816014H | IN816025G | IN816025H | IN816025H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN816014G | IN815013H | IN815013K | IN816014G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 11000 | | | 9760 | |
| ANTIMONY | | | 7.4 UN | | | 24 N | |
| ARSENIC | | | 8.8 U | | | 8.9 U | |
| BARIUM | | | 184 | | | 178 | |
| BERYLLIUM | | | 1.3 | | | 1.2 | |
| CADMIUM | | | 0.81 | | | 0.83 | |
| CALCIUM | | | 27800 | | | 28500 | |
| CHROMIUM | | | 29 | | | 48 | |
| COBALT | | | 6.1 B | | | 6.8 B | |
| COPPER | | | 20 | | | 21 | |
| IRON | | | 18100 | | | 18100 | |
| LEAD | | | 9.6 B | | | 9 B | |
| MAGNESIUM | | | 6700 | | | 7230 | |
| MANGANESE | | | 288 | | | 476 | |
| MERCURY | | 0.04 B | | | 0.17 | | |
| NICKEL | | | 25 | | | 27 | |
| POTASSIUM | | | | 2700 | | | 2200 |
| SELENIUM | | | 7.4 U | | | 7.4 U | |
| SILVER | | | 0.92 B | | | 1.2 B | |
| SODIUM | | | 478 B | | | 485 B | |
| VANADIUM | | | 38 E | | | 35 E | |
| ZINC | | | 114 | | | 135 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816036G | IN816036H | IN816036H | IN816047G | IN816047H | IN816047H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN816014G | IN815013H | IN815013K | IN816014G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 7370 | | | 6720 | |
| ANTIMONY | | | 7.7 UN | | | 7.3 UN | |
| ARSENIC | | | 9.2 U | | | 8.8 U | |
| BARIUM | | | 160 | | | 98 | |
| BERYLLIUM | | | 1.1 | | | 1 | |
| CADMIUM | | | 0.69 B | | | 0.58 B | |
| CALCIUM | | | 33700 | | | 33300 | |
| CHROMIUM | | | 29 | | | 22 | |
| COBALT | | | 5.1 B | | | 4.7 B | |
| COPPER | | | 17 | | | 14 | |
| IRON | | | 14400 | | | 13400 | |
| LEAD | | | 89 | | | 6.9 B | |
| MAGNESIUM | | | 6190 | | | 6170 | |
| MANGANESE | | | 209 | | | 181 | |
| MERCURY | | 0.06 | | | 0.05 | | |
| NICKEL | | | 22 | | | 18 | |
| POTASSIUM | | | | 1700 | | | 1200 |
| SELENIUM | | | 7.7 U | | | 7.3 U | |
| SILVER | | | 0.92 U | | | 0.88 U | |
| SODIUM | | | 395 B | | | 227 B | |
| VANADIUM | | | 32 E | | | 27 E | |
| ZINC | | | 100 | | | 48 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816058G | IN816058H | IN816058H | IN816069G | IN816069H | IN816069H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN816014G | IN815013H | IN815013K | IN816014G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 7100 | | | 9690 | |
| ANTIMONY | | | 7.1 UN | | | 7.4 UN | |
| ARSENIC | | | 8.6 U | | | 8.9 U | |
| BARIUM | | | 116 | | | 170 | |
| BERYLLIUM | | | 1.1 | | | 1.2 | |
| CADMIUM | | | 0.54 B | | | 0.73 B | |
| CALCIUM | | | 29100 | | | 25100 | |
| CHROMIUM | | | 20 | | | 28 | |
| COBALT | | | 4.1 B | | | 5.7 B | |
| COPPER | | | 14 | | | 18 | |
| IRON | | | 12800 | | | 16300 | |
| LEAD | | | 5 B | | | 8.8 B | |
| MAGNESIUM | | | 4740 | | | 6420 | |
| MANGANESE | | | 183 | | | 263 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816058G | IN816058H | IN816058H | IN816069G | IN816069H | IN816069H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN816014G | IN815013H | IN815013K | IN816014G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| MERCURY | | 0.04 B | | | 0.05 | | |
| NICKEL | | | 19 | | | 25 | |
| POTASSIUM | | | | 1600 | | | 2200 |
| SELENIUM | | | 7.1 U | | | 7.4 U | |
| SILVER | | | 0.86 U | | | 0.99 B | |
| SODIUM | | | 276 B | | | 418 B | |
| VANADIUM | | | 28 E | | | 30 E | |
| ZINC | | | 55 | | | 116 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816070G | IN816070H | IN816070H | IN816081G | IN816081H | IN816081H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN816014G | IN815013H | IN815013K | IN816014G | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 6490 | | | 7060 | |
| ANTIMONY | | | 23 N | | | 7.6 UN | |
| ARSENIC | | | 9.8 B | | | 9.1 U | |
| BARIUM | | | 120 | | | 112 | |
| BERYLLIUM | | | 1.4 | | | 1.1 | |
| CADMIUM | | | 0.67 B | | | 0.55 B | |
| CALCIUM | | | 135000 | | | 28700 | |
| CHROMIUM | | | 23 | | | 21 | |
| COBALT | | | 3.6 B | | | 4.5 B | |
| COPPER | | | 19 | | | 14 | |
| IRON | | | 10700 | | | 12800 | |
| LEAD | | | 4.1 U | | | 22 B | |
| MAGNESIUM | | | 12800 | | | 4990 | |
| MANGANESE | | | 232 | | | 190 | |
| MERCURY | | 0.07 | | | 0.09 | | |
| NICKEL | | | 17 | | | 19 | |
| POTASSIUM | | | | 1800 | | | 1600 |
| SELENIUM | | | 6.9 U | | | 7.6 U | |
| SILVER | | | 1.1 B | | | 0.91 U | |
| SODIUM | | | 653 B | | | 286 B | |
| VANADIUM | | | 22 E | | | 26 E | |
| ZINC | | | 82 | | | 137 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816092G | IN816092H | IN816092H | IN816105G | IN816105H | IN816105H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017C | IN815013H | IN815013K | IN801017C | IN815013H | IN815013K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 6150 | | | 7440 | |
| ANTIMONY | | | 6.9 UN | | | 7.3 UN | |
| ARSENIC | | | 8.2 U | | | 8.8 U | |
| BARIUM | | | 96 | | | 218 | |
| BERYLLIUM | | | 0.98 | | | 1 | |
| CADMIUM | | | 0.54 B | | | 0.58 B | |
| CALCIUM | | | 27300 | | | 25700 | |
| CHROMIUM | | | 18 | | | 20 | |
| COBALT | | | 3.8 B | | | 4 B | |
| COPPER | | | 16 | | | 14 | |
| IRON | | | 11600 | | | 13500 | |
| LEAD | | | 6.8 B | | | 4.4 U | |
| MAGNESIUM | | | 4180 | | | 5920 | |
| MANGANESE | | | 149 | | | 186 | |
| MERCURY | | 0.08 | | | 0.05 | | |
| NICKEL | | | 16 | | | 19 | |
| POTASSIUM | | | | 1500 | | | 1500 |
| SELENIUM | | | 9.2 B | | | 7.3 U | |
| SILVER | | | 2.2 | | | 0.88 U | |
| SODIUM | | | 239 B | | | 268 B | |
| VANADIUM | | | 25 E | | | 26 E | |
| ZINC | | | 56 | | | 56 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816116G | IN816116H | IN816116H | IN816127G | IN816127H | IN816127H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017C | IN816116H | IN816116K | IN801017C | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 8080 | | | 32800 | |
| ANTIMONY | | | 7.4 UN | | | 8.4 UN | |
| ARSENIC | | | 8.8 U | | | 10 U | |
| BARIUM | | | 127 | | | 282 | |
| BERYLLIUM | | | 1.3 E | | | 2.3 E | |
| CADMIUM | | | 1.3 | | | 0.54 B | |
| CALCIUM | | | 39400 | | | 13300 | |
| CHROMIUM | | | 26 | | | 33 | |
| COBALT | | | 5.5 B | | | 14 | |
| COPPER | | | 28 N* | | | 30 N* | |
| IRON | | | 14900 | | | 33200 | |
| LEAD | | | 17 B | | | 10 B | |
| MAGNESIUM | | | 6120 | | | 10600 | |
| MANGANESE | | | 218 | | | 975 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816116G | IN816116H | IN816116H | IN816127G | IN816127H | IN816127H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017C | IN816116H | IN816116K | IN801017C | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| MERCURY | | 0.07 | | | 0.06 | | |
| NICKEL | | | 23 | | | 33 | |
| POTASSIUM | | | | 1500 | | | 7000 |
| SELENIUM | | | 7.4 U | | | 8.4 U | |
| SILVER | | | 0.88 U | | | 1 B | |
| SODIUM | | | 25 U | | | 28 U | |
| VANADIUM | | | 31 E | | | 42 E | |
| ZINC | | | 87 | | | 100 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816138G | IN816138H | IN816138H | IN816150G | IN816150H | IN816150H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017C | IN816116H | IN816116K | IN801017C | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 7610 | | | 4550 | |
| ANTIMONY | | | 7.3 UN | | | 6.9 UN | |
| ARSENIC | | | 8.8 U | | | 8.3 U | |
| BARIUM | | | 125 | | | 82 | |
| BERYLLIUM | | | 1.2 E | | | 1.2 E | |
| CADMIUM | | | 0.64 B | | | 0.41 B | |
| CALCIUM | | | 29400 | | | 72700 | |
| CHROMIUM | | | 24 | | | 14 | |
| COBALT | | | 5.1 B | | | 2.8 B | |
| COPPER | | | 16 N* | | | 10 N* | |
| IRON | | | 14400 | | | 8880 | |
| LEAD | | | 48 | | | 4.2 B | |
| MAGNESIUM | | | 5670 | | | 3800 | |
| MANGANESE | | | 212 | | | 108 | |
| MERCURY | | 0.06 | | | 0.05 B | | |
| NICKEL | | | 20 | | | 12 | |
| POTASSIUM | | | | 1400 | | | 1100 |
| SELENIUM | | | 7.3 U | | | 6.9 U | |
| SILVER | | | 0.88 U | | | 0.83 U | |
| SODIUM | | | 25 U | | | 23 U | |
| VANADIUM | | | 33 E | | | 23 E | |
| ZINC | | | 104 | | | 36 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816161G | IN816161H | IN816161H | IN816183G | IN816183H | IN816183H |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017C | IN816116H | IN816116K | IN801017C | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 11900 | | | 34200 | |
| ANTIMONY | | | 7.5 UN | | | 363 N | |
| ARSENIC | | | 9 U | | | 35 B | |
| BARIUM | | | 155 | | | 390 | |
| BERYLLIUM | | | 1.5 E | | | 2.2 E | |
| CADMIUM | | | 0.94 | | | 1.7 | |
| CALCIUM | | | 28600 | | | 6980 | |
| CHROMIUM | | | 25 | | | 37 | |
| COBALT | | | 10 | | | 16 | |
| COPPER | | | 27 N* | | | 40 N* | |
| IRON | | | 25300 | | | 34400 | |
| LEAD | | | 349 | | | 28200 | |
| MAGNESIUM | | | 10800 | | | 8670 | |
| MANGANESE | | | 469 | | | 805 | |
| MERCURY | | 0.1 | | | 0.04 B | | |
| NICKEL | | | 27 | | | 36 | |
| POTASSIUM | | | | 1900 | | | 6200 |
| SELENIUM | | | 7.5 U | | | 8.4 U | |
| SILVER | | | 0.9 U | | | 1.4 B | |
| SODIUM | | | 26 U | | | 29 U | |
| VANADIUM | | | 40 E | | | 45 E | |
| ZINC | | | 101 | | | 96 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816207G | IN816207H | IN816207H |
|---|---|---|---|---|
| | SDG NO: | IN801017C | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB |
| ALUMINUM | | | 6440 | |
| ANTIMONY | | | 7.4 UN | |
| ARSENIC | | | 8.8 U | |
| BARIUM | | | 70 | |
| BERYLLIUM | | | 1.2 E | |
| CADMIUM | | | 0.36 B | |
| CALCIUM | | | 26700 | |
| CHROMIUM | | | 26 | |
| COBALT | | | 4.6 B | |
| COPPER | | | 14 N* | |
| IRON | | | 14200 | |
| LEAD | | | 11 B | |
| MAGNESIUM | | | 5780 | |
| MANGANESE | | | 175 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN816207G | IN816207H | IN816207H |
|---|---|---|---|---|
| | SDG NO: | IN801017C | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB |
| MERCURY | | 0.04 | | |
| NICKEL | | | 19 | |
| POTASSIUM | | | | 1000 |
| SELENIUM | | | 7.4 U | |
| SILVER | | | 0.88 U | |
| SODIUM | | | 25 U | |
| VANADIUM | | | 35 E | |
| ZINC | | | 48 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN816014A | IN816025A | IN816036A | IN816047A | IN816058A | IN816069A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN802074A | IN802074A | IN802074A | IN802074A | IN802074A | IN802074A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 28 U | 240 | 48 | 37 U | 34 U | 1200 E |
| ETHYLBENZENE | | 11 J | 21 U | 19 U | 18 U | 17 U | 22 U |
| METHYLENE CHLORIDE | | 640 E | 180 | 120 | 73 | 60 | 400 |
| TETRACHLOROETHENE | | 14 U | 21 U | 19 U | 18 U | 17 U | 22 U |
| TOLUENE | | 6 J | 5 J | 19 U | 18 U | 3 J | 22 U |
| XYLENE (TOTAL) | | 67 | 11 J | 19 U | 18 U | 17 U | 22 U |
| 1,1,1-TRICHLOROETHANE | | 21 | 85 | 41 | 53 | 28 | 19 J |
| 2-BUTANONE | | 28 U | 78 | 38 U | 37 U | 34 U | 590 |
| 2-HEXANONE | | 28 U | 43 U | 38 U | 37 U | 34 U | 44 U |
| 4-METHYL-2-PENTANONE | | 28 U | 43 U | 38 U | 37 U | 34 U | 44 U |
| * CAMPHENE(22.42) | | | | | | | |
| * C10 HYDROCARBON(21.82) | | | | | | | |
| * C11 HYDROCARBON(21.67) | | | | | | | |
| * C13 HYDROCARBON(19.37) | | | | | | | |
| * PROPYL BENZENE(22.15) | | | | | | | |
| * UNKNOWN HYDROCARBON(21.98) | | | | | | | |
| * UNKNOWN SUBS. HYDROCARB(19.12) | | | | | | | |
| * UNKNOWN(18.87) | | | | | | | |
| * UNKNOWN(19.98) | | | | | | | |
| * UNKNOWN(21.30) | | | | | | | |
| * 2-HEPTANONE(21.28) | | | | | | | |
| * 3-CONENE(21.80) | | | 430 J | | | | |
| * 3-CORENE(21.77) | | | | | | | |
| * 3-METHYL-2-BUTANONE(14.80) | | | | | | | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN816070A | IN816081A | IN816092A | IN816105A | IN816116A | IN816127A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | IN802074A | IN802074A | IN802074A | IN802074A | IN802074A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 590 | 170 | 1700 E | 37 U | 490 | 48 U |
| ETHYLBENZENE | | 37 | 5 J | 99 | 18 U | 20 U | 24 U |
| METHYLENE CHLORIDE | | 220 B | 330 | 230 | 45 | 74 | 45 |
| TETRACHLOROETHENE | | 22 J | 20 U | 30 | 18 U | 20 U | 24 U |
| TOLUENE | | 23 J | 8 J | 240 | 18 U | 20 U | 24 U |
| XYLENE (TOTAL) | | 270 | 26 | 1200 | 18 U | 39 | 13 J |
| 1,1,1-TRICHLOROETHANE | | 270 B | 15 J | 220 | 18 U | 14 J | 93 |
| 2-BUTANONE | | 54 U | 62 | 400 | 37 U | 450 | 240 |
| 2-HEXANONE | | 54 U | 40 U | 44 U | 37 U | 40 U | 48 U |
| 4-METHYL-2-PENTANONE | | 54 U | 40 U | 1000 E | 37 U | 40 U | 48 U |
| * CAMPHENE(22.42) | | 300 J | | | | | |
| * C10 HYDROCARBON(21.82) | | | | 130 J | | | |
| * C11 HYDROCARBON(21.67) | | | | 360 J | | | |
| * C13 HYDROCARBON(19.37) | | | | 27 J | | | |
| * PROPYL BENZENE(22.15) | | 82 J | | | | | |
| * UNKNOWN HYDROCARBON(21.98) | | 38 J | | | | | |
| * UNKNOWN SUBS. HYDROCARB(19.12) | | | | 31 J | | | |
| * UNKNOWN(18.87) | | | | 35 J | | | |
| * UNKNOWN(19.98) | | | | 130 J | | | |
| * UNKNOWN(21.30) | | | | 5300 J | | | |
| * 2-HEPTANONE(21.28) | | | | | | | 35 J |
| * 3-CONENE(21.80) | | | | | | | |
| * 3-CORENE(21.77) | | 15000 J | | | | | |
| * 3-METHYL-2-BUTANONE(14.80) | | | | 1300 J | | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN816138A | IN816150A | IN816161A | IN816183A | IN816207A |
|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | IN502015A | IN502015A | IN502015A | IN502015A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 150 | 34 J | 2400 E | 240 | 34 U |
| ETHYLBENZENE | | 20 U | 18 U | 8 J | 20 U | 17 U |
| METHYLENE CHLORIDE | | 46 B | 77 B | 100 B | 190 B | 30 |
| TETRACHLOROETHENE | | 20 U | 18 U | 22 U | 20 U | 17 U |
| TOLUENE | | 20 U | 18 U | 5 J | 20 U | 17 U |
| XYLENE (TOTAL) | | 7 J | 18 U | 55 | 20 U | 17 U |
| 1,1,1-TRICHLOROETHANE | | 47 B | 23 B | 47 B | 19 BJ | 27 |
| 2-BUTANONE | | 40 U | 37 U | 950 BE | 40 U | 34 U |
| 2-HEXANONE | | 40 U | 37 U | 45 | 40 U | 34 U |
| 4-METHYL-2-PENTANONE | | 40 U | 37 U | 140 | 40 U | 34 U |
| * CAMPHENE(22.42) | | | | | | |
| * C10 HYDROCARBON(21.82) | | | | | | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SOIL

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN816138A | IN816150A | IN816161A | IN816183A | IN816207A |
|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | IN502015A | IN502015A | IN502015A | IN502015A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB |
| * C11 HYDROCARBON(21.67) | | | | | | |
| * C13 HYDROCARBON(19.37) | | | | | | |
| * PROPYL BENZENE(22.15) | | | | | | |
| * UNKNOWN HYDROCARBON(21.98) | | | | | | |
| * UNKNOWN SUBS. HYDROCARB(19.12) | | | | | | |
| * UNKNOWN(18.87) | | | | | | |
| * UNKNOWN(19.98) | | | | | | |
| * UNKNOWN(21.30) | | | | | | |
| * 2-HEPTANONE(21.28) | | | | | | |
| * 3-CONENE(21.80) | | | | | | |
| * 3-CORENE(21.77) | | | | | | |
| * 3-METHYL-2-BUTANONE(14.80) | | | | | | |

S&A REQUEST: 816
LOCATION: CFA LANDFILL II
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN816218F | IN816218G |
|---|---|---|---|
| | SDG NO: | IN501014D | IN402014I |
| | TYPE: | RINSATE | RINSATE |
| BARIUM | | | 1.4 B |
| IRON | | | 24 B |
| MAGNESIUM | | | 17 B |
| MERCURY | | 0.03 B | |
| SODIUM | | | 214 B |
| ZINC | | | 15 B |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN816218B |
|---|---|---|
| | SDG NO: | IN802074A |
| | TYPE: | RINSATE |
| METHYLENE CHLORIDE | | 6 B |
| TOLUENE | | 2 J |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 817
LOCATION: BORAX TRASH DUMP
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN817059 | IN817060 | IN817071 | IN817117 | IN817151 | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0 | 0 | 0 | 0 | 0 | |
| PH (UNITS) | | 7.3 | 7.3 | 7.4 | 7.3 | 7.5 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN817059C | IN817059D | IN817059D | IN817060C | IN817060D | IN817060D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN816014G | IN816116H | IN816116K | IN816014G | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 18000 | | | 20400 | |
| BARIUM | | | 273 | | | 235 | |
| BERYLLIUM | | | 2 E | | | 1.9 E | |
| CADMIUM | | | 0.54 B | | | 0.29 B | |
| CALCIUM | | | 81300 | | | 49400 | |
| CHROMIUM | | | 24 | | | 29 | |
| COBALT | | | 7.5 B | | | 7.8 | |
| COPPER | | | 21 N* | | | 20 N* | |
| IRON | | | 21900 | | | 23000 | |
| LEAD | | | 7.9 B | | | 7.9 B | |
| MAGNESIUM | | | 14400 | | | 13500 | |
| MANGANESE | | | 425 | | | 444 | |
| MERCURY | | 0.05 | | | 0.08 | | |
| NICKEL | | | 22 | | | 24 | |
| POTASSIUM | | | | 3500 | | | 3800 |
| SILVER | | | 1 B | | | 0.96 B | |
| SODIUM | | | 1600 | | | 25 U | |
| VANADIUM | | | 42 E | | | 47 E | |
| ZINC | | | 60 | | | 63 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN817071C | IN817071D | IN817071D | IN817117C | IN817117D | IN817117D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN816014G | IN816116H | IN816116K | IN816014G | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 18100 | | | 16800 | |
| BARIUM | | | 229 | | | 220 | |
| BERYLLIUM | | | 1.8 E | | | 1.7 E | |
| CADMIUM | | | 0.4 B | | | 0.3 B | |
| CALCIUM | | | 59100 | | | 54400 | |
| CHROMIUM | | | 24 | | | 23 | |
| COBALT | | | 8.9 | | | 9.3 | |
| COPPER | | | 19 N* | | | 18 N* | |
| IRON | | | 23300 | | | 23200 | |
| LEAD | | | 5.3 B | | | 7.8 B | |
| MAGNESIUM | | | 14600 | | | 14100 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 817
LOCATION: BORAX TRASH DUMP
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN817071C | IN817071D | IN817071D | IN817117C | IN817117D | IN817117D |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN816014G | IN816116H | IN816116K | IN816014G | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| MANGANESE | | | 449 | | | 466 | |
| MERCURY | | 0.73 | | | 0.91 | | |
| NICKEL | | | 24 | | | 24 | |
| POTASSIUM | | | | 3700 | | | 3200 |
| SILVER | | | 1 B | | | 0.84 U | |
| SODIUM | | | 26 U | | | 1110 | |
| VANADIUM | | | 43 E | | | 40 E | |
| ZINC | | | 67 | | | 101 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN817151C | IN817151D | IN817151D |
|---|---|---|---|---|
| | SDG NO: | IN816014G | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB |
| ALUMINUM | | | 17500 | |
| BARIUM | | | 223 | |
| BERYLLIUM | | | 1.7 E | |
| CADMIUM | | | 0.34 B | |
| CALCIUM | | | 52200 | |
| CHROMIUM | | | 24 | |
| COBALT | | | 10 | |
| COPPER | | | 19 N* | |
| IRON | | | 25100 | |
| LEAD | | | 4.6 B | |
| MAGNESIUM | | | 14700 | |
| MANGANESE | | | 478 | |
| MERCURY | | 0.56 | | |
| NICKEL | | | 25 | |
| POTASSIUM | | | | 1900 |
| SILVER | | | 0.85 U | |
| SODIUM | | | 1600 | |
| VANADIUM | | | 41 E | |
| ZINC | | | 64 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN817059A | IN817060A | IN817071A | IN817117A | IN817151A |
|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | IN502015A | IN502015A | IN502015A | IN502015A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 72 | 37 U | 36 U | 42 | 37 U |
| METHYLENE CHLORIDE | | 260 | 630 | 190 | 110 | 190 |
| TOLUENE | | 7 J | 4 J | 18 U | 18 U | 18 U |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 817
LOCATION: BORAX TRASH DUMP
MEDIUM: SOIL

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN817059A | IN817060A | IN817071A | IN817117A | IN817151A |
|---|---|---|---|---|---|---|
| | SDG NO: | IN502015A | IN502015A | IN502015A | IN502015A | IN502015A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB |
| 1,1,1-TRICHLOROETHANE | | 78 | 34 | 34 | 23 | 37 |

S&A REQUEST: 817
LOCATION: BORAX TRASH DUMP
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN817173F | IN817173G | IN817173G |
|---|---|---|---|---|
| | SDG NO: | IN501014D | IN402014I | IN402014K |
| | TYPE: | RINSATE | RINSATE | RINSATE |
| ALUMINUM | | | 801 | |
| BARIUM | | | 85 B | |
| BERYLLIUM | | | 3 B | |
| CADMIUM | | | 2.1 B | |
| CALCIUM | | | 72400 | |
| CHROMIUM | | | 21 | |
| COPPER | | | 107 | |
| IRON | | | 736 | |
| MAGNESIUM | | | 24200 | |
| MANGANESE | | | 32 | |
| MERCURY | | 0.05 B | | |
| NICKEL | | | 8.8 B | |
| POTASSIUM | | | | 7500 |
| SODIUM | | | 23300 | |
| VANADIUM | | | 16 B | |
| ZINC | | | 988 | |

| VOLATILE ORGANICS (UG/L) | SAMP NO: | IN817173B |
|---|---|---|
| | SDG NO: | IN802074A |
| | TYPE: | RINSATE |
| METHYLENE CHLORIDE | | 5 B |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 818
LOCATION: ANL-W BURN PITS
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN818016D | IN818016E | IN818016E | IN818027D | IN818027E | IN818027E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN505018C | IN505018K | IN522019C | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 13000 | | | 13300 | |
| BARIUM | | | 172 | | | 220 | |
| BERYLLIUM | | | 1.6 | | | 1.5 | |
| CADMIUM | | | 0.42 B | | | 0.39 B | |
| CALCIUM | | | 68100 | | | 73200 | |
| CHROMIUM | | | 18 | | | 21 | |
| COBALT | | | 6.3 B | | | 6.6 B | |
| COPPER | | | 17 | | | 20 | |
| IRON | | | 15200 | | | 15300 | |
| LEAD | | | 7.9 B | | | 9.1 B | |
| MAGNESIUM | | | 12700 | | | 15200 | |
| MANGANESE | | | 419 E | | | 421 E | |
| MERCURY | | 0.02 B | | | 0.02 B | | |
| NICKEL | | | 21 | | | 28 | |
| POTASSIUM | | | | 2900 | | | 2600 |
| SILVER | | | 1.2 B | | | 1.2 B | |
| SODIUM | | | 2230 | | | 1720 | |
| VANADIUM | | | 27 E | | | 31 E | |
| ZINC | | | 61 | | | 57 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN818038D | IN818038E | IN818038E | IN818049D | IN818049E | IN818049E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN505018C | IN505018K | IN522019C | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 12300 | | | 12000 | |
| BARIUM | | | 203 | | | 174 | |
| BERYLLIUM | | | 1.5 | | | 1.5 | |
| CADMIUM | | | 0.31 B | | | 0.29 B | |
| CALCIUM | | | 80200 | | | 64600 | |
| CHROMIUM | | | 20 | | | 17 | |
| COBALT | | | 7.1 B | | | 6.2 B | |
| COPPER | | | 17 | | | 14 | |
| IRON | | | 15200 | | | 14900 | |
| LEAD | | | 6.6 B | | | 8.1 B | |
| MAGNESIUM | | | 15700 | | | 14000 | |
| MANGANESE | | | 393 E | | | 414 E | |
| MERCURY | | 0.06 | | | 0.02 B | | |
| NICKEL | | | 30 | | | 20 | |
| POTASSIUM | | | | 1900 | | | 2400 |
| SILVER | | | 1 B | | | 0.88 B | |
| SODIUM | | | 2780 | | | 1330 | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 818
LOCATION: ANL-W BURN PITS
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN818038D | IN818038E | IN818038E | IN818049D | IN818049E | IN818049E |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019C | IN505018C | IN505018K | IN522019C | IN505018C | IN505018K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| VANADIUM | | | 29 E | | | 28 E | |
| ZINC | | | 52 | | | 56 | |

| PCBS & OTHER EXTRACTABLES (NG/G) | SAMP NO: | IN818016C | IN818027C | IN818038C | IN818049C | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN814012C | IN814012C | IN814012C | IN814012C | | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | | |
| HPCDD | | 0.006 U | 0.025 U | 0.016 | 0.022 U | | |
| HPCDF | | 0.004 U | 0.02 U | 0.004 | 0.009 U | | |
| OCDD | | 0.008 | 0.11 U | 0.064 | 0.14 U | | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN818016A | IN818027A | IN818038A | IN818049A | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN522019A | IN514019A | IN514019A | IN522019A | | |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | | |
| ACETONE | | 30 | 57 | 26 U | 52 | | |
| CHLOROFORM | | 3 J | 13 U | 13 U | 5 U | | |
| METHYLENE CHLORIDE | | 200 | 310 | 260 | 200 | | |
| TOLUENE | | 3 J | 13 U | 13 U | 2 J | | |
| 1,1,1-TRICHLOROETHANE | | 3 J | 13 | 13 U | 5 U | | |
| 2-BUTANONE | | 65 | 160 | 160 | 72 | | |

S&A REQUEST: 819
LOCATION: PBF DISPOSAL PIT/BURIAL AREA
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN819017 | IN819028 | IN819039 | IN819051 | IN819062 | IN819073 |
|---|---|---|---|---|---|---|---|
| RADS (CPM) | | 150 | 150 | 150 | 150 | 150 | 150 |

| FIELD MEASUREMENTS | SAMP NO: | IN819084 | | | | | |
|---|---|---|---|---|---|---|---|
| RADS (CPM) | | 150 | | | | | |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 819
LOCATION: PBF DISPOSAL PIT/BURIAL AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN819051A | IN819051B | IN819051B | IN819062A | IN819062B | IN819062B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN301045D | IN511016K | IN804010B | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 11300 | | | 12700 | |
| ANTIMONY | | | 7.2 UN | | | 7.5 UN | |
| BARIUM | | | 166 | | | 182 | |
| BERYLLIUM | | | 1.3 E | | | 1.4 E | |
| CADMIUM | | | 0.48 B | | | 0.46 B | |
| CALCIUM | | | 14500 | | | 9850 | |
| CHROMIUM | | | 26 | | | 29 | |
| COBALT | | | 7.5 | | | 7.5 | |
| COPPER | | | 18 | | | 20 | |
| IRON | | | 18600 | | | 19000 | |
| LEAD | | | 9.4 B | | | 11 B | |
| MAGNESIUM | | | 7790 E | | | 7140 E | |
| MANGANESE | | | 273 | | | 266 | |
| MERCURY | | 0.03 B | | | 0.02 B | | |
| NICKEL | | | 24 | | | 26 | |
| POTASSIUM | | | | 1900 | | | 2200 |
| SILVER | | | 0.86 U | | | 0.9 U | |
| SODIUM | | | 299 B | | | 285 B | |
| VANADIUM | | | 41 E | | | 49 E | |
| ZINC | | | 60 | | | 65 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN819073A | IN819073B | IN819073B | IN819084A | IN819084B | IN819084B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN301045D | IN511016K | IN804010B | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 11900 | | | 11900 | |
| ANTIMONY | | | 7 UN | | | 11 N | |
| BARIUM | | | 209 | | | 234 | |
| BERYLLIUM | | | 1.4 E | | | 1.6 E | |
| CADMIUM | | | 0.68 B | | | 7.9 | |
| CALCIUM | | | 18100 | | | 61300 | |
| CHROMIUM | | | 36 | | | 42 | |
| COBALT | | | 7 | | | 6.9 B | |
| COPPER | | | 28 | | | 73 | |
| IRON | | | 18600 | | | 27000 | |
| LEAD | | | 30 | | | 56 | |
| MAGNESIUM | | | 8000 E | | | 8610 E | |
| MANGANESE | | | 263 | | | 414 | |
| MERCURY | | 0.02 B | | | 0.02 B | | |
| NICKEL | | | 27 | | | 30 | |
| POTASSIUM | | | | 2300 | | | 3300 |

TABLE 4.3.7 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 7 DRAFT DO NOT CITE
LANDFILLS

S&A REQUEST: 819
LOCATION: PBF DISPOSAL PIT/BURIAL AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN819073A | IN819073B | IN819073B | IN819084A | IN819084B | IN819084B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN804010B | IN301045D | IN511016K | IN804010B | IN301045D | IN511016K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| SILVER | | | 0.92 B | | | 1.6 | |
| SODIUM | | | 356 B | | | 1390 | |
| VANADIUM | | | 47 E | | | 36 E | |
| ZINC | | | 78 | | | 875 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN819017A | IN819028A | IN819039A | | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN505052A | IN505052A | IN505052A | | | |
| | TYPE: | GRAB | GRAB | GRAB | | | |
| ACETONE | | 10 U | 12 | 21 | | | |
| METHYLENE CHLORIDE | | 29 B | 2 BJ | 5 B | | | |
| TOLUENE | | 3 J | 5 U | 5 U | | | |
| * 1,1,2-TRICHL-1,2,2-TRIF(11.32) | | 11 BJ | | | | | |
| * 1,1,2-TRICHL-1,2,2-TRIF(11.33) | | | | 6 BJ | | | |
| * 1,1,2-TRICHL-1,2,2TRIFL(11.36) | | | 6 BJ | | | | |

## 4.13 Environmental Problem 8: French Drains and Dry Wells

**Request Numbers:** 820, 821, and 822.
**Requester:** Levitan/Sichelstiel.
**Finding and Basis:** French drains and dry wells at the INEL were used to dispose of chemical and radioactive liquid wastes and, as a result, the constituents may have contaminated the unsaturated zone and groundwater.

Thirty-four French drains, dry wells, and limestone neutralization pits were reported to have been used at the INEL. Two basic types were used: 1) open at the surface and 2) covered. In both cases, the units tended to be lined on the bottom with sand and gravel. Limestone pits were filled with limestone. They were used for the disposal of liquid wastes. Liquids were received through pipes carrying overflow from tanks and percolated into the soils. They contained a variety of contaminants, including corrosives (mainly acids), radionuclides, solvents, fuels, and metals. As a result, three were noted to be of particular environmental concern and were recommended for sampling and analysis.

### 4.13.1 Sampling and Analysis Objectives

**Statement:** Soils at individual French drains and dry wells were to be sampled to determine whether various contaminants were present as a result of their use.

### 4.13.2 Sampling and Analytical Design

#### 4.13.2.1 Sampling Design

**Request 820: TAN/TSF Paint Shop Floor Drain Leach Field (Soil)** (Fig. 4.8a.) Six grab soil samples (Sampling Method: Reference E5.2.3) from three locations were to be collected at the TAN/TSF paint shop floor drain leach field at two depths (Field Method: References E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived at the TAN-636 leach field on 29JUN88 at 1358. The temperature was 80-85$^{o}$F, skies were sunny, and winds were gusting at 30 to 40 mph. The area, approximately 64 $m^2$, was divided into a 64 segment grid measuring 8 x 8 m and three segments were chosen at random for sampling.

The old leach field, 5 ft below the ground surface, was almost completely covered with asphalt. Railroad timbers and boards covered the entire gridded area. TAN craft workers were to move the ties and began doing so at 1426. The Sampling Team set up to auger on grid 48 at 1452. The TIP was calibrated to clean air only by zero adjustment. Creosote on the railroad ties gave 12 relative counts on the TIP, causing the readings over the hole to be ineffective. At grid 48, the hole began with an 18-in. thick layer of gravel. Below the gravel was brown, poorly sorted sand. A radiation scan by the team gave a reading of 40 to 50 cpm. All sampling depth readings in the hole were 70 cpm. Sample IN820010 was collected from the 8 ft depth at 1530. Sample IN820043 was collected from the 13 ft depth at 1540. The Health Physicist scanned the bottled samples and obtained a reading of 150 cpm. The Health Physicist then ran a gamma spec on sample IN820010; no contamination was found. The auger remained on the site to continue sampling at grids 55 and 57 on 30JUN88. The team left the site at 1615.

The Sampling Team arrived on 30JUN88 at 0900. The weather was clear and sunny, with slight breezes, and the temperature at approximately 85$^{o}$F. The TIP was calibrated to isobutylene standard (100 ppm). The TIP reading on location, surrounded by railroad ties, was 0. The team set up the auger at grid 57. The asphalt cover at this location was 4 in. thick. Sample IN820032 was collected from the 8 ft depth at 9046. The cuttings were scanned for radiation by the Health Physicist. TIP readings made by the Assistant Sampling Team Leader were 0 at the hole and for the cuttings. Sample IN820065 was collected from the 13 ft depth of grid 57 at 0952.

The team began to drill at grid 55 at 1030. Sample IN820021 was taken at 8 ft at 1055. Sample IN820054 was collected from the 13 ft depth at 1115. A radiation scan by the Health Physicist read 120 cpm. The Health Physicist checked all drill rods, etc., and found only normal readings. The team left the site at 1130.

**Request 821: French Drain Southeast of CFA-633 (Soil) (Fig. 4.8b.)** Six grab samples (Sampling Method: E5.2.3) from two locations were to be taken from the CFA French drain southeast of CFA-633 at three depths using a straight auger.

The team gridded the site and obtained their Safe Work permit on 11JUL88. The area was covered with 24 in. of concrete. Attempts to break through by hand chiseling were abandoned. A request to INEL for the use of site personnel and power equipment to obtain the samples was made. Work was to continue when the holes (removal of concrete) were ready.

On 12JUL88, with the approval of DOE Headquarters, it was decided to delete Request 821 because of the actual depth of the concrete (4 ft substrat and 2 ft of gravel fill).

**Request 822: French Drain South of CAPP-633 (Soil) (Fig. 4.8c.)** Nine grab samples (Sampling Method: Reference E5.2.3) were to be taken from two sections of interest: the area immediately within the French drain and the gully alongside the French drain. Grab samples were to be collected below the bottom of the French drain using a straight auger (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived at the site on 13JUL88 at 1040. Winds were from the south-southwest at approximately 15 mph under clear skies. The temperature was 87$^{o}$F, with 10% humidity. The surface was covered with gravel fill. The area of the French drain was filled with gravel (0.5 in. to 3 in. diameter) and sand, with very little soil in the profile. A PID (TIP I)

instrument was used and calibrated 13JUL88 using a 100 ppm isobutylene gas standard. All PID measurements were reported as ppm isobutylene equivalents. A Safe Work permit indicated the power source, and WINCO EE personnel pointed out the location for the sampling. No field measurements for samples were made because of the heat generated by auger friction.

Sample IN822012 (grid 5) was obtained at 1055 by shoveling down to the first 2.5 ft due to gravel fill. The sample was fill dirt, gravel, and a sandy brown color. Sample IN822045 (grid 5), taken at 5 to 7 ft at 1115, was sandy, gravelly, and mushy. Sample IN822078, taken at 10 to 12 ft at 1125, was also sandy and brown in color.

Grid 41 appeared to be very moist. Sample IN822034, taken at 1315, was obtained by shoveling down to the first 2.5 feet due to gravel fill and was gravel fill dirt, sandy, and brown. Sample IN822067, taken at 1331, was collected at 5 to 7 ft and was sandy, gravelly, and brown in color. Sample IN822090 was taken at 1347 from 10 to 12 ft.

At grid 21, sample IN822023 was taken at 0 to 2 ft at 1408. Sample IN822056 was taken at 5 to 7 ft at 1410 and was sandy, gravelly, and dark brown in color. Sample IN822089 was taken from 10 to 12 ft at 1433.

#### 4.13.2.2 Analytical Design

**Request 820:** The field parameters requested were pH and temperature. The parameters analyzed included volatiles, ICP metals, and AA-mercury.

**Request 821:** The parameters to have been analyzed included volatiles and gamma scan.

**Request 822:** The field parameters requested were pH and temperature. The parameters analyzed included volatiles, ICP metals, and AA-mercury.

### 4.13.3 Field and Analytical Data

**Field Data:**

**Request 820:** *The field data for this problem are given in Table 4.3.8. Two samples from each of three sites were to be collected. Field measurements included pH and temperature. These measurements were not taken; instead PID and radioactivity readings were recorded. The PID reading of 12 was taken over the creosote log; no reading was recorded over the drill hole because of the log. All other samples showed that no organic vapor was present. The radiation scan showed 120 cpm for all the samples except the 13 ft depth sample from grid 48.*

**Request 821:** *No samples were collected for this request because a thick concrete slab prevented penetration.*

**Request 822:** *The field data for this problem are given in Table 4.3.8. Three samples representing three depths were collected; one of the samples was obtained within the French drain and the other two were alongside the drain. The samples within the drain showed a pH of 7.6 at the 0-2 and 5-7 ft depth samples and 7.5 at the deepest (10-12 ft) depth. For the other two samples, the pH ranged from 7.6 to 8.1. The pH readings of the samples from grid 21 were 7.9, 7.8, and 7.8 from the surface to the deepest depth. For the sample from grid 41, the pH readings were 7.6, 8.1, and 7.6 with depth.*

*Although the surface samples outside the French drain showed no organic vapor, the deeper samples showed organic vapor ranging from 10.2 to 21 ppm. Within the French drain, no organic vapor was detected.*

Field Data Evaluation:

Request 820: Because the PID and radiological instruments were calibrated prior to field use, the readings are reliable. No evaluation of pH and temperature can be made because no readings were taken.

Request 821: NA.

Request 822: Because the PID and pH instruments were calibrated prior to taking field measurements, the readings are reliable. No temperature readings were taken because of the heat generated by the auger.

Analytical Data:

Request 820:

*Metals. Analytical data for metals in soil are presented in Table 4.3.8. Of the 20 metals detected, the following 4 metals of interest to the Survey were below the CRDL in all six samples: arsenic, cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 182 to 244 mg/kg; beryllium, 1.7 to 2 mg/kg; chromium, 26 to 34 mg/kg; copper, 23 to 24 mg/kg; mercury, 0.06 to 0.08 mg/kg; nickel, 28 to 37 mg/kg; and zinc, 85 to 131 mg/kg. Toxic metals of interest not listed in Table 4.3.8 were below the IDL for the samples tested.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.8. Three compounds were detected in five of the samples and two compounds were detected in the remaining soil sample for this request. Methylene chloride was detected in all samples, but always below the detection limit. Toluene was detected in all samples, but always 8 ppb or less. Acetone was measured up to 24 ppb. No other volatile organic compounds were detected in the samples for this request.*

Request 821:

*Volatile organics. This request was deleted because the depth of the concrete prevented sampling.*

Request 822:

*Metals. (French Drain South of CPP-633) - Analytical data for metals in soil are presented in Table 4.3.8. Of the 18 metals detected, the following 2 metals of interest to the Survey were below the CRDL in all six samples: cadmium and lead. Of the metals of interest detected, barium ranged from 133 to 157 mg/kg; beryllium, 1.1 to 1.3 mg/kg; chromium, 19 to 22 mg/kg; copper, 15 to 23 mg/kg; mercury, 0.19 to 7.8 mg/kg; nickel, 20 to 32 mg/kg; and zinc, 59 to 67 mg/kg.*

*(Within French Drain South of CPP-633) Of the 18 metals detected, the following 2 metals of interest to the Survey were below the CRDL in all three samples: cadmium and lead. Of the metals of interest detected, barium ranged from 92 to 116 mg/kg; beryllium, 0.98 to 1.1 mg/kg; chromium, 18 to 22 mg/kg; copper, 14 to 25 mg/kg; mercury, 0.62 to 21 mg/kg; nickel, 19 to 26 mg/kg; and zinc, 49 to 64 mg/kg. Toxic metals of interest not listed in Table 4.3.8 were below the IDL for the samples tested.*

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.8. From two to four compounds were identified in particular samples of the total of nine samples taken for this request. Chloroform was detected below the detection limit in sample IN822012. Methylene chloride was measured in all samples in concentrations ranging from 200 to 930 ppb. Toluene was detected below the detection limit in some of the samples. All samples contained measurable amounts of 1,1,1-trichloroethane, with concentrations ranging from 28 to 110 ppb.*

Analytical Data Evaluation:

Request 820:

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Methylene chloride, and toluene were detected at less than 10 ppb. The only other volatile organic compound detected was acetone (in five samples at concentrations of 24 ppb or less).

Request 821: This request was deleted.

Request 822:

Metals. Seven metals of interest--barium, beryllium, chromium, copper, mercury, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Volatile organics. Methylene chloride was measured up to 930 ppb and 1,1,1-trichloroethane was measured up to 110 ppb. Toluene and chloroform were detected below the detection limit in at least one sample.

4.13.4 Limitations and Qualifications

Data Quality Level:

Request 820: The sampling design and the field sampling are rated Quality Level II. The overall analytical Quality Level is I.

**Request 821:** The sampling design is rated Quality Level I. The field sampling and analytical quality cannot be rated because no samples were collected.

**Request 822:** The sampling design and the field sampling are rated Quality Level I. The overall analytical Quality Level is II.

**Field Data:**

**Request 820:** The sampling design requested samples from 8 and 13 ft; normal previous requests define a range of depth such as 8-10 and 13-15. pH measurements were not made during sampling as requested; temperature readings have not been taken when auguring is used. For these reasons, the sampling design and field sampling are assigned Quality Level II.

**Request 821:** Although the field sampling team attempted to obtain power equipment, consultation with the Survey Team resulted in the deletion of this request.

**Request 822:** Both the design and the field sampling were rated Quality Level I.

**Analytical Data:**

**Request 820:**

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level II. Analytical results for AA metals were Quality Level I. For antimony, the percent recovery for spikes fell within the range 30 to 74% and the reported sample result was positive. The possibility for a false negative exists.

Volatile organics. Data are given as Quality Level I. Most of the volatile organic compounds detected were below detection limits.

Request 821: NA.

Request 822:

Metals. Analytical results for ICP metals were Quality Level I except for antimony at Quality Level II. Analytical results for AA metals were Quality Level I. For antimony, the percent recovery for spikes fell within the range 30 to 74% and the reported sample result was positive. The possibility for a false negative exists.

Volatile organics. The six samples from SDG 514019 are of Quality Level I. The three samples from SDG 801017 are of Quality Level III due to lack of matrix spike and serial dilution in this SDG. The three samples from SDG 801017, however, do not appear anomalous with respect to the other samples taken for this request.

Environmental Problem: 8
Request Number: 820

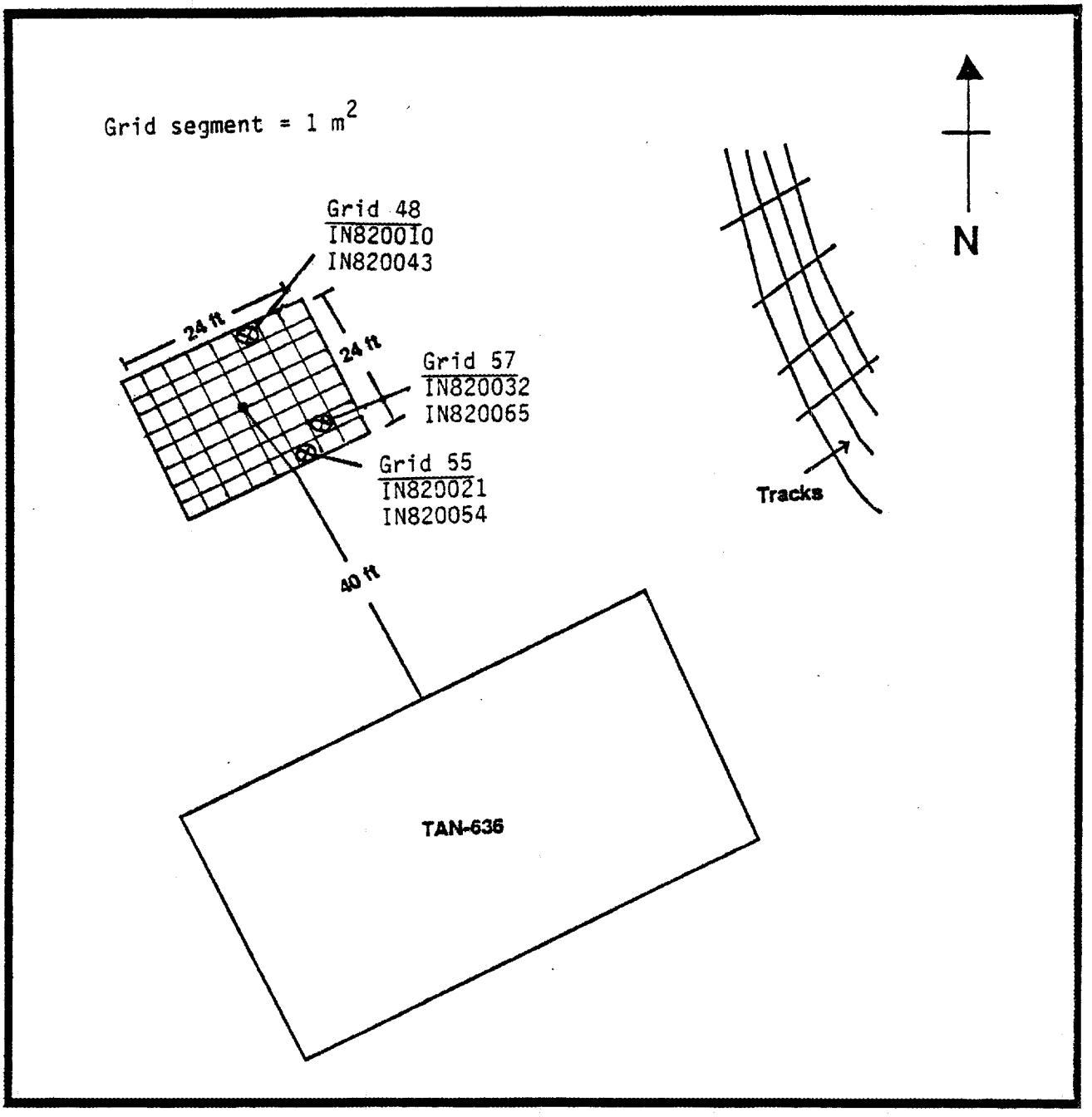


Figure 4.8a. TAN/TSF Paint Shop Floor Drain Leach Field (Request 820)

Environmental Problem: 8
Request Number: 821

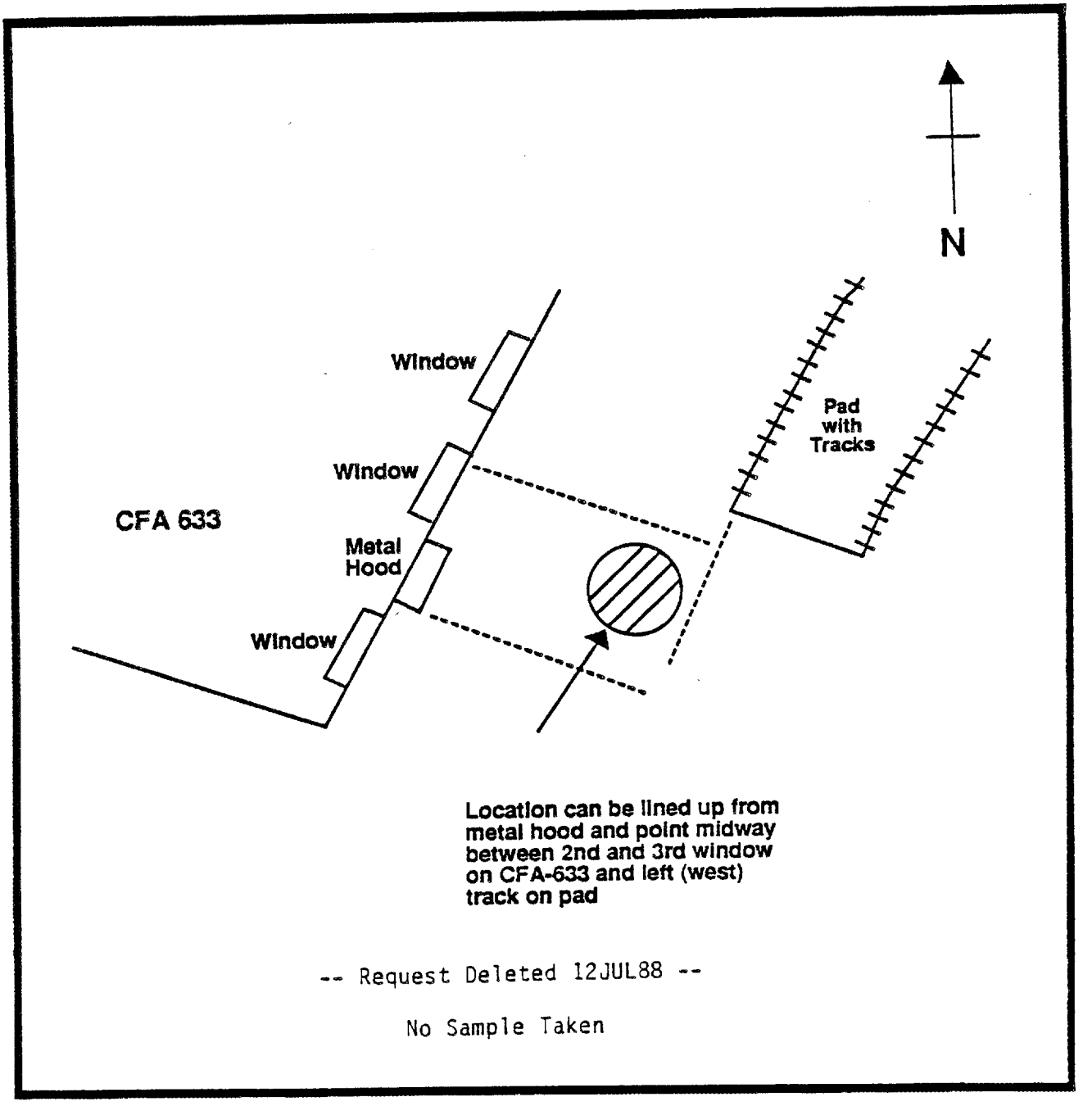


Figure 4.8b. French Drain Southeast of CFA-633 (Request 821)

Environmental Problem: 8
Request Number: 822

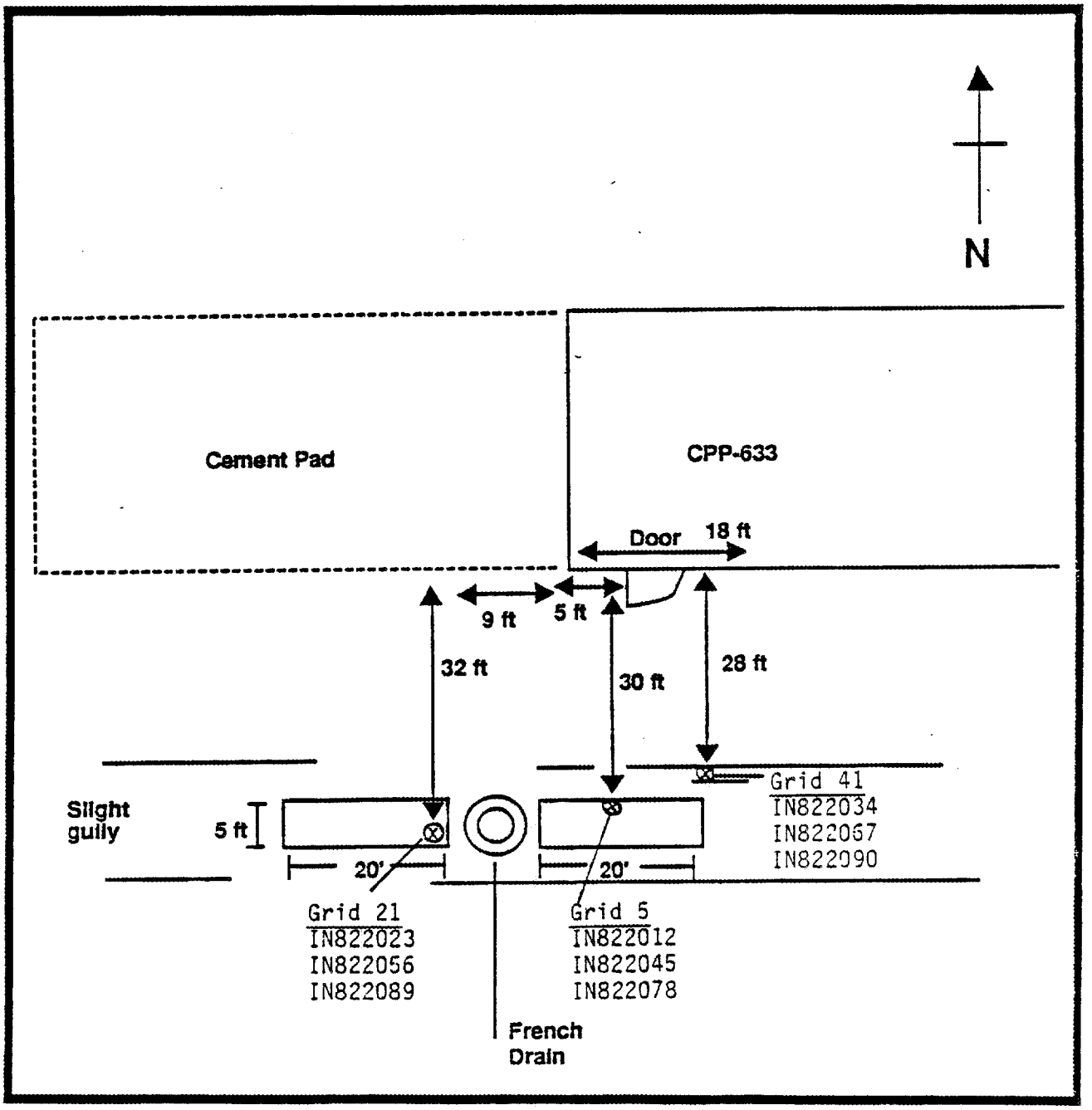


Figure 4.8c. French Drain Southeast of CPP-633 (Request 822)

TABLE 4.2.8 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 8

DRAFT DO NOT CITE

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN820 | TAN/TSF | LEACH FLD | SOIL | 6 | 6 | GRAB | 0 | 0 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 | 0 |
| IN821 | TAN/TSF | LEACH FLD | SOIL | 6 | 0 | GRAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN822 | TAN/TSF | LEACH FLD | SOIL | 9 | 9 | GRAB | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 0 | 0 |
| | | MED TOTAL | | 21 | 15 | | 0 | 0 | 15 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 0 | 0 |
| IN821 | TAN/TSF | LEACH FLD | SUR WATER | 1 | 0 | QC RN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MED TOTAL | | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | EP TOTAL | | 22 | 15 | | 0 | 0 | 15 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 0 | 0 |

TABLE 4.3.8 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 8 DRAFT DO NOT CITE
FRENCH DRAINS AND DRYWELLS

S&A REQUEST: 820
LOCATION: TAN/TSF PAINT SHOP FLOOR DRAIN LEACH FIELD
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN820010 | IN820021 | IN820032 | IN820043 | IN820054 | IN820065 |
|---|---|---|---|---|---|---|---|
| CREOSOTE (CTS) | | 12 | | | | | |
| FID/PID (PPM) | | | 0 | 0 | 0 | 0 | 0 |
| RADS (CPM) | | 120 | 120 | 120 | 150 | 120 | 120 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN820010B | IN820010C | IN820010C | IN820021B | IN820021C | IN820021C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 13700 | | | 17400 | |
| ARSENIC | | | 12 B | | | 9.5 U | |
| BARIUM | | | 182 | | | 211 | |
| BERYLLIUM | | | 1.7 | | | 1.9 | |
| CADMIUM | | | 0.59 B | | | 0.71 B | |
| CALCIUM | | | 82100 * | | | 68000 * | |
| CHROMIUM | | | 26 | | | 31 | |
| COBALT | | | 7 B | | | 8.8 | |
| COPPER | | | 23 | | | 30 | |
| IRON | | | 18200 | | | 25200 | |
| LEAD | | | 10 B | | | 15 B | |
| MAGNESIUM | | | 16300 | | | 11900 | |
| MANGANESE | | | 467 N | | | 544 N | |
| MERCURY | | 0.06 | | | 0.08 | | |
| NICKEL | | | 28 | | | 34 | |
| POTASSIUM | | | | 2400 | | | 3100 |
| SILVER | | | 0.88 U | | | 0.95 U | |
| SODIUM | | | 475 B | | | 532 B | |
| VANADIUM | | | 39 | | | 45 | |
| ZINC | | | 85 | | | 117 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN820032B | IN820032C | IN820032C | IN820043B | IN820043C | IN820043C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 17800 | | | 15100 | |
| ARSENIC | | | 9.7 U | | | 9.5 B | |
| BARIUM | | | 219 | | | 199 | |
| BERYLLIUM | | | 1.9 | | | 1.8 | |
| CADMIUM | | | 0.71 B | | | 0.72 B | |
| CALCIUM | | | 74900 * | | | 93100 * | |
| CHROMIUM | | | 32 | | | 29 | |
| COBALT | | | 8.7 | | | 7.3 B | |
| COPPER | | | 32 | | | 25 | |

TABLE 4.3.8 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 8 DRAFT DO NOT CITE
FRENCH DRAINS AND DRYWELLS

S&A REQUEST: 820
LOCATION: TAN/TSF PAINT SHOP FLOOR DRAIN LEACH FIELD
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN820032B | IN820032C | IN820032C | IN820043B | IN820043C | IN820043C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| IRON | | | 23900 | | | 19600 | |
| LEAD | | | 16 B | | | 10 B | |
| MAGNESIUM | | | 12800 | | | 12100 | |
| MANGANESE | | | 613 N | | | 482 N | |
| MERCURY | | 0.08 | | | 0.07 | | |
| NICKEL | | | 35 | | | 30 | |
| POTASSIUM | | | | 3500 | | | 3000 |
| SILVER | | | 1.1 B | | | 0.91 U | |
| SODIUM | | | 532 B | | | 559 B | |
| VANADIUM | | | 48 | | | 45 | |
| ZINC | | | 131 | | | 96 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN820054B | IN820054C | IN820054C | IN820065B | IN820065C | IN820065C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 17200 | | | 19300 | |
| ARSENIC | | | 9.6 U | | | 10 B | |
| BARIUM | | | 221 | | | 244 | |
| BERYLLIUM | | | 1.9 | | | 2 | |
| CADMIUM | | | 0.68 B | | | 0.67 B | |
| CALCIUM | | | 74000 * | | | 74600 * | |
| CHROMIUM | | | 31 | | | 34 | |
| COBALT | | | 9.5 | | | 9.8 | |
| COPPER | | | 31 | | | 34 | |
| IRON | | | 24300 | | | 25600 | |
| LEAD | | | 16 B | | | 17 B | |
| MAGNESIUM | | | 13400 | | | 14000 | |
| MANGANESE | | | 558 N | | | 588 N | |
| MERCURY | | 0.07 | | | 0.07 | | |
| NICKEL | | | 35 | | | 37 | |
| POTASSIUM | | | | 3000 | | | 3300 |
| SILVER | | | 1.1 B | | | 0.93 U | |
| SODIUM | | | 551 B | | | 540 B | |
| VANADIUM | | | 48 | | | 55 | |
| ZINC | | | 111 | | | 123 | |

TABLE 4.3.8 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 8 DRAFT DO NOT CITE
FRENCH DRAINS AND DRYWELLS

S&A REQUEST: 820
LOCATION: TAN/TSF PAINT SHOP FLOOR DRAIN LEACH FIELD
MEDIUM: SOIL

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN820010A | IN820021A | IN820032A | IN820043A | IN820054A | IN820065A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN511050A | IN511050A | IN511050A | IN511050A | IN511050A | IN511050A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 9 J | 22 | 24 | 13 U | 7 J | 5 J |
| METHYLENE CHLORIDE | | 2 J | 5 J | 2 J | 5 J | 4 J | 3 J |
| TOLUENE | | 4 J | 3 J | 8 | 5 J | 6 | 4 J |

S&A REQUEST: 822
LOCATION: FRENCH DRAIN SOUTH OF CPP-633
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN822023 | IN822034 | IN822056 | IN822067 | IN822089 | IN822090 |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0 | 0 | 0.2 | 5.5 | 21 | 0.2 |
| PH (UNITS) | | 7.9 | 7.6 | 7.8 | 8.1 | 7.8 | 7.6 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN822023B | IN822023C | IN822023C | IN822034B | IN822034C | IN822034C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 9290 | | | 9320 | |
| BARIUM | | | 157 | | | 140 | |
| BERYLLIUM | | | 1.2 | | | 1.1 | |
| CADMIUM | | | 0.42 B | | | 0.32 B | |
| CALCIUM | | | 21700 * | | | 31100 * | |
| CHROMIUM | | | 22 | | | 19 | |
| COBALT | | | 5.1 B | | | 4.6 B | |
| COPPER | | | 17 | | | 16 | |
| IRON | | | 15300 | | | 13700 | |
| LEAD | | | 23 B | | | 6.8 B | |
| MAGNESIUM | | | 5660 | | | 12200 | |
| MANGANESE | | | 213 N | | | 198 N | |
| MERCURY | | 0.49 | | | 7.8 | | |
| NICKEL | | | 22 | | | 20 | |
| POTASSIUM | | | | 1600 | | | 1600 |
| SODIUM | | | 306 B | | | 289 B | |
| VANADIUM | | | 33 | | | 29 | |
| ZINC | | | 66 | | | 61 | |

TABLE 4.3.8 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 8 DRAFT DO NOT CITE
FRENCH DRAINS AND DRYWELLS

S&A REQUEST: 822
LOCATION: FRENCH DRAIN SOUTH OF CPP-633
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN822056B | IN822056C | IN822056C | IN822067B | IN822067C | IN822067C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 9090 | | | 9920 | |
| BARIUM | | | 145 | | | 148 | |
| BERYLLIUM | | | 1.2 | | | 1.2 | |
| CADMIUM | | | 0.22 B | | | 0.27 B | |
| CALCIUM | | | 16500 * | | | 24100 * | |
| CHROMIUM | | | 21 | | | 22 | |
| COBALT | | | 5.6 B | | | 6.2 B | |
| COPPER | | | 22 | | | 19 | |
| IRON | | | 17800 | | | 16500 | |
| LEAD | | | 10 B | | | 7.7 B | |
| MAGNESIUM | | | 4840 | | | 8920 | |
| MANGANESE | | | 245 N | | | 244 N | |
| MERCURY | | 0.19 | | | 1.9 | | |
| NICKEL | | | 23 | | | 24 | |
| POTASSIUM | | | | 1400 | | | 1600 |
| SODIUM | | | 261 B | | | 331 B | |
| VANADIUM | | | 30 | | | 32 | |
| ZINC | | | 62 | | | 67 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN822089B | IN822089C | IN822089C | IN822090B | IN822090C | IN822090C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 9370 | | | 8920 | |
| BARIUM | | | 142 | | | 133 | |
| BERYLLIUM | | | 1.3 | | | 1.2 | |
| CADMIUM | | | 0.23 B | | | 0.33 B | |
| CALCIUM | | | 43100 * | | | 35600 * | |
| CHROMIUM | | | 22 | | | 19 | |
| COBALT | | | 5.7 B | | | 4.9 B | |
| COPPER | | | 23 | | | 15 | |
| IRON | | | 20900 | | | 13800 | |
| LEAD | | | 7.4 B | | | 5.4 B | |
| MAGNESIUM | | | 4950 | | | 7960 | |
| MANGANESE | | | 271 N | | | 193 N | |
| MERCURY | | 0.52 | | | 4.2 | | |
| NICKEL | | | 32 | | | 20 | |
| POTASSIUM | | | | 1600 | | | 1500 |
| SODIUM | | | 341 B | | | 318 B | |
| VANADIUM | | | 32 | | | 29 | |
| ZINC | | | 61 | | | 59 | |

TABLE 4.3.8 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 8 DRAFT DO NOT CITE
FRENCH DRAINS AND DRYWELLS

S&A REQUEST: 822
LOCATION: FRENCH DRAIN SOUTH OF CPP-633
MEDIUM: SOIL

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN822023A | IN822034A | IN822056A | IN822067A | IN822089A | IN822090A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN514019A | IN514019A | IN514019A | IN801017A | IN801017A | IN801017A |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ACETONE | | 55 U | 52 | 53 U | 53 U | 54 U | 53 U |
| METHYLENE CHLORIDE | | 400 | 930 | 360 | 580 | 470 | 460 |
| TOLUENE | | 27 U | 9 J | 27 U | 6 J | 8 J | 6 J |
| 1,1,1-TRICHLOROETHANE | | 70 | 66 | 97 | 94 | 58 | 28 |

S&A REQUEST: 822
LOCATION: WITHIN FRENCH DRAIN SOUTH OF CPP-633
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN822012 | IN822045 | IN822078 | | | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 0 | 0 | 0 | | | |
| PH (UNITS) | | 7.6 | 7.6 | 7.5 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN822012B | IN822012C | IN822012C | IN822045B | IN822045C | IN822045C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 17800 | | | 10700 | |
| BARIUM | | | 92 | | | 111 | |
| BERYLLIUM | | | 0.98 | | | 1 | |
| CADMIUM | | | 0.64 B | | | 0.4 B | |
| CALCIUM | | | 7670 * | | | 14400 * | |
| CHROMIUM | | | 21 | | | 18 | |
| COBALT | | | 4.3 B | | | 4.2 B | |
| COPPER | | | 17 | | | 14 | |
| IRON | | | 11900 | | | 12600 | |
| LEAD | | | 13 B | | | 6.4 B | |
| MAGNESIUM | | | 4290 | | | 4040 | |
| MANGANESE | | | 237 N | | | 291 N | |
| MERCURY | | 21 | | | 1 | | |
| NICKEL | | | 20 | | | 19 | |
| POTASSIUM | | | | 1100 | | | 1200 |
| SODIUM | | | 256 B | | | 284 B | |
| VANADIUM | | | 23 | | | 22 | |
| ZINC | | | 64 | | | 49 | |

TABLE 4.3.8 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 8
FRENCH DRAINS AND DRYWELLS

S&A REQUEST: 822
LOCATION: WITHIN FRENCH DRAIN SOUTH OF CPP-633
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN822078B | IN822078C | IN822078C |
|---|---|---|---|---|
| | SDG NO: | IN820010B | IN514019D | IN514019K |
| | TYPE: | GRAB | GRAB | GRAB |
| ALUMINUM | | | 10300 | |
| BARIUM | | | 116 | |
| BERYLLIUM | | | 1.1 | |
| CADMIUM | | | 0.29 B | |
| CALCIUM | | | 8080 * | |
| CHROMIUM | | | 22 | |
| COBALT | | | 5.9 B | |
| COPPER | | | 25 | |
| IRON | | | 21200 | |
| LEAD | | | 7.2 B | |
| MAGNESIUM | | | 4160 | |
| MANGANESE | | | 350 N | |
| MERCURY | | 0.62 | | |
| NICKEL | | | 26 | |
| POTASSIUM | | | | 1500 |
| SODIUM | | | 299 B | |
| VANADIUM | | | 38 | |
| ZINC | | | 59 | |

| VOLATILE ORGANICS (UG/KG) | SAMP NO: | IN822012A | IN822045A | IN822078A |
|---|---|---|---|---|
| | SDG NO: | IN514019A | IN514019A | IN514019A |
| | TYPE: | GRAB | GRAB | GRAB |
| ACETONE | | 53 U | 52 | 53 U |
| CHLOROFORM | | 8 J | 26 U | 26 U |
| METHYLENE CHLORIDE | | 590 | 200 | 230 |
| TOLUENE | | 26 U | 6 J | 26 U |
| 1,1,1-TRICHLOROETHANE | | 59 | 40 | 110 |

## 4.14 Environmental Problem 9: Spills

**Request Numbers:** 823, 824, 825, 826, and 827.
**Requester:** Levitan/Sichelstiel.
**Finding and Basis:** Several significant chemical, radioactive, and petroleum product spills and leaks have occurred at the INEL which have not been adequately cleaned up and have the potential to contaminate the unsaturated zone and groundwater.

Approximately 77 spills at the INEL have been identified in the site's Initial Assessment process. Most are the result of line and tank failures, leaking valves and equipment, product transfer mishaps, and atmospheric releases. They have occurred on the surface or within 10 ft of the surface and have involved a variety of contaminants, including radionuclides (cesium-137, cerium-144, strontium-90); metals, especially mercury; petroleum products; PCBs; acids; and solvents. Volumes have ranged from unknown to 2 gal. to 45,000 gal. Several spills and releases have not been adequately cleaned up, and with sufficient volume and driving force, the spilled materials have the potential to migrate into the subsurface environment.

All spills and releases were evaluated based on the types and volumes of known or suspected constituents, the degree of remediation, and any existing monitoring data. As a result, 14 spills/releases were noted to be of particular concern. Five of these were recommended for sampling and analysis.

### 4.14.1 Sampling and Analysis Objectives

**Statement:** Soil samples were to be collected at spill sites to determine whether contaminants are present. Please refer to the individual requests for specific objectives for each of the locations that were sampled.

### 4.14.2 Sampling and Analytical Design

#### 4.14.2.1 Sampling Design

**Request 823: TAN/TSF PM-2A Tank Area (Fig. 4.9a.).** Twenty grab soil samples (Sampling Method: Reference E5.2.3) were to be collected from five locations at the TAN/TSF PM-2A Tank Area at four depths (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH).

In a discussion on 21JUL88 between the Assistant Sampling Team Leader, Lee Stevens (DOE Headquarters), and the Health Physicist, the need for five sample locations was reconsidered because the area was smaller than previously thought. The possibility of high radiation contamination also suggested a possibly reduced number of sampling locations. Based upon these observations, the area of interest was gridded by the Assistant Sampling Team Leader and EG&G personnel into a 100 segment grid of 20 x 15 ft segments. The overall area to be sampled was 30,000 $ft^2$.

The PM-2A tank area contained two 50,000-gal. underground tanks. Tank tops were 14.5 ft below ground surface and an evaporator. Because of operational difficulties and spillages, the system had been shut down. In 1981 and 1982, the area was decontaminated and decommissioned. Surficial soil was removed and the area was backfilled with clean soil. The evaporator was removed, but the tanks were abandoned in place.

The Sampling Team arrived at the site on 22JUL88 at 0635. The sky was clear, the temperature 75$^{o}$F, and winds were 5 to 10 mph. As agreed to on 21JUL89, soil samples were to be collected from three locations at four depths using a straight auger. Team members scanned the area with a magnetometer to ensure that tanks were not hit during augering. If a selected grid segment was near a positive reading, the next segment was substituted.

The drill rig was set up at grid 7. The battery for the drill had to be replaced before sampling began and delayed the team an hour. A radiation scan of the area read 100 cpm. Sample IN823013 (collected at 1 to 3 ft at 0800) was blond in color and dry. Sample IN823068 (collected at 5 to 7 ft at 0820) was a very light color and hard to auger at about 5 ft. The drillers experienced auger refusal at 7.5 to 8 ft. For this reason, samples IN823115 and IN823160 were not collected.

At grid 19, a radiation scan reading was 100 cpm on the surface. At 2 ft, the radiation scan read 220 cpm, then dropped back down. The soil was light in color and dry for samples IN823024 (collected at 1 to 3 ft at 0900), IN823079 (collected at 5 to 7 ft at 0918), and IN823126 (collected at 11 to 12 ft at 0928). Sample IN823171 (collected at 15 to 17 ft at 0937) consisted of dirt and gravel.

At grid 74, sample IN823057 (collected at 1 to 3 ft at 1005) was a darker color brown and granular. Sample IN823104 (collected from 5 to 7 ft at 1016) was blond-colored dirt. Sample IN823159 (collected from 11 to 12 ft at 1024) was a medium brown color. Sample IN823206 (collected at 15 to 17 ft at 1040) was dry with a few pieces of gravel in the soil. Drilling the total depth of the hole was accomplished with no problems.

At grid 61, sample IN823035, light blond in color, was collected from 1 to 3 ft at 1250. Sample IN823080 was collected from 5 to 7 ft at 1258. Sample IN823137 was collected from 11 to 12 ft at 1305. Sample IN823182 was collected from 15 to 17 ft at 1320.

Three holes were successfully drilled to the 17 ft depth while one was to 7 ft with refusal at or before the next depth. Because three holes were to the specified depth and the sampling plan was revised, samples for the fifth sampling grid (grid 73) originally requested in the INEL Sampling and Analysis Plan

(IN823046, IN823092, IN823148, and IN823193) were not collected. All work was performed under the coverage of a Safe Work permit with continuous radiation screening by site personnel and periodic screening for volatiles with a TIP by team members.

The soil pH was noted as "soil pH in water." Soil temperatures were not measured for any samples because of the heat transferred from auger friction to trimmings.

**Request 824: TAN/TSF Intermediate Level Waste Disposal Area (Soil) (Fig. 4.9b).** Six grab soil samples (Sampling Method: Reference E5.2) were to be collected from the TAN/TSF Intermediate Level Waste Disposal Area at three locations from two depths (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH).

The Sampling Team arrived on-site at 1115 on 16JUL88. A discussion was held with EG&G personnel about the sample area and safety concerns. The area was divided into a 6 x 10 segment grid (one cell equalled 6 x 7 ft 8 in.). The area, approximately 325 $m^2$ and designated a Zone II contaminated area, contained three 10,000-gallon underground tanks that had received intermediate level radioactive liquids since 1954. One of the tanks was taken out of service in 1964. Team members scanned the area with a magnetometer to ensure that tanks were not hit during augering. If a grid segment selected was near a positive reading, the next grid was substituted.

The Sampling Team was briefed on the protective equipment to be used. Surface readings were 2 to 10 mR/hr. Subsurface readings were suspected to increase. Contamination was expected to be less than 20,000 dpm/$cm^2$. The team dressed out at 1230. The Health Physicist technician performed a beta/gamma scan of the sample area. The highest readings were found near the concrete block (20 mR/h). Most readings were between 0.5 and 5.5 mR/h. Surface readings at each

sample location were recorded on the DOE Environmental Survey Sample Log Sheets under "Field Observations." At 1300, sampling began at grid 50. Radioactivity was 0.2 mR/hr at the surface. Sample IN824036 was collected at the 1 to 2 ft depth at 1430 and composited. Sample IN824069 was not collected at 5 to 7 ft because it was not possible with the tools provided and the area had a lot of subsurface fill/gravel. At grid 37, sample IN824025 was collected at 1 to 2 ft at 1400 because a 1 to 3 ft sample was not possible due to hitting rock. Sample IN824058 was not collected from the 5 to 7 ft depth of grid 37 for this reason. Radioactivity was 2 mR/hr at the surface. At grid 10, sample IN824014 was taken from the 1 to 2 ft depth at 1430 because a 1 to 3 ft sample was not possible due to rock. Sample IN824047 could not be collected from grid 10 at the 5 to 7 ft depth because of equipment limitations. Radioactivity was 0.5 mR/hr at the surface.

**Request 825: CFA-760 Pump Station Fuel Spill (Fig. 4.9c.).** Three grab air samples (Sampling Method: Reference E4.5) were to be collected to determine whether the concentrations of volatile organics in the soil gas in the vicinity of CFA-623 were above detectable limits as an indication of whether residues from a fuel spill remain.

In December 1978, a 60,000 gal. aboveground No. 1 fuel storage tank was inventoried and found to be full. The tank was next inventoried in March 1979 and was found to contain only 5,000 gallons. Based on the amount of fuel used during the intervening time period, it is estimated that 45,000 gallons leaked from the tank. It is believed that the leak occurred from a hole that developed in an underground line leading from the tank. There were no signs of leaks above ground. No remedial action was undertaken at that time. In 1986, the tank was removed to allow for the construction of Building CFA-623/624.

The Sampling Team arrived on-site at 0900 on 16JUN88. The team experienced problems with the drill rig motor. The rig finally began running at 1030. The

team drilled the hole for grid 33. The TIP reading was 9.7 in the hole. The team began drilling the hole for grid 13 at approximately 1105. The auger hit something very hard at 2 ft, but the hole was finished at 1122. The TIP reading was 6.3 ppm. The team began drilling the hole for grid 53 at 1130, and hit a large rock 1 ft below the top of the asphalt. The hole was moved over 6 in. toward a metal building and drilling began at 1200. The drilling rig quit running at 1224 because something was fouling the plug. The rig would not start up after the Sampling Team returned from lunch. The plant mechanic discovered that the head gasket was cracked on the rig. A decision was made to soil gas sample only the two holes that had been completed for this request.

Sample IN825015, collected at 1335 from grid 13, used Tenex Tube 1 at a rate of 0.5 L of air pulled through. Sample IN825026, collected at 1348 from grid 33, used Tenex Tube 3 with 0.5 L of air pulled through. The air pump was standardized at 1 L/min. Samples were collected for 30 sec (500 mL). Sample IN825037 was not collected from grid 33 because of rig problems.

**Request 826: ICPP Tank Farm (Fig. 4.9d.).** Two grab soil samples and two vertical composites (Sampling Method: Reference E5.2.3) were to be collected from the ICPP tank farm area (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH) to determine whether the concentrations of mercury and volatile organics in the soil at the ICPP tank farm were above reference concentrations.

In a discussion with Lee Stevens of DOE HQ on 19JUL88, it was decided that the potential for incident due to a possible 200 R/hr source was high. Augering was judged to be too risky. The options, as identified in a radiological sampling procedure developed by ICPP, were to collect soil-gas by probe or use existing dry or wet wells. It was decided that the drive tube probe could not penetrate the overburden without stopping up the holes and that the best alternative was to sample soil-gas from the wet wells closest to the tank of interest (WM-183).

Soil gas was collected as an alternative to grab soil samples for analyses for volatiles.

On 20JUL88 the Sampling Team arrived at the ICPP Tank Farm at approximately 1345. After badging and processing through security, the Sampling Team dressed in blue coveralls as prescribed by WINCO. A RWP was present when the team went to the tank farm.

Wells A-44, A-56, and A-52 were selected and opened on request by a Health Physicist. Well A-44 was opened, scanned for radiation, and a soil-gas sample tube placed in the 3 in. well at the 4 ft depth. Sample IN826016A was collected at 1451 using a Carbotrap 300 soil-gas tube (tube 9) for 4 min at 200 cc/min for a total volume of 800 cc. Sample IN826016B (tube 6) was collected at 1459 for 2 min at 200 cc/min for a total volume of 400 cc.

A total of three soil gas tubes were collected at Well A-56. Sample IN826027A (tube 4) was collected for 6 min at 200 cc/min for a total volume of 1200 cc. Sample IN826027B (tube 17) was collected for 4 min at 200 cc for a total volume of 800 cc. Sample IN826027C (tube 5) was collected for 2 min at 200 cc for a total volume of 400 cc.

At Well A-52, sample IN826038A (tube 7) was collected for 2 min at 200 cc/min for a total of 400 cc. Sample IN826038B (tube 8) was collected for 4 min at 200 cc/min for a total volume of 800 cc.

Samples IN826049A and IN026049B, used as trip blanks, were collected at 1540. A Carbotrap No. 11 was used for sample IN826049A and a No. 2 for IN826049B.

After sample collection, all carbotubes were radiation screened by the Health Physicist. All work was carried out by a special WINCO radiation procedure under guidance of a Safe Work permit.

**Request 827: TRA/ETR Cooling Tower Basin (Fig. 4.9e.).** A total of 64 grab soil samples (Sampling Method: Reference E5.2.3) were to be collected with a split spoon to determine if chromium (total and hexavalent) was present above detection limits within the subsurface soils adjacent to the old ETR cooling tower basin (Field Method: Reference E4.5.1 for temperature and E4.5.2 for pH).

The cooling tower basin, 270 ft long by 60 ft wide and 6 ft deep, was constructed of concrete with expansion joints at given section lengths. Significant amounts of cooling water were lost from the ETR tower due to evaporation. Wind-blown losses were deposited on the ground downwind of the tower basin structure.

The Sampling Team arrived at the site on 15JUL88 at approximately 1245 and was processed through security. The weather was clear, winds were gusting to 15 mph, and the temperature was approximately 87$^{o}$F. The team's TRA operations escort directed the team to the cooling tower basin. There were two areas of interest: 1) the perimeter of the basin adjacent to the basin expansion joints, and 2) the prevalent wind directions outward from the cooling tower.

The Sampling Team located and numbered the expansion joints in the basin and then selected four joints at random for sampling as well as two areas adjacent to the joints on the north side of the basin and two areas adjacent to the joints on the south side of the basin. The area was surveyed (riser pipes, return cold water pipes, etc.) and pin flags were placed at four locations for augering. Although the INEL Sampling and Analysis Plan indicated several expansion joints in the basin, only four were found. Two on the eastern half of the basin were selected for sampling. Although the overall sample population was reduced following a discussion between the Assistant Sampling Team Leader and Lee Stevens of DOE HQ, the revised sampling plan would determine the potential for any hexavalent chromium transport.

In addition to the request for total chromium sample (aliquot A), a second aliquot (aliquot B) was relinquished to INEL personnel for hexavalent chromium determinations by diphenyl carbazide colormetric methods (holding time 24 hrs). No temperatures were recorded for samples because of the heat due to auger friction.

Augering began at grid 33 at 1430. The medium was gravel and sand to the specified depth. The gravel ranged from approximately 0.5 cm to 10 cm in diameter. Samples were taken from grid 33 as follows: IN827437 at 1435 at 2.5 ft; IN827471 at 1500 at 5.0 ft; IN827517 at 1502 at 7.5 ft; IN827551 at 1504 at 10.0 ft; and IN827595 at 1515 at 12.5 ft. Sample IN827631 was not collected at grid 33 because of auger refusal at 12.5 ft.

Samples were taken from grid 34 as follows: IN827448 at 1524 at 1.5 ft; IN827482 at 1527 at 5.0 ft; IN827528 at 1538 at 7.5 ft; IN827562 at 1547 at 10.0 ft; IN827608 at 1550 at 12.5 ft; and IN827642 at 1600 at 15.0 ft. QC rinsate sample IN827664 was collected at 1600.

On 18JUL88, the Sampling Team arrived at 1000, checked in with their TRA Operations escort, and proceeded to the cooling tower basin. Skies were sunny, wind was 0 to 5 mph out of the south, and the temperature was 75$^{o}$F. Access to the drilling sites was prevented by a 5 ft fence. The TRA Operations escort had been notified on 15JUL88 that the fence needed to be taken down. At approximately 1045, the fence was taken down. The Sampling Team collected samples from grid 26 as follows: IN827415 at 1115 at 2.5 ft; IN827459 at 1121 at 5.0 ft; IN827493 at 1128 at 7.5 ft; IN827539 at 1133 at 10.0 ft; and IN827573 at 1245 at 12.5 ft. At 12.5 ft, the team encountered large gravel that was hard to drill. Because the auger met refusal at 15 ft, sample IN827619 was not collected.

At grid 32, sample IN827426 collected at 1252 at 2.5 ft had large gravel on the surface. Sample IN827460 was collected at 1310 at 5.0 ft, but the auger met refusal after collection at the 5 ft interval. A new hole was drilled 2.5 m south and 0.5 m west of the original hole. Sample IN827506 was collected at 7.5 ft at the new location at 1329. When sample IN827540 was collected at 1340 at a depth of 10 ft, the 3 ft bit twisted off at the 10 ft depth. A backhoe was to be used to retrieve the bit on 19JUL88. Samples IN827584 and IN827620 were not collected because of refusal at 12.5 ft when the bit twisted off.

On 19JUL88, the Sampling Team arrived at the TRA/ETR cooling tower basin at 1230. Samples were to be collected northeast of the basin to determine potential chromium deposition was from drift downwind and in a southwest direction represented upwind deposition. A single hole instead of the two holes requested at 50 m and a single hole instead of the three holes requested at 100 m were judged to be sufficient to detect any deposition and downward migration of the chromium in both the northeast and southwest azimuths. (Please see discussion for 15JUL88 for additional information.)

The team set up the rig for grid 36 at an arc 50 yards from the northeast corner. Sample IN827107, taken at 1020 at 2.5 ft, and sample IN827119, taken at 1024 at 5.0 ft, had dirt and gravel in the mix. Sample IN827211, taken at 1059 at 10 ft, had dirt and gravel in the mix. Because the auger was catching at about 7 ft, the team tried to move the auger to another area in the same grid and dug deeper. The new area read higher than 300 cps due to an enclosed fenced area about 10 ft away. The radiation reading for inside the area read greater than 5R on contact with crates of radioactive material. Sample IN827313, taken at 1116 at 15 ft, was described as gravel, dirt, and sand, with large gravel occasionally cutting the auger. The gravel size was 1/2 in. to 2 in.

At grid 40, samples IN827028, IN827120, IN827222, and IN827324 were not collected due to auger refusals on 19JUL88 and 20JUL88.

At grid 10, the engine of the drill rig turned once and froze. There was a significant mechanical problem to be corrected before augering could be resumed.

The rig was repaired and drilling resumed on 20JUL88 in grid 10, located at an arc 100 yds from the northeast corner. Sample IN827052, collected at 1507 at 2.5 ft, consisted of a gravelly, dirt mix. The sample site was near underground utility lines with underground radioactive storage tanks. Sample IN827153, collected at 1509 at 5 ft, consisted of a gravelly, dirt fill mix. Sample IN827255 was collected at 1510 at 10 ft. Sample IN827357, collected at 1517 at 15 ft, consisted of gravel with very little dirt mix.

At grid 8, at an arc 50 ft to the southwest, sample IN827039, taken at 1424 at 2.5 ft, and sample IN827131, taken at 1432 at 5 ft, were described as sandy and wet. Sample IN827233, taken at 1444 at 10 ft, and sample IN827335, taken at 1455 at 15 ft, were sandy. Sample location possibilities at 100 yds were in streets or subtended by buildings. QC rinsate sample IN827653 was collected at 1510.

Because of the reduction in sample population, samples IN827040, -062, -073, -084, -095, -108, -142, -164, -175, -186, -197, -200, -244, -266, -277, -288, -302, -368, -379, and -404 were not collected.

#### 4.14.2.2 Analytical Design

**Request 823:** The field parameters requested for Request 823 were pH and temperature. The parameters analyzed included ICP metals, AA mercury, and gamma scan.

**Request 824:** The field parameters requested for Request 824 were pH and temperature. The parameters analyzed included ICP metals and AA mercury.

**Request 825:** The parameter analyzed for Request 825 was volatiles.

**Request 826:** The field parameters measured for Request 826 were pH and temperature. The parameters to have been analyzed included AA mercury and volatiles. Because of conditions at the site, soil gas samples, rather than soil grab samples, were obtained.

**Request 827:** The field parameters to be measured for Request 827 were pH and temperature. The parameter to be analyzed was chromium (hexavalent and total).

### 4.14.3 Field and Analytical Data

**Field Data:**

**Request 823:** *The field data are presented in Table 4.3.9. Due to the smaller size of the impacted area, the number of segments was reduced to four from the original five. The four grids were 7, 19, 61, and 74. Only two depths were sampled from grid 7 (1-3 and 5-7 ft) and auger refusal was encountered at 7 ft. The pH ranged from 7 to 8.1. Two shallow samples (1-3 ft) showed pH readings of 7 and 7.4. With depth, the pH increased and, below the near-surface samples, the pH ranged from 7.7 to 8.1. PID readings were also taken and values ranged from 0 to 15 ppm. The highest values were the 5-7 ft sample at grid 7 at 15 ppm and the 15-17 ft sample at grid 61. The third highest reading was 3.9 in the 5-7 ft sample of grid 74. Remaining samples were 2.3 ppm or lower.*

**Request 824:** *The field data are presented in Table 4.3.9. Although the INEL Sampling and Analysis Plan requested pH and temperature measurements, these were not taken. Also three deeper samples (5-7 ft) were not collected.*

**Request 825:** *The field data are presented in Table 4.3.9. Although no field measurement was requested, the table shows a PID reading of 9.7 ppm. Field notes also record a PID reading for sample IN825015 at 6.3 ppm at the 2 ft depth.*

**Request 826:** *The field data are presented in Table 4.3.9. Although pH and temperature measurements were requested, the sampling plan was revised to obtain samples for volatile analysis by soil gas tubes in place of soils, and no measurements were made. Because of the risk of excessive radiation exposure if the tank were penetrated, no soil samples were obtained.*

**Request 827:** *The field data are presented in Table 4.3.9. Although both pH and temperature were requested, only pH was determined because the heat from auguring resulted in erroneous sample temperatures. Four sites were selected to represent the expansion joint areas--two on the north side and two on the south side. The pH on the northside samples ranged from 6.9 to 7.9. In the northside samples the pH increased with depth for one sample (grid 26) and decreased with depth for the other (grid 32). In the southside samples, the pH ranged from 7.2 to 7.9. In these samples the pH appeared to reach a maximum (7.9) at about the 10 ft depth and decreased both above and below that zone.*

*Prevailing wind directions were used for three samples; two in the northeast downwind direction--50 yards (grid 36) and 100 yards (grid 10); and one in the southwesterly upwind direction at 50 yds (grid 8). The samples taken 50 yards downwind showed a pH range from 7.8 to 8.3. For the samples taken upwind,*

*the pH ranged from 7.5 to 8.4. These samples show a tendency to increase in pH with depth. No temperature readings were made.*

**Field Data Evaluation:**

**Request 823:** Because the pH and PID instruments were calibrated prior to taking field readings, the results are reliable. Temperature readings were not taken because of heating induced by the auguring.

**Request 824:** No field measurements were made.

**Request 825:** No field measurements were requested. Because the PID instrument was calibrated prior to taking field measurements, the readings are reliable.

**Request 826:** Soil samples were not collected because volatile samples were collected by soil gas tubes. No measurements were made of pH and temperature because no soil samples were collected.

**Request 827:** Because the pH instrument was calibrated prior to field use, the readings are reliable.

**Analytical Data:**

Request 823:

*Metals. Analytical data for metals in soil are presented in Table 4.3.9. Of the 22 metals detected, the following 4 metals of interest to the Survey were below the CRDL in all fourteen samples: antimony, arsenic, lead, and selenium. Of the metals of interest detected, barium ranged from 80 to 237 mg/kg; beryllium, 1.6 to 2 mg/kg; cadmium, 0.74 to 1.3 mg/kg; chromium, 14 to 35 mg/kg; copper, 9.1*

*to 28 mg/kg; mercury, 0.03 to 0.06 mg/kg; nickel, 16 to 39 mg/kg; silver, 1.5 to 1.9 mg/kg; and zinc, 49 to 131 mg/kg. Only thallium was below the IDL and is, therefore, not listed in Table 4.3.9.*

*Radiochemistry. Radiochemical data are given in Table 4.3.9. Fourteen soil samples from the TAN/TSF PM-2A Tank Area were given a gamma scan. The following ranges of radionuclide concentrations in pCi/kg were found: naturally occurring potassium-40, 9,100 to 18,000; cobalt-60, 0 to 240; and cesium-137, 170 to 120,000. Averages in pCi/kg were potassium-40, 12,000; cobalt-60, 58; and cesium-137, 20,853.*

**Request 824:**

*Metals. Analytical data for metals in soil are presented in Table 4.3.9. Of the 20 metals detected, the following 2 metals of interest to the Survey were below the CRDL in all three samples: lead and silver. Of the metals of interest detected, arsenic was 8.6 mg/kg; barium ranged from 127 to 186 mg/kg; beryllium, 1.7 to 1.8 mg/kg; cadmium, 1 to 1.1 mg/kg; chromium, 22 to 32 mg/kg; copper, 14 to 22 mg/kg; mercury, 0.08 to 0.12 mg/kg; nickel, 22 to 30 mg/kg; and zinc, 67 to 101 mg/kg. Toxic metals of interest not listed in Table 4.3.9 were below the IDL for the samples tested.*

**Request 825:**

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.9. Fourteen volatile organic compounds were detected in one soil gas sample and 23 in the other soil gas sample for this request. Benzene, carbon tetrachloride, chlorobenzene, and 1,1,1-trichloroethane were all detected below the detection limits in sample IN825026. A TIC (a trichlorofluoromethane) was also detected in that sample with an estimated concentration of 9400 ug/m$^3$ of air sampled, and in the other sample at 720*

*ug/m$^3$ of air sampled. Chloroform was detected below the detection limit in both samples. Methylene chloride was measured in both samples (380 and 840 ppb) and was also found in the method blank. Toluene was measured in both samples with a maximum concentration of 460 ug/m$^3$ of air sampled.*

**Request 826:**

*Volatile organics. Analytical results for volatile organic compounds are presented in Table 4.3.9. There were 2 volatiles detected in one of these soil gas samples, 3 volatiles in another, and 21 detected in the third sample. There were 25 volatiles detected in the corresponding field blank. The highest concentration of any volatile organic compound in these samples was 15,000 ug/m$^3$ of air sampled of acetone in sample IN826027. Chloroform was detected at 200 ug/m$^3$ of air sampled in one sample and was below the detection limit in the field blank. Ethylbenzene was detected below the detection limit in one sample, and at 140 ug/m$^3$ of air sampled in the field blank. Methylene chloride was detected at 7100 ug/m$^3$ of air sampled in sample IN826027 and at 1800 ug/m$^3$ of air sampled in the field blank. Methylene chloride was also detected in the method blank. Toluene was detected at 1500 ug/m$^3$ of air sampled in sample IN826027 and at 1100 ug/m$^3$ of air sampled in the field blank. The field blank also had 39 ug/m$^3$ of air sampled of 1,1,1-trichloroethane, as compared with 38 ug/m$^3$ of air sampled in sample IN826027. The highest concentration of any TIC was 10,000 ug/m$^3$ of air sampled of trichlorofluoromethane in the field blank.*

**Request 827:**

*Metals. (TRA/ETR Cooling Tower Basin Expansion Joints North Side)- Analytical data for metals in soil are presented in Table 4.3.9. The INEL Sampling and Analysis Plan requested only total chromium and hexavalent chromium. Of the 19 metals detected, silver was the only metal of interest to the Survey below the CRDL in all nine samples. Of the metals of interest*

*detected, antimony was 10 mg/kg; barium ranged from 105 to 274 mg/kg; beryllium, 1.2 to 1.4 mg/kg; cadmium, 0.72 to 1.9 mg/kg; chromium, 50 to 1630 mg/kg; copper, 17 to 264 mg/kg; lead, 44 to 55 mg/kg; nickel, 21 to 32 mg/kg; and zinc, 78 to 1490 mg/kg.*

*(TRA/ETR Cooling Tower Basin Expansion Joints South Side) - Analytical data for metals in soil are presented in Table 4.3.9. Of the 18 metals detected, the following 2 metals of interest to the Survey were below the CRDL in all eleven samples: lead and silver. Of the metals of interest detected, barium ranged from 113 to 257 mg/kg; beryllium, 1 to 1.6 mg/kg; cadmium was 0.81 mg/kg; chromium ranged from 20 to 68 mg/kg; copper, 13 to 21 mg/kg; nickel, 16 to 26 mg/kg; and zinc, 38 to 79 mg/kg.*

*(TRA/ETR Cooling Tower Basin Northeast Wind Direction 100 Yds) - Analytical data for metals in soil are presented in Table 4.3.9. Of the 18 metals detected, the following 2 metals of interest to the Survey were below the CRDL in all four samples: cadmium and lead. Of the metals of interest detected, barium ranged from 60 to 170 mg/kg; beryllium, 1 to 1.2 mg/kg; chromium, 21 to 30 mg/kg; copper, 9.8 to 22 mg/kg; nickel, 18 to 21 mg/kg; silver was 1.7 mg/kg; and zinc ranged from 31 to 74 mg/kg.*

*(TRA/ETR Cooling Tower Basin Northeast Wind Direction 50 Yds) - Analytical data for metals in soil are presented in Table 4.3.9. Of the 18 metals detected, the following 3 metals of interest to the Survey were below the CRDL in all four samples: cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 77 to 157 mg/kg; beryllium, 1.1 to 1.2 mg/kg; chromium, 17 to 28 mg/kg; copper, 15 to 24 mg/kg; nickel, 16 to 22 mg/kg; and zinc, 39 to 83 mg/kg.*

*(TRA/ETR Cooling Tower Basin Southwest Wind Direction 50 Yds) - Analytical data for metals in soil are presented in Table 4.3.9. Of the 18 metals detected,*

*the following 3 metals of interest to the Survey were below the CRDL in all four samples: cadmium, lead, and silver. Of the metals of interest detected, barium ranged from 115 to 211 mg/kg; beryllium, 1 to 1.5 mg/kg; chromium, 15 to 24 mg/kg; copper, 13 to 18 mg/kg; nickel, 16 to 21 mg/kg; and zinc, 36 to 72 mg/kg.*

*Toxic metals of interest not listed in Table 4.3.9 were below the IDL for the samples tested.*

Analytical Data Evaluation:

Request 823:

Metals. Nine metals of interest--barium, beryllium, cadmium, chromium, copper, mercury, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request.

Radiochemistry. Radiological instrumentation was calibrated daily. Instrument backgrounds and efficiencies were also determined. Because control sample results were within 10% of their true value, radiological data are considered reliable.

Request 824:

Metals. Nine metals of interest--arsenic, barium, beryllium, cadmium, chromium, copper, mercury, nickel, and zinc--were detected above the CRDL or the IDL for this request.

**Request 825:**

Volatile organics. Benzene, carbon tetrachloride, chlorobenzene, and 1,1,1-trichloroethane were all detected below the detection limits in one sample. Chloroform was detected below the detection limit in both samples. Methylene chloride was measured in both samples and was also found in the blank. Toluene was measured in both samples. Trichlorofluoromethane was tentatively identified in estimated concentrations in excess of 500 ug/m$^3$ of air sampled in both samples.

**Request 826:**

Volatile organics. The highest concentration was 15,000 ug/m$^3$ of air sampled of acetone in sample IN826027. Chloroform was detected at 200 ug/m$^3$ of air sampled in one sample and below the detection limit in the field blank. Ethylbenzene, methylene chloride, toluene, and 1,1,1-trichloroethane were detected in sample IN826027 and in the field blank. Methylene chloride was also in the method bank. The highest concentration of any TIC was 10,000 ug/m$^3$ of air sampled of trichlorofluoromethane in the field blank.

**Request 827:**

Metals. (TRA/ETR Cooling Tower Basin Expansion Joints North Side) - Nine metals of interest--antimony, barium, beryllium, cadmium, chromium, copper, lead, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

(TRA/ETR Cooling Tower Basin Expansion Joints South Side) - Seven metals of interest--barium, beryllium, cadmium, chromium, copper, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

(TRA/ETR Cooling Tower Basin Northeast Wind Direction 100 Yds) - Seven metals of interest--barium, beryllium, chromium, copper, nickel, silver, and zinc--were detected above either the CRDL or the IDL for this request.

(TRA/ETR Cooling Tower Basin Northeast Wind Direction 50 Yds) - Six metals of interest--barium, beryllium, chromium, copper, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

(TRA/ETR Cooling Tower Basin Southwest Wind Direction 50 Yds) - Six metals of interest--barium, beryllium, chromium, copper, nickel, and zinc--were detected above either the CRDL or the IDL for this request.

Note: Hexavalent chromium analyses were unreliable and not reported.

### 4.14.4 Limitations and Qualifications

**Data Quality Level:**

**Request 823:** The sampling design and field sampling were both rated Quality Level I. The overall analytical Quality Level is I.

**Request 824:** The sampling design is rated Quality Level I. The field sampling is rated Quality Level II. The overall analytical Quality Level rating is I.

**Request 825:** The sampling design and field sampling are rated Quality Level I. The overall analytical Quality Level rating is II.

**Request 826:** The sampling design is rated Quality Level II. The field sampling is rated Quality Level I. The overall analytical Quality Level rating is III.

**Request 827:** The sampling design and field sampling Quality Levels are I. The overall analytical Quality Level is III.

**Field Data:**

**Request 823:** Both the design and the sampling are rated Quality Level I.

**Request 824:** The sampling team did not measure the requested pH and temperature of the samples. The field notes also state that two of the deeper samples could not be obtained because of the limitations of the sampling tool. For these reasons, the field sampling is rated Quality Level II.

**Request 825:** Both the design and the sampling are rated Quality Level I.

**Request 826:** The design was rated Quality Level II because insufficient attention was paid to the potential for accidental exposure from the sampling operations of the high level tank farm. This request should best be handled using remote controlled operations and with prescribed safety and health precautions.

**Request 827:** Both the design and the field sampling were rated Quality Level I. (The number of samples were reduced from the INEL Sampling and Analysis Plan through consultation with the Survey team representative.)

**Analytical Data:**

**Request 823:**

Metals. Analytical results for ICP metals were Quality Level I except for antimony and lead at Quality Level III. Analytical results for AA metals were Quality Level I. For antimony, the calibration verification result was less than

90% and the element was not detected in the sample. For lead, the positive value for the solid LCS was outside the lower control limit, indicating the possibility of a false negative.

Radiochemistry. All data are Quality Level I.

**Request 824:**

Metals. Analytical results for ICP metals were Quality Level I. Analytical results for AA metals were Quality Level I.

**Request 825:**

Volatile organics. The data Quality Level is III because the holding time was exceeded and conventional quality control (matrix spike, matrix spike duplicate, surrogate additions) could not be used with this type of sample (i.e., soil gas). Although these data were determined as being of Quality Level III, data for compounds above the CRDL (except for methylene chloride in the samples) and for the known TICs (except for hexamethyl disiloxane) were deemed in the case narrative to be usable. Specifically identified TIC data have a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

**Request 826:**

Volatile organics. The data Quality Level is III because the holding time was exceeded and conventional quality control (matrix spike, matrix spike duplicate, surrogate additions) could not be used with this type of sample (i.e., soil gas). Although these data were determined as being of Quality Level III, data for compounds above the CRDL (except for methylene chloride samples IN826049 and IN826027) and for the known TICs (except for hexamethyl disiloxane) were deemed in the case narrative to be usable. Specifically identified TIC data have

a Quality Level of II, whereas all unknown TIC data are assigned a Quality Level of III.

**Request 827:**

Metals. (TRA/ETR Cooling Tower Basin Expansion Joints North Side)- Analytical results for ICP metals were Quality Level I except for antimony, lead, and zinc at Quality Level III. For antimony, the percent recovery for spike was less than 30% and the reported sampling results are less than the IDL, indicating severe analytical deficiencies. For lead, the positive value for the solid Laboratory Control Sample was outside the lower control limit, indicating the possibility of a false negative. For zinc, positive values were observed in the calibration blank that are greater than the CRDL. This is indicative of severe analytical deficiencies.

(TRA/ETR Cooling Tower Basin Expansion Joints South Side) - Analytical results for ICP metals were Quality Level I except for antimony, lead, and zinc at Quality Level III. For antimony, the percent recovery for spike was less than 30% and the reported sampling results are less than the IDL, indicating severe analytical deficiencies. For lead, the positive value for the solid LCS was outside the lower control limit, indicating the possibility of a false negative. For zinc, positive values were observed in the calibration blank that are greater than the CRDL. This is indicative of severe analytical deficiencies.

(TRA/ETR Cooling Tower Basin Northeast Wind Direction 100 Yds.) - For samples IN827051 and -255, analytical results for ICP metals were Quality Level I except for antimony at Quality Level II. For antimony, the percent recovery for spikes falls within the range 30 to 74% and the reported sample result is positive. The possibility for a false negative exists.

For sample IN827357, analytical results for ICP metals were Quality Level I except for antimony and lead at Quality Level III. For antimony, the percent recovery for spike was less than 30% and the reported sampling results are less than the IDL, indicating severe analytical deficiencies. For lead, the positive value for the solid LCS was outside the lower control limit, indicating the possibility of a false negative.

(TRA/ETR Cooling Tower Basin Northeast Wind Direction 50 Yds.) - For samples IN827017 and -211, analytical results for ICP metals were Quality Level I except for antimony at Quality Level II. For antimony, the percent recovery for spikes falls within the range 30 to 74%, and the reported sample result is positive. The possibility for a false negative exists.

For sample IN827313, analytical results for ICP metals were Quality Level I except for antimony and lead at Quality Level III. For antimony, the percent recovery for spike was less than 30% and the reported sampling results are less than the IDL, indicating severe analytical deficiencies. For lead, the positive value for the solid LCS was outside the lower control limit, indicating the possibility of a false negative.

(TRA/ETR Cooling Tower Basin Southwest Wind Direction 50 Yds) - For samples IN827039 and -233, analytical results for ICP metals were Quality Level I except for antimony at Quality Level II. For antimony, the percent recovery for spikes falls within the range 30 to 74% and the reported sample result is positive. The possibility for a false negative exists.

For sample IN827335, analytical results for ICP metals were Quality Level I except for antimony and lead at Quality Level III. For antimony, the percent recovery for spike was less than 30% and the reported sampling results were less

than the IDL, indicating severe analytical deficiencies. For lead, the positive value for the solid LCS was outside the lower control limit, indicating the possibility of a false negative.

Environmental Problem: 9
Request Number: 823

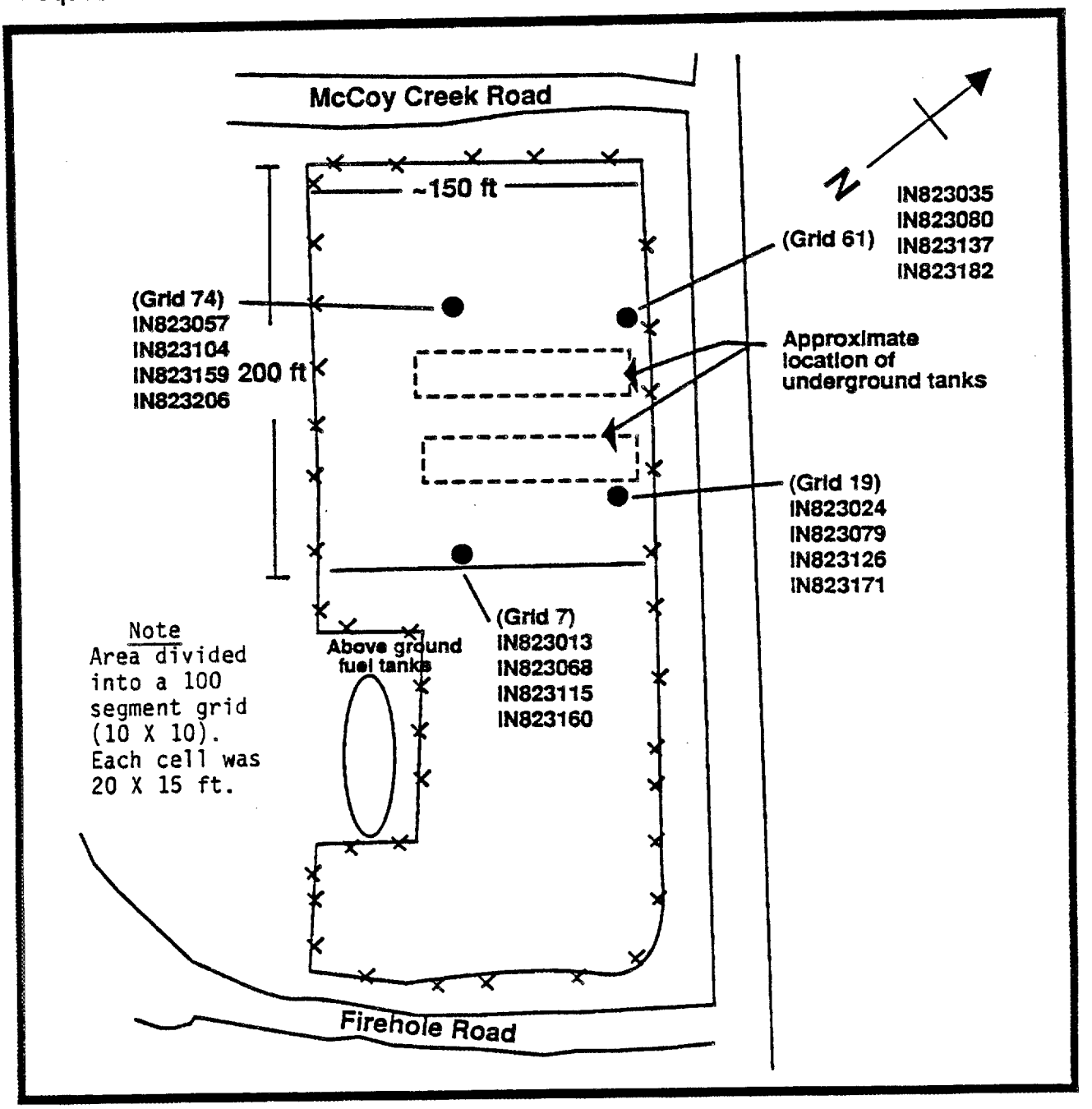


Figure 4.9a. TAN/TSF PM-2A Tank Area (Request 823)

Environmental Problem: 9
Request Number: 824

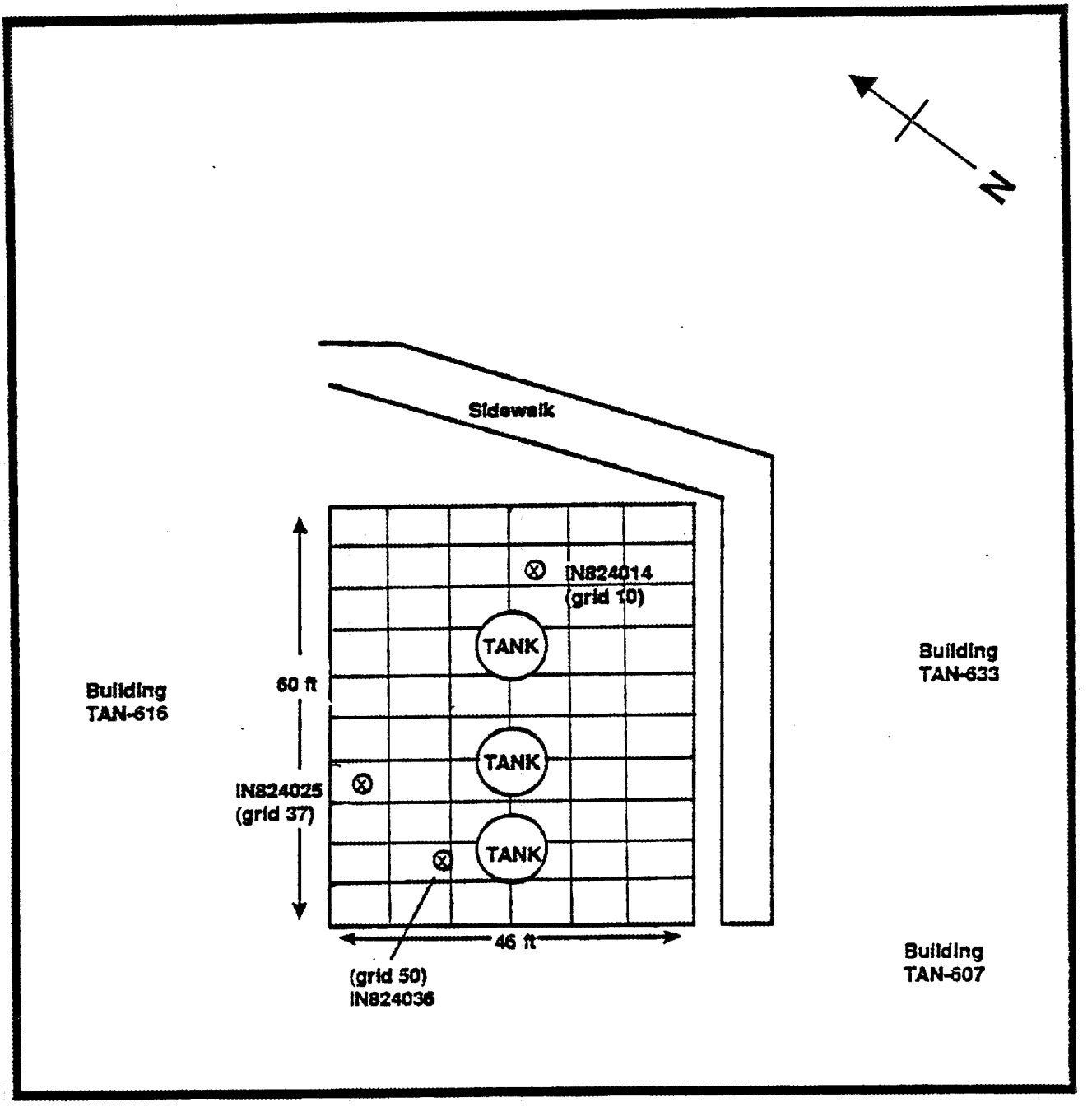


Figure 4.9b. TAN/TSF Intermediate Level Waste Disposal Area (Request 824)

Environmental Problem: 9
Request Number: 825

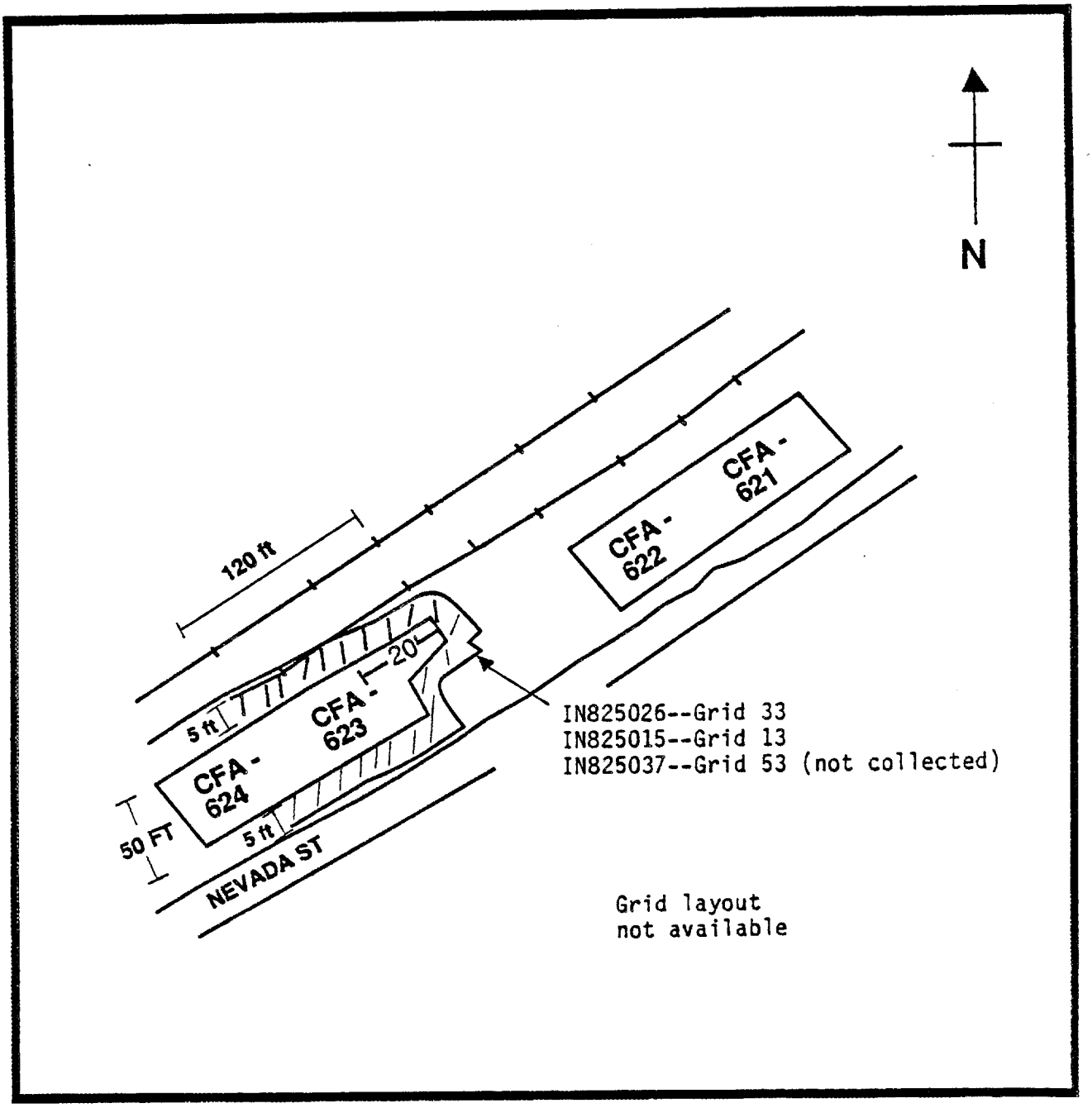


Figure 4.9c. CFA Pump Station Fuel Spill Area (Request 825)

Environmental Problem: 9
Request Number: 826

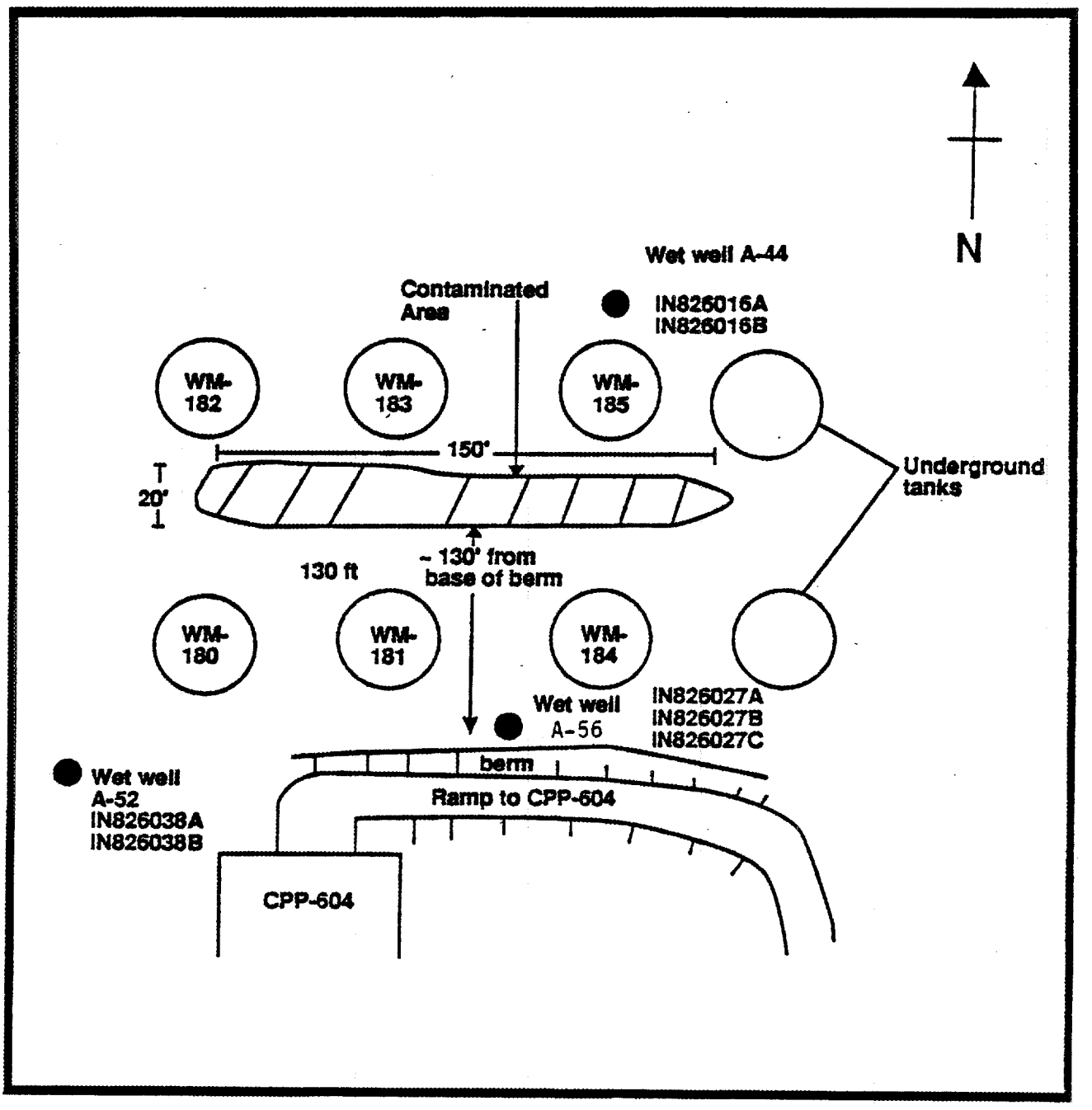


Figure 4.9d. ICPP Tank Farm Area (Request 826)

Environmental Problem: 9
Request Number: 827

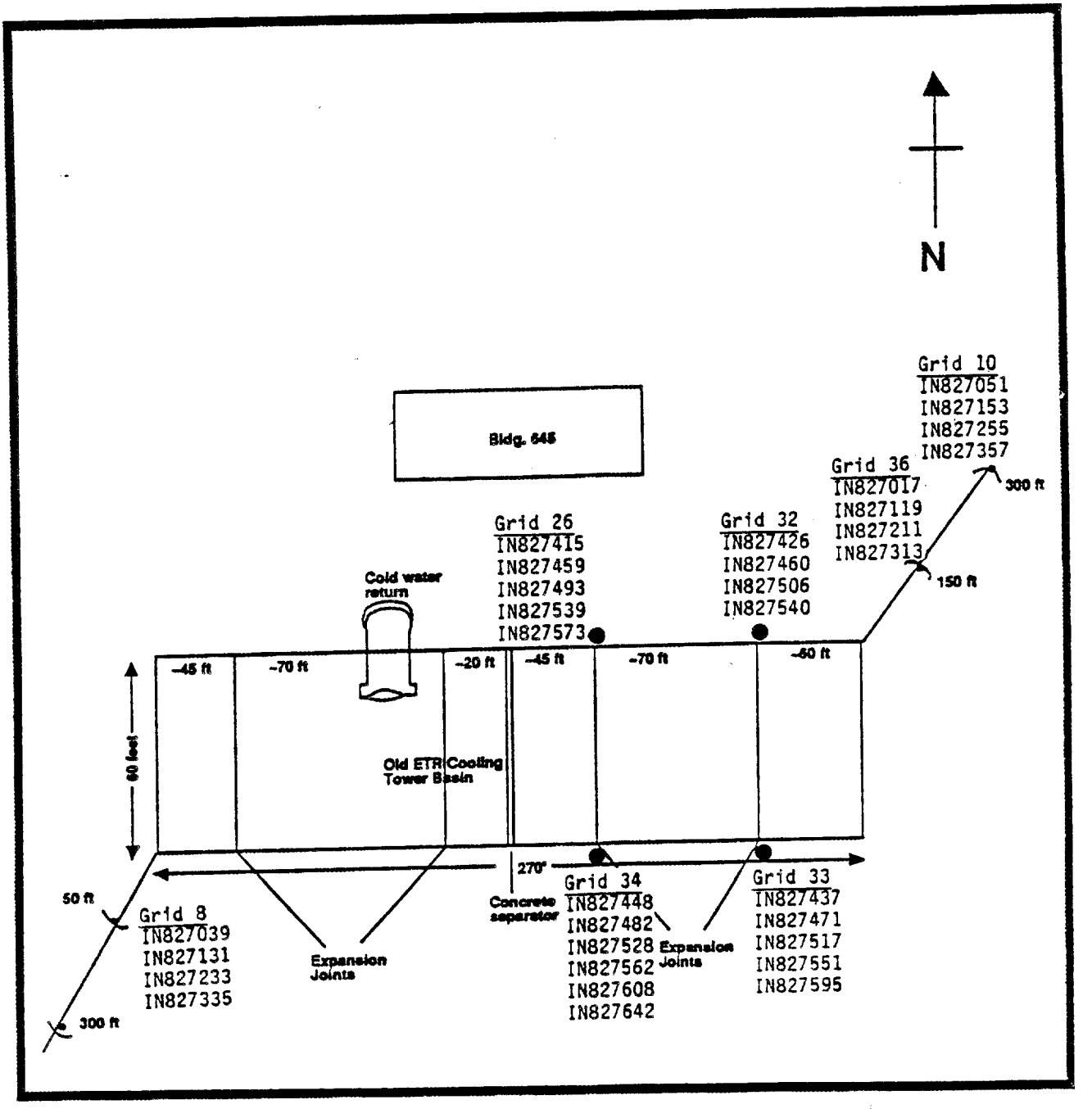


Figure 4.9e. TRA/ETR Cooling Tower Basin (Request 827)

TABLE 4.2.9 SAMPLING AND ANALYSIS DATA SUMMARY
ENVIRONMENTAL PROBLEM - 9

DRAFT DO NOT CITE

| REQUEST NUMBER | LOCATION | TYPE LOCATION | MEDIA | NUMB REQ | NUMB COLL | TYPE | ANIONS NUMB HITS | ANIONS NUMB ANAL | METALS NUMB HITS | METALS NUMB ANAL | SOIL GAS NUMB HITS | SOIL GAS NUMB ANAL | PES/H/PCB NUMB HITS | PES/H/PCB NUMB ANAL | SEMIVOLS NUMB HITS | SEMIVOLS NUMB ANAL | VOLS NUMB HITS | VOLS NUMB ANAL | RADS NUMB HITS | RADS NUMB ANAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN823 | PH-2A TANK | TANK | SOIL | 20 | 14 | GRAB | 0 | 0 | 14 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 14 |
| IN824 | PH-2A TANK | TANK | SOIL | 6 | 3 | GRAB | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | PH-2A TANK | TANK | SOIL | 64 | 33 | GRAB | 0 | 0 | 32 | 32 | 0 | 0 | 0 | 0' | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | MED TOTAL | 90 | 50 | | 0 | 0 | 49 | 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 14 |
| IN825 | PH-2A TANK | TANK | AIR | 3 | 2 | GRAB | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | MED TOTAL | 3 | 2 | | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN826 | PH-2A TANK | TANK | OTHER | 1 | 1 | QC FL | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN826 | PH-2A TANK | TANK | OTHER | 1 | 1 | GRAB | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN826 | PH-2A TANK | TANK | OTHER | 2 | 2 | S COM | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | MED TOTAL | 4 | 4 | | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827 | PH-2A TANK | TANK | SUR WATER | 2 | 2 | QC RN | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | MED TOTAL | 2 | 2 | | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | EP TOTAL | 99 | 58 | | 0 | 0 | 51 | 51 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 14 |
| | | | TOTAL | 617 | 391 | | 131 | 133 | 312 | 312 | 13 | 13 | 12 | 37 | 16 | 16 | 207 | 249 | 135 | 170 |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 823
LOCATION: TAN/TSF PM-2A TANK AREA
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN823013 | IN823024 | IN823035 | IN823057 | IN823068 | IN823079 |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 1.6 | 1.4 | 1.3 | 2.3 | 15 | 1.4 |
| PH (UNITS) | | 7.4 | 7 | 8 | 8 | 7.8 | 7.7 |

| FIELD MEASUREMENTS | SAMP NO: | IN823080 | IN823104 | IN823126 | IN823137 | IN823159 | IN823171 |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 1.2 | 3.9 | 1.8 | 0 | 0 | 1.5 |
| PH (UNITS) | | 7.8 | 7.8 | 8.2 | 7.9 | 8.1 | 7.9 |

| FIELD MEASUREMENTS | SAMP NO: | IN823182 | IN823206 | | | | |
|---|---|---|---|---|---|---|---|
| FID/PID (PPM) | | 14 | 1 | | | | |
| PH (UNITS) | | 8 | 8 | | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823013A | IN823013B | IN823013B | IN823024A | IN823024B | IN823024B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN816116H | IN816116K | IN823013A | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 7710 | | | 6580 | |
| ANTIMONY | | | 7.2 UN | | | 6.9 UN | |
| ARSENIC | | | 13 B | | | 14 B | |
| BARIUM | | | 91 | | | 80 | |
| BERYLLIUM | | | 1.6 E | | | 1.7 E | |
| CADMIUM | | | 0.6 B | | | 0.96 | |
| CALCIUM | | | 156000 | | | 182000 | |
| CHROMIUM | | | 17 | | | 15 | |
| COBALT | | | 3.8 B | | | 3.6 B | |
| COPPER | | | 11 N* | | | 9.1 N* | |
| IRON | | | 10300 | | | 8890 | |
| LEAD | | | 5.5 B | | | 4.1 U | |
| MAGNESIUM | | | 11000 | | | 11100 | |
| MANGANESE | | | 215 | | | 179 | |
| MERCURY | | 0.03 B | | | 0.03 B | | |
| NICKEL | | | 18 | | | 16 | |
| POTASSIUM | | | | 1900 | | | 1600 |
| SELENIUM | | | 7.2 U | | | 6.9 U | |
| SILVER | | | 0.86 U | | | 1.1 B | |
| SODIUM | | | 24 U | | | 23 U | |
| VANADIUM | | | 25 E | | | 23 E | |
| ZINC | | | 52 | | | 49 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 823
LOCATION: TAN/TSF PM-2A TANK AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823035A | IN823035B | IN823035B | IN823057A | IN823057B | IN823057B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN816116H | IN816116K | IN823013A | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 6370 | | | 10800 | |
| ANTIMONY | | | 7.2 UN | | | 7.4 UN | |
| ARSENIC | | | 14 B | | | 9.8 B | |
| BARIUM | | | 91 | | | 137 | |
| BERYLLIUM | | | 1.7 E | | | 1.8 E | |
| CADMIUM | | | 0.74 | | | 0.82 | |
| CALCIUM | | | 171000 | | | 144000 | |
| CHROMIUM | | | 14 | | | 20 | |
| COBALT | | | 3.2 B | | | 5.2 B | |
| COPPER | | | 11 N* | | | 16 N* | |
| IRON | | | 8590 | | | 14000 | |
| LEAD | | | 5.1 B | | | 7.1 B | |
| MAGNESIUM | | | 10300 | | | 10800 | |
| MANGANESE | | | 190 | | | 389 | |
| MERCURY | | 0.03 | | | 0.03 B | | |
| NICKEL | | | 17 | | | 24 | |
| POTASSIUM | | | | 1600 | | | 2100 |
| SELENIUM | | | 7.2 U | | | 7.4 U | |
| SILVER | | | 0.86 U | | | 1.1 B | |
| SODIUM | | | 24 U | | | 25 U | |
| VANADIUM | | | 24 E | | | 28 E | |
| ZINC | | | 52 | | | 75 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823068A | IN823068B | IN823068B | IN823079A | IN823079B | IN823079B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN816116H | IN816116K | IN823013A | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 14400 | | | 9200 | |
| ANTIMONY | | | 7.4 UN | | | 7 UN | |
| ARSENIC | | | 9.2 B | | | 14 B | |
| BARIUM | | | 171 | | | 101 | |
| BERYLLIUM | | | 1.8 E | | | 1.8 E | |
| CADMIUM | | | 0.8 | | | 0.78 | |
| CALCIUM | | | 94800 | | | 183000 | |
| CHROMIUM | | | 27 | | | 19 | |
| COBALT | | | 7.3 B | | | 3.8 B | |
| COPPER | | | 26 N* | | | 12 N* | |
| IRON | | | 22700 | | | 10900 | |
| LEAD | | | 9.2 B | | | 4.3 B | |
| MAGNESIUM | | | 12400 | | | 10600 | |
| MANGANESE | | | 425 | | | 210 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 DRAFT DO NOT CITE
SPILLS

S&A REQUEST: 823
LOCATION: TAN/TSF PM-2A TANK AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823068A | IN823068B | IN823068B | IN823079A | IN823079B | IN823079B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN816116H | IN816116K | IN823013A | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| MERCURY | | 0.04 B | | | 0.05 | | |
| NICKEL | | | 31 | | | 18 | |
| POTASSIUM | | | | 4400 | | | 2100 |
| SELENIUM | | | 7.4 U | | | 7 U | |
| SILVER | | | 1.2 B | | | 0.85 B | |
| SODIUM | | | 25 U | | | 24 U | |
| VANADIUM | | | 41 E | | | 29 E | |
| ZINC | | | 82 | | | 56 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823080A | IN823080B | IN823080B | IN823104A | IN823104B | IN823104B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN816116H | IN816116K | IN823013A | IN816116H | IN816116K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 18600 | | | 18400 | |
| ANTIMONY | | | 7.4 UN | | | 7.3 UN | |
| ARSENIC | | | 8.9 U | | | 8.8 U | |
| BARIUM | | | 211 | | | 225 | |
| BERYLLIUM | | | 2 E | | | 2 E | |
| CADMIUM | | | 0.95 | | | 0.93 | |
| CALCIUM | | | 78700 | | | 74100 | |
| CHROMIUM | | | 35 | | | 33 | |
| COBALT | | | 8.4 | | | 8.8 | |
| COPPER | | | 25 N* | | | 27 N* | |
| IRON | | | 22000 | | | 23100 | |
| LEAD | | | 14 B | | | 16 B | |
| MAGNESIUM | | | 13100 | | | 13300 | |
| MANGANESE | | | 460 | | | 525 | |
| MERCURY | | 0.05 B | | | 0.06 | | |
| NICKEL | | | 35 | | | 34 | |
| POTASSIUM | | | | 3800 | | | 3600 |
| SELENIUM | | | 7.4 U | | | 7.3 U | |
| SILVER | | | 1.2 B | | | 1.5 | |
| SODIUM | | | 25 U | | | 25 U | |
| VANADIUM | | | 59 E | | | 53 E | |
| ZINC | | | 131 | | | 101 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 823
LOCATION: TAN/TSF PM-2A TANK AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823126A | IN823126B | IN823126B | IN823137A | IN823137B | IN823137B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN806012C | IN806012K | IN823013A | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 10300 | | | 14700 | |
| ANTIMONY | | | 4 UN | | | 4.4 UN | |
| ARSENIC | | | 20 B | | | 19 B | |
| BARIUM | | | 126 | | | 180 | |
| BERYLLIUM | | | 1.8 E | | | 1.9 E | |
| CADMIUM | | | 0.99 | | | 1 | |
| CALCIUM | | | 170000 | | | 104000 | |
| CHROMIUM | | | 22 E | | | 28 E | |
| COBALT | | | 5.7 B | | | 7.7 | |
| COPPER | | | 18 | | | 23 | |
| IRON | | | 14800 | | | 19600 | |
| LEAD | | | 11 B | | | 18 B | |
| MAGNESIUM | | | 11300 | | | 12700 | |
| MANGANESE | | | 452 E | | | 543 E | |
| MERCURY | | 0.03 B | | | 0.05 | | |
| NICKEL | | | 23 | | | 30 | |
| POTASSIUM | | | | 2200 | | | 3000 |
| SELENIUM | | | 8 U | | | 8.8 U | |
| SILVER | | | 0.97 B | | | 1.6 | |
| SODIUM | | | 824 | | | 619 B | |
| VANADIUM | | | 30 E | | | 41 E | |
| ZINC | | | 73 | | | 94 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823159A | IN823159B | IN823159B | IN823171A | IN823171B | IN823171B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN806012C | IN806012K | IN823013A | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 18200 | | | 16400 | |
| ANTIMONY | | | 4.3 UN | | | 6.4 BN | |
| ARSENIC | | | 14 B | | | 18 B | |
| BARIUM | | | 237 | | | 201 | |
| BERYLLIUM | | | 2 E | | | 2 E | |
| CADMIUM | | | 1.2 | | | 1.2 | |
| CALCIUM | | | 77000 | | | 110000 | |
| CHROMIUM | | | 34 E | | | 31 E | |
| COBALT | | | 9.5 | | | 8.4 | |
| COPPER | | | 28 | | | 26 | |
| IRON | | | 24200 | | | 21700 | |
| LEAD | | | 19 B | | | 18 B | |
| MAGNESIUM | | | 13300 | | | 12400 | |
| MANGANESE | | | 637 E | | | 597 E | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 DRAFT DO NOT CITE
SPILLS

S&A REQUEST: 823
LOCATION: TAN/TSF PM-2A TANK AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823159A | IN823159B | IN823159B | IN823171A | IN823171B | IN823171B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN806012C | IN806012K | IN823013A | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| MERCURY | | 0.04 | | | 0.04 B | | |
| NICKEL | | | 35 | | | 32 | |
| POTASSIUM | | | | 3600 | | | 3600 |
| SELENIUM | | | 8.6 U | | | 9 U | |
| SILVER | | | 1.6 | | | 1.6 | |
| SODIUM | | | 554 B | | | 619 B | |
| VANADIUM | | | 53 E | | | 49 E | |
| ZINC | | | 107 | | | 98 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN823182A | IN823182B | IN823182B | IN823206A | IN823206B | IN823206B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN823013A | IN806012C | IN806012K | IN823013A | IN806012C | IN806012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 15600 | | | 14600 | |
| ANTIMONY | | | 6 BN | | | 4.3 UN | |
| ARSENIC | | | 14 B | | | 17 B | |
| BARIUM | | | 192 | | | 195 | |
| BERYLLIUM | | | 2 E | | | 1.8 E | |
| CADMIUM | | | 1 | | | 1.3 | |
| CALCIUM | | | 94500 | | | 83600 | |
| CHROMIUM | | | 34 E | | | 29 E | |
| COBALT | | | 8 B | | | 8.1 | |
| COPPER | | | 25 | | | 24 | |
| IRON | | | 20300 | | | 20800 | |
| LEAD | | | 18 B | | | 15 B | |
| MAGNESIUM | | | 13800 | | | 11800 | |
| MANGANESE | | | 579 E | | | 548 E | |
| MERCURY | | 0.04 B | | | 0.05 | | |
| NICKEL | | | 39 | | | 29 | |
| POTASSIUM | | | | 3300 | | | 3400 |
| SELENIUM | | | 11 B | | | 8.6 U | |
| SILVER | | | 1.3 B | | | 1.9 | |
| SODIUM | | | 545 B | | | 532 B | |
| VANADIUM | | | 47 E | | | 45 E | |
| ZINC | | | 115 | | | 86 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 823
LOCATION: TAN/TSF PM-2A TANK AREA
MEDIUM: SOIL

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN823013C | IN823024C | IN823035C | IN823057C | IN823068C | IN823079C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8785 | LLL8785 | LLL8785 | LLL8785 | LLL8785 | LLL8785 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | 70 U | 240 | 87 | 60 U | 70 U | 130 |
| CS-137 | | 15000 | 120000 | 9400 | 1500 | 9800 | 45000 |
| K-40 | | 10000 | 9100 | 11000 | 10000 | 11000 | 12000 |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN823080C | IN823104C | IN823126C | IN823137C | IN823159C | IN823171C |
|---|---|---|---|---|---|---|---|
| | SDG NO: | LLL8785 | LLL8785 | LLL8785 | LLL8785 | LLL8785 | LLL8785 |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| CO-60 | | 70 U | 60 U | 160 | 200 | 70 U | 70 U |
| CS-137 | | 7500 | 170 | 46000 | 3400 | 190 | 32000 |
| K-40 | | 14000 | 18000 | 10000 | 12000 | 13000 | 12000 |

| RADIOCHEMISTRY (PCI/KGD) | SAMP NO: | IN823182C | IN823206C |
|---|---|---|---|
| | SDG NO: | LLL8785 | LLL8785 |
| | TYPE: | GRAB | GRAB |
| CO-60 | | 70 U | 70 U |
| CS-137 | | 1700 | 290 |
| K-40 | | 13000 | 14000 |

S&A REQUEST: 824
LOCATION: TAN/TSF INTERMEDIATE LEVEL WASTE DISPOSAL AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN824014A | IN824014B | IN824014B | IN824025A | IN824025B | IN824025B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012C | IN301012D | IN301012K | IN301012C | IN301012D | IN301012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | | 10100 | | | 16300 | |
| ARSENIC | | | 8.6 | | | 8.6 U | |
| BARIUM | | | 127 N | | | 186 N | |
| BERYLLIUM | | | 1.7 | | | 1.8 | |
| CADMIUM | | | 1 | | | 1.1 | |
| CALCIUM | | | 148000 * | | | 92300 * | |
| CHROMIUM | | | 22 | | | 32 | |
| COBALT | | | 4.9 B | | | 7 B | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 824
LOCATION: TAN/TSF INTERMEDIATE LEVEL WASTE DISPOSAL AREA
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN824014A | IN824014B | IN824014B | IN824025A | IN824025B | IN824025B |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN301012C | IN301012D | IN301012K | IN301012C | IN301012D | IN301012K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| COPPER | | | 14 | | | 22 | |
| IRON | | | 12700 | | | 19100 | |
| LEAD | | | 8.1 B | | | 14 B | |
| MAGNESIUM | | | 11600 | | | 12900 | |
| MANGANESE | | | 250 | | | 410 | |
| MERCURY | | 0.12 | | | 0.08 | | |
| NICKEL | | | 22 | | | 30 | |
| POTASSIUM | | | | 2500 | | | 3800 |
| SILVER | | | 0.96 B | | | 1.1 B | |
| SODIUM | | | 660 B | | | 613 B | |
| VANADIUM | | | 33 | | | 48 | |
| ZINC | | | 67 | | | 101 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN824036A | IN824036B | IN824036B |
|---|---|---|---|---|
| | SDG NO: | IN301012C | IN301012D | IN301012K |
| | TYPE: | GRAB | GRAB | GRAB |
| ALUMINUM | | | 13400 | |
| ARSENIC | | | 9.9 B | |
| BARIUM | | | 168 N | |
| BERYLLIUM | | | 1.7 | |
| CADMIUM | | | 1.1 | |
| CALCIUM | | | 105000 * | |
| CHROMIUM | | | 25 | |
| COBALT | | | 6.3 B | |
| COPPER | | | 20 | |
| IRON | | | 16500 | |
| LEAD | | | 13 B | |
| MAGNESIUM | | | 12300 | |
| MANGANESE | | | 409 | |
| MERCURY | | 0.08 | | |
| NICKEL | | | 28 | |
| POTASSIUM | | | | 3000 |
| SILVER | | | 1.1 B | |
| SODIUM | | | 472 B | |
| VANADIUM | | | 39 | |
| ZINC | | | 98 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 825
LOCATION: CFA-760 PUMP STATION FUEL SPILL
MEDIUM: AIR

| FIELD MEASUREMENTS | SAMP NO: IN825026 |
|---|---|
| FID/PID (PPM) | 9.7 |

| SOIL GAS (UG/M3) | SAMP NO: IN825015A<br>SDG NO: IN803064A<br>TYPE: GRAB | IN825026A<br>IN803064A<br>GRAB |
|---|---|---|
| ACETONE | 1400 | 4000 |
| BENZENE | 24 U | 24 J |
| CARBON TETRACHLORIDE | 25 U | 10 J |
| CHLOROBENZENE | 25 U | 25 J |
| CHLOROFORM | 14 J | 8 J |
| ETHYLBENZENE | 25 U | 36 |
| METHYLENE CHLORIDE | 380 B | 840 B |
| TETRACHLOROETHENE | 25 U | 17 J |
| TOLUENE | 84 | 460 |
| XYLENE (TOTAL) | 25 U | 5 J |
| 1,1,1-TRICHLOROETHANE | 25 U | 23 J |
| 2-BUTANONE | 50 U | 330 |
| 4-METHYL-2-PENTANONE | 50 U | 240 |
| * HEXANE(17.85) | | 27 J |
| * HEXANE(17.86) | 10 J | |
| * TRICHLOROFLUOROMETHANE( 7.60) | | 9400 J |
| * TRICHLOROFLUOROMETHANE( 8.05) | 740 J | |
| * UNKNOWN(11.71) | 58 J | |
| * UNKNOWN(12.55) | | 54 J |
| * UNKNOWN(13.25) | 9 J | |
| * UNKNOWN(15.92) | 2 J | 15 J |
| * UNKNOWN(16.27) | | 14 J |
| * UNKNOWN(18.70) | 4 J | |
| * UNKNOWN(19.59) | 6 J | |
| * UNKNOWN(20.78) | 12 J | 45 J |
| * UNKNOWN(21.32) | | 71 J |
| * UNKNOWN(21.37) | 16 J | |
| * UNKNOWN(21.87) | | 42 J |
| * UNKNOWN(23.35) | | 20 J |
| * UNKNOWN(24.54) | 95 J | |
| * UNKNOWN(24.84) | | 22 J |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9
SPILLS

S&A REQUEST: 826
LOCATION: ICPP TANK FARM
MEDIUM: OTHER

| SAMP NO: | IN826016A | IN826027B | IN826038B | IN826049A |
|---|---|---|---|---|
| SDG NO: | IN803064A | IN803064A | IN803064A | IN803064A |
| TYPE: | S. COMPOSITE | S. COMPOSITE | GRAB | FIELD BLANK |
| SOIL GAS (UG/M3) | | | | |
| ACETONE | 50 U | 15000 | 50 U | 5400 |
| BENZENE | 25 U | 33 | 25 U | 46 |
| CARBON TETRACHLORIDE | 25 U | 25 U | 25 U | 13 J |
| CHLOROBENZENE | 25 U | 25 U | 25 U | 11 J |
| CHLOROFORM | 25 U | 200 | 25 U | 11 J |
| ETHYLBENZENE | 25 U | 16 J | 25 U | 140 |
| METHYLENE CHLORIDE | 25 U | 7100 B | 25 U | 1800 B |
| STYRENE | 25 U | 25 U | 25 U | 31 |
| TETRACHLOROETHENE | 81 | 62 | 25 U | 17 J |
| TOLUENE | 25 U | 1500 | 25 U | 1100 |
| TRICHLOROETHENE | 25 U | 5 J | 25 U | 6 J |
| XYLENE (TOTAL) | 25 U | 37 | 25 U | 150 |
| 1,1,1-TRICHLOROETHANE | 25 U | 38 | 25 U | 39 |
| 2-BUTANONE | 50 U | 560 | 50 U | 470 |
| 4-METHYL-2-PENTANONE | 50 U | 83 | 50 U | 590 |
| * ALPHA PINENE(24.83) | | | 120 J | 94 J |
| * ETHYLESTER ACETIC ACID(13.17) | | | 83 BJ | |
| * HEXAMELTRYL DISILOXANE(22.49) | 130 BJ | | | 33 J |
| * HEXAMETHYLDISILOXANE(22.49) | | 26 J | | |
| * HEXANE(17.79) | | 21 J | | 10000 J |
| * HEXANE(17.84) | | | | 82 J |
| * METHYLCYCLOHEXANE(18.68) | | | | |
| * TRICHLOROFLUOROMETHANE( 7.74) | | 33 J | | |
| * UNKNOWN(10.86) | | 74 J | | 12 J |
| * UNKNOWN(12.64) | | | 27 J | |
| * UNKNOWN(13.28) | | | | 32 J |
| * UNKNOWN(13.93) | | | | |
| * UNKNOWN(14.12) | | 10 J | | 17 J |
| * UNKNOWN(14.47) | | | | |
| * UNKNOWN(14.52) | | 22 J | | 120 J |
| * UNKNOWN(18.68) | | | | 100 J |
| * UNKNOWN(20.76) | | | | |
| * UNKNOWN(21.31) | | 18 J | | |
| * UNKNOWN(21.85) | | 60 J | | |
| * UNKNOWN(21.90) | | 25 J | | 56 J |
| * UNKNOWN(23.34) | | | | |
| * 1,1,3-TRIMETHYLCYCLOHEX(25.07) | | | | |
| * 3-METHYLHEXANE(20.76) | | | | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN
MEDIUM: SURFACE WATER

| METALS, INCLUDING CR+6 (UG/L) | SAMP NO: | IN827653A | IN827653A | IN827664A | IN827664A | | |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN503050G | IN503050K | IN503050G | IN503050K | | |
| | TYPE: | RINSATE | RINSATE | RINSATE | RINSATE | | |
| ALUMINUM | | 285 | | 271 | | | |
| BARIUM | | 61 B | | 12 B | | | |
| BERYLLIUM | | 2.3 B | | 0.3 U | | | |
| CALCIUM | | 59700 | | 1260 B | | | |
| CHROMIUM | | 18 | | 6.2 B | | | |
| COPPER | | 13 B | | 49 | | | |
| IRON | | 103 | | 237 | | | |
| MAGNESIUM | | 21900 | | 207 B | | | |
| MANGANESE | | 3.2 B | | 6.4 B | | | |
| POTASSIUM | | | 3400 B | | 100 | | |
| SODIUM | | 18800 | | 200 U | | | |
| VANADIUM | | 17 B | | 4 U | | | |
| ZINC | | 338 | | 78 | | | |

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN EXPANSION JOINTS NORTH SIDE
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN827415 | IN827426 | IN827459 | IN827460 | IN827493 | IN827506 |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 6.9 | 7.9 | 7.2 | 7.6 | 7.2 | 7.6 |

| FIELD MEASUREMENTS | SAMP NO: | IN827539 | IN827540 | IN827573 | | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.7 | 7.4 | 7.7 | | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827415A | IN827415A | IN827426A | IN827426A | IN827459A | IN827459A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K | IN827313A | IN827313K | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 12600 | | 7940 | | 7740 | |
| ANTIMONY | | 10 N | | 7.1 UN | | 6.8 UN | |
| BARIUM | | 440 | | 263 | | 207 | |
| BERYLLIUM | | 1.4 | | 1.2 | | 1.1 | |
| CADMIUM | | 1.9 | | 0.63 B | | 0.77 | |
| CALCIUM | | 40300 | | 51200 | | 20100 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9
SPILLS

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN EXPANSION JOINTS NORTH SIDE
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN827415A IN827313A GRAB | IN827415A IN827313K GRAB | IN827426A IN827313A GRAB | IN827426A IN827313K GRAB | IN827459A IN827313A GRAB | IN827459A IN827313K GRAB |
|---|---|---|---|---|---|---|---|
| CHROMIUM | | 1630 | | 85 | | 342 | |
| COBALT | | 12 | | 6 B | | 6.3 B | |
| COPPER | | 264 | | 26 | | 76 | |
| IRON | | 35900 | | 21200 | | 16900 | |
| LEAD | | 55 | | 7.2 B | | 44 | |
| MAGNESIUM | | 7460 | | 5160 | | 4790 | |
| MANGANESE | | 473 E | | 229 E | | 266 E | |
| NICKEL | | 24 | | 24 | | 21 | |
| POTASSIUM | | | 2300 | | 2100 | | 1500 |
| SILVER | | 1.3 B | | 0.85 U | | 0.81 U | |
| SODIUM | | 556 B | | 348 B | | 279 B | |
| VANADIUM | | 43 | | 27 | | 28 | |
| ZINC | | 1490 | | 78 | | 513 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN827460A IN827313A GRAB | IN827460A IN827313K GRAB | IN827493A IN827313A GRAB | IN827493A IN827313K GRAB | IN827506A IN827313A GRAB | IN827506A IN827313K GRAB |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | 7910 | | 9460 | | 10500 | |
| ANTIMONY | | 6.9 UN | | 7.1 BN | | 7.7 UN | |
| BARIUM | | 185 | | 274 | | 186 | |
| BERYLLIUM | | 1.2 | | 1.2 | | 1.3 | |
| CADMIUM | | 0.72 | | 1.2 | | 0.53 B | |
| CALCIUM | | 45600 | | 33900 | | 18600 | |
| CHROMIUM | | 236 | | 594 | | 50 | |
| COBALT | | 5.2 B | | 7.4 | | 5.5 B | |
| COPPER | | 34 | | 80 | | 17 | |
| IRON | | 16400 | | 26300 | | 17600 | |
| LEAD | | 19 B | | 21 B | | 6.1 B | |
| MAGNESIUM | | 4630 | | 5460 | | 5800 | |
| MANGANESE | | 253 E | | 314 E | | 254 E | |
| NICKEL | | 23 | | 24 | | 21 | |
| POTASSIUM | | | 1500 | | 1800 | | 2300 |
| SILVER | | 0.83 U | | 0.9 B | | 0.93 U | |
| SODIUM | | 334 B | | 367 B | | 323 B | |
| VANADIUM | | 29 | | 35 | | 42 | |
| ZINC | | 172 | | 703 | | 84 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN EXPANSION JOINTS NORTH SIDE
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827539A | IN827539A | IN827540A | IN827540A | IN827573A | IN827573A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K | IN827313A | IN827313K | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 9150 | | 8940 | | 8870 | |
| ANTIMONY | | 7.1 UN | | 7.5 UN | | 6.9 UN | |
| BARIUM | | 203 | | 180 | | 232 | |
| BERYLLIUM | | 1.2 | | 1.3 | | 1.2 | |
| CADMIUM | | 0.9 | | 0.6 B | | 0.87 | |
| CALCIUM | | 30100 | | 36000 | | 26600 | |
| CHROMIUM | | 295 | | 59 | | 317 | |
| COBALT | | 7.7 | | 6.1 B | | 9.1 | |
| COPPER | | 78 | | 21 | | 63 | |
| IRON | | 21600 | | 19400 | | 36800 | |
| LEAD | | 20 B | | 8.4 B | | 17 B | |
| MAGNESIUM | | 5880 | | 5660 | | 5390 | |
| MANGANESE | | 356 E | | 256 E | | 346 E | |
| NICKEL | | 25 | | 24 | | 32 | |
| POTASSIUM | | | 1600 | | 1800 | | 1600 |
| SILVER | | 0.97 B | | 0.9 U | | 0.85 B | |
| SODIUM | | 363 B | | 360 B | | 332 B | |
| VANADIUM | | 34 | | 29 | | 34 | |
| ZINC | | 389 | | 141 | | 391 | |

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN EXPANSION JOINTS SOUTH SIDE
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN827437 | IN827448 | IN827471 | IN827482 | IN827517 | IN827528 |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.3 | 7.2 | 7.4 | 7.6 | 7.4 | 7.9 |

| FIELD MEASUREMENTS | SAMP NO: | IN827551 | IN827562 | IN827595 | IN827608 | IN827642 | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.9 | 7.9 | 7.5 | 7.8 | 7.6 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9
SPILLS

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN EXPANSION JOINTS SOUTH SIDE
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827437A | IN827437A | IN827448A | IN827448A | IN827471A | IN827471A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K | IN827313A | IN827313K | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 15200 | | 9650 | | 9950 | |
| BARIUM | | 257 | | 166 | | 180 | |
| BERYLLIUM | | 1.6 | | 1.4 | | 1.3 | |
| CADMIUM | | 0.52 B | | 0.57 B | | 0.55 B | |
| CALCIUM | | 12100 | | 29100 | | 29300 | |
| CHROMIUM | | 68 | | 36 | | 64 | |
| COBALT | | 7.4 B | | 6 B | | 5.4 B | |
| COPPER | | 20 | | 20 | | 17 | |
| IRON | | 22500 | | 18900 | | 17200 | |
| LEAD | | 8.7 B | | 7.2 B | | 7.4 B | |
| MAGNESIUM | | 7090 | | 6400 | | 5640 | |
| MANGANESE | | 475 E | | 275 E | | 262 E | |
| NICKEL | | 26 | | 26 | | 20 | |
| POTASSIUM | | | 3100 | | 1600 | | 2000 |
| SILVER | | 0.91 U | | 0.94 U | | 0.89 U | |
| SODIUM | | 320 B | | 311 B | | 336 B | |
| VANADIUM | | 33 | | 30 | | 31 | |
| ZINC | | 79 | | 79 | | 57 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827482A | IN827482A | IN827517A | IN827517A | IN827528A | IN827528A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K | IN827313A | IN827313K | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 5620 | | 9950 | | 8550 | |
| BARIUM | | 137 | | 160 | | 159 | |
| BERYLLIUM | | 1 | | 1.4 | | 1.3 | |
| CADMIUM | | 0.35 B | | 0.54 B | | 0.62 B | |
| CALCIUM | | 22800 | | 49300 | | 34500 | |
| CHROMIUM | | 20 | | 50 | | 38 | |
| COBALT | | 4.2 B | | 5.3 B | | 5.3 B | |
| COPPER | | 13 | | 16 | | 17 | |
| IRON | | 11700 | | 16400 | | 15400 | |
| LEAD | | 6.5 B | | 5.3 B | | 5.6 B | |
| MAGNESIUM | | 4070 | | 5670 | | 5210 | |
| MANGANESE | | 141 E | | 268 E | | 217 E | |
| NICKEL | | 16 | | 23 | | 20 | |
| POTASSIUM | | | 1000 | | 2000 | | 1700 |
| SILVER | | 0.88 U | | 0.89 U | | 0.95 B | |
| SODIUM | | 275 B | | 365 B | | 342 B | |
| VANADIUM | | 28 | | 29 | | 29 | |
| ZINC | | 38 | | 60 | | 49 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN EXPANSION JOINTS SOUTH SIDE
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827551A | IN827551A | IN827562A | IN827562A | IN827595A | IN827595A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K | IN827313A | IN827313K | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 6540 | | 8590 | | 9850 | |
| BARIUM | | 117 | | 160 | | 157 | |
| BERYLLIUM | | 1.1 | | 1.3 | | 1.3 | |
| CADMIUM | | 0.44 B | | 0.56 B | | 0.53 B | |
| CALCIUM | | 23900 | | 34000 | | 24900 | |
| CHROMIUM | | 31 | | 42 | | 47 | |
| COBALT | | 3.8 B | | 7.4 B | | 5 B | |
| COPPER | | 17 | | 16 | | 15 | |
| IRON | | 12700 | | 16500 | | 16200 | |
| LEAD | | 4.2 U | | 6 B | | 8 B | |
| MAGNESIUM | | 6320 | | 5090 | | 6330 | |
| MANGANESE | | 237 E | | 231 E | | 257 E | |
| NICKEL | | 18 | | 18 | | 18 | |
| POTASSIUM | | | 1100 | | 1500 | | 2000 |
| SILVER | | 0.84 U | | 1.2 B | | 0.89 U | |
| SODIUM | | 242 B | | 345 B | | 322 B | |
| VANADIUM | | 25 | | 30 | | 30 | |
| ZINC | | 48 | | 48 | | 54 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827608A | IN827608A | IN827642A | IN827642A |
|---|---|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 6420 | | 7190 | |
| BARIUM | | 132 | | 113 | |
| BERYLLIUM | | 1.1 | | 1 | |
| CADMIUM | | 0.81 | | 0.45 B | |
| CALCIUM | | 27300 | | 18700 | |
| CHROMIUM | | 31 | | 40 | |
| COBALT | | 5.2 B | | 4.5 B | |
| COPPER | | 21 | | 13 | |
| IRON | | 14300 | | 12100 | |
| LEAD | | 6.3 B | | 5.7 B | |
| MAGNESIUM | | 4760 | | 5160 | |
| MANGANESE | | 197 E | | 195 E | |
| NICKEL | | 21 | | 18 | |
| POTASSIUM | | | 1100 | | 1200 |
| SILVER | | 1.3 B | | 0.87 U | |
| SODIUM | | 389 B | | 226 B | |
| VANADIUM | | 29 | | 24 | |
| ZINC | | 42 | | 42 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN NORTHEAST WIND DIRECTION 100 YDS
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN827051 | IN827153 | IN827255 | IN827357 | | |
|---|---|---|---|---|---|---|---|
| PH (UNITS) | | 7.8 | 8.1 | 8.1 | 8.3 | | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN827051A IN801017D GRAB | IN827051A IN801017K GRAB | IN827153A IN801017D GRAB | IN827153A IN801017K GRAB | IN827255A IN801017D GRAB | IN827255A IN801017K GRAB |
|---|---|---|---|---|---|---|---|
| ALUMINUM | | 9340 | | 8080 | | 9540 | |
| BARIUM | | 170 | | 147 | | 170 | |
| BERYLLIUM | | 1.2 E | | 1.1 E | | 1.2 E | |
| CADMIUM | | 0.52 B | | 0.41 B | | 0.58 B | |
| CALCIUM | | 24400 | | 20800 | | 21800 | |
| CHROMIUM | | 27 | | 21 | | 30 | |
| COBALT | | 5.8 B | | 5.4 B | | 5.9 B | |
| COPPER | | 19 | | 20 | | 22 | |
| IRON | | 16700 | | 19100 | | 18900 | |
| LEAD | | 14 B | | 8.5 B | | 13 B | |
| MAGNESIUM | | 5130 E | | 4780 E | | 5420 E | |
| MANGANESE | | 255 E | | 228 E | | 247 E | |
| NICKEL | | 20 | | 18 | | 21 | |
| POTASSIUM | | | 1900 | | 1700 | | 2000 |
| SILVER | | 1.7 | | 1.1 B | | 1 B | |
| SODIUM | | 408 B | | 384 B | | 424 B | |
| VANADIUM | | 30 E | | 35 E | | 34 E | |
| ZINC | | 68 | | 60 | | 74 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: SDG NO: TYPE: | IN827357A IN827313A GRAB | IN827357A IN827313K GRAB |
|---|---|---|---|
| ALUMINUM | | 4380 | |
| BARIUM | | 60 | |
| BERYLLIUM | | 1 | |
| CADMIUM | | 0.4 B | |
| CALCIUM | | 61700 | |
| CHROMIUM | | 21 | |
| COBALT | | 3.3 B | |
| COPPER | | 9.8 | |
| IRON | | 7970 | |
| LEAD | | 5 B | |
| MAGNESIUM | | 3940 | |
| MANGANESE | | 217 E | |
| NICKEL | | 18 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN NORTHEAST WIND DIRECTION 100 YDS
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827357A | IN827357A |
|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB |
| POTASSIUM | | | 770 |
| SILVER | | 0.84 U | |
| SODIUM | | 259 B | |
| VANADIUM | | 17 | |
| ZINC | | 31 | |

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN NORTHEAST WIND DIRECTION 50 YDS
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN827017 | IN827119 | IN827211 | IN827313 |
|---|---|---|---|---|---|
| PH (UNITS) | | 7.8 | 8.4 | 7.6 | 8.8 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827017A | IN827017A | IN827119A | IN827119A | IN827211A | IN827211A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017D | IN801017K | IN801017D | IN801017K | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 9190 | | 8740 | | 7120 | |
| BARIUM | | 157 | | 144 | | 119 | |
| BERYLLIUM | | 1.2 E | | 1.2 E | | 1.1 E | |
| CADMIUM | | 0.61 B | | 0.45 B | | 0.32 B | |
| CALCIUM | | 24700 | | 28600 | | 28400 | |
| CHROMIUM | | 28 | | 24 | | 22 | |
| COBALT | | 5.7 B | | 5.9 B | | 5.8 B | |
| COPPER | | 24 | | 21 | | 24 | |
| IRON | | 17100 | | 16300 | | 21000 | |
| LEAD | | 10 B | | 8.2 B | | 5.4 B | |
| MAGNESIUM | | 5160 E | | 5530 E | | 6060 E | |
| MANGANESE | | 251 E | | 236 E | | 199 E | |
| NICKEL | | 21 | | 22 | | 21 | |
| POTASSIUM | | | 2100 | | 1700 | | 1400 |
| SILVER | | 1.1 B | | 0.88 B | | 0.88 B | |
| SODIUM | | 299 B | | 291 B | | 288 B | |
| VANADIUM | | 36 E | | 31 E | | 32 E | |
| ZINC | | 72 | | 62 | | 39 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 DRAFT DO NOT CITE
SPILLS

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN NORTHEAST WIND DIRECTION 50 YDS
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827313A | IN827313A |
|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 4620 | |
| BARIUM | | 77 | |
| BERYLLIUM | | 1.1 | |
| CADMIUM | | 0.66 B | |
| CALCIUM | | 56800 | |
| CHROMIUM | | 17 | |
| COBALT | | 3.5 B | |
| COPPER | | 15 | |
| IRON | | 11600 | |
| LEAD | | 13 B | |
| MAGNESIUM | | 4050 | |
| MANGANESE | | 203 E | |
| NICKEL | | 16 | |
| POTASSIUM | | | 1100 |
| SILVER | | 0.87 U | |
| SODIUM | | 253 B | |
| VANADIUM | | 21 | |
| ZINC | | 83 | |

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN SOUTHWEST WIND DIRECTION 50 YDS
MEDIUM: SOIL

| FIELD MEASUREMENTS | SAMP NO: | IN827039 | IN827131 | IN827233 | IN827335 |
|---|---|---|---|---|---|
| PH (UNITS) | | 7.5 | 8.1 | 8.4 | 8.2 |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827039A | IN827039A | IN827131A | IN827131A | IN827233A | IN827233A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017D | IN801017K | IN801017D | IN801017K | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| ALUMINUM | | 12000 | | 5570 | | 7680 | |
| BARIUM | | 211 | | 115 | | 153 | |
| BERYLLIUM | | 1.5 E | | 1 E | | 1.2 E | |
| CADMIUM | | 0.41 B | | 0.35 B | | 0.45 B | |
| CALCIUM | | 27000 | | 32400 | | 26800 | |
| CHROMIUM | | 24 | | 15 | | 20 | |

TABLE 4.3.9 ANALYTICAL DATA SUMMARY BY MEDIUM FOR ENVIRONMENTAL PROBLEM 9 SPILLS

DRAFT DO NOT CITE

S&A REQUEST: 827
LOCATION: TRA/ETR COOLING TOWER BASIN SOUTHWEST WIND DIRECTION 50 YDS
MEDIUM: SOIL

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827039A | IN827039A | IN827131A | IN827131A | IN827233A | IN827233A |
|---|---|---|---|---|---|---|---|
| | SDG NO: | IN801017D | IN801017K | IN801017D | IN801017K | IN801017D | IN801017K |
| | TYPE: | GRAB | GRAB | GRAB | GRAB | GRAB | GRAB |
| COBALT | | 6.3 B | | 4.7 B | | 5.3 B | |
| COPPER | | 18 | | 13 | | 14 | |
| IRON | | 19200 | | 12000 | | 14400 | |
| LEAD | | 9.5 B | | 4.9 B | | 10 B | |
| MAGNESIUM | | 6370 E | | 4150 E | | 4790 E | |
| MANGANESE | | 310 E | | 234 E | | 242 E | |
| NICKEL | | 21 | | 16 | | 17 | |
| POTASSIUM | | | 2500 | | 1000 | | 1500 |
| SILVER | | 1.3 B | | 0.87 U | | 0.98 B | |
| SODIUM | | 332 B | | 250 B | | 294 B | |
| VANADIUM | | 43 E | | 26 E | | 32 E | |
| ZINC | | 72 | | 36 | | 46 | |

| METALS, INCLUDING CR+6 (MG/KG) | SAMP NO: | IN827335A | IN827335A |
|---|---|---|---|
| | SDG NO: | IN827313A | IN827313K |
| | TYPE: | GRAB | GRAB |
| ALUMINUM | | 7750 | |
| BARIUM | | 136 | |
| BERYLLIUM | | 1.2 | |
| CADMIUM | | 0.38 B | |
| CALCIUM | | 40300 | |
| CHROMIUM | | 18 | |
| COBALT | | 4.6 B | |
| COPPER | | 15 | |
| IRON | | 14200 | |
| LEAD | | 6.2 B | |
| MAGNESIUM | | 5450 | |
| MANGANESE | | 205 E | |
| NICKEL | | 18 | |
| POTASSIUM | | | 1600 |
| SILVER | | 0.87 U | |
| SODIUM | | 295 B | |
| VANADIUM | | 26 | |
| ZINC | | 53 | |

# 5.0 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

This chapter covers quality assurance and quality control requirements addressed by QA/QC plans for the INEL Site. Section 5.1 reviews the QA/QC plan for the INEL Site and provides a summary of the quality control samples generated and collected in the field. An analysis of results, a summary of laboratory QA/QC procedures for stable and radioactive contaminants, and a discussion of audits conducted by the EPA and others are also provided. (Please refer to specific environmental problems in Chapter 4.0 for data limitations.) Section 5.2 addresses stable chemistry, laboratory radiological chemistry, and field radiological chemistry, as well as audits conducted by the EPA and others.

Table 5.1 provides a cross-reference for correlating and locating QA/QC information in the INEL Sampling and Analysis Data Document, the INEL Sampling and Analysis Plan, and the August 1987 issue of the DOE Environmental Survey Manual.

## 5.1 Field QA/QC

All drafts of the INEL Sampling and Analysis Plans were reviewed by EMSL-LV and approved by DOE. Items 5, 8, 11, and 12 from the QA/QC plan (see Table 5.1) are addressed in the paragraphs that follow.

**Item 5. QA Objectives for Completeness.** The goal for completeness of field measurements was 100%, although 90% was acceptable. This goal was accomplished except for temperature measurements, which were waived in many cases (particularly sub-surface soils) because of heat generated during difficult drilling.

The objective for sampling completeness for water, soils, and sediment samples was 95%.

Table 5.1. Quality Assurance/Quality Control Project Plan Locator

| | Essential Elements** | Data Document | INEL S&A Plan | Survey Manual* |
|---|---|---|---|---|
| 1. | TITLE PAGE WITH APPROVAL SIGNATURES | COVER PAGE | COVER PAGE | COVER PAGE |
| 2. | TABLE OF CONTENTS | iii | | APPEND F |
| 3. | PROJECT DESCRIPTION | 1.0 | 1.2.1 | |
| 4. | PROJECT ORGANIZATION AND RESPONSIBILITIES | 1.1 | 6.2 | Sect. 2 |
| 5. | QA OBJECTIVES FOR MEASUREMENT DATA (Precision, accuracy, completeness, representativeness, and comparability) | 5.0 | 6.3 | APPEND F |
| 6. | SAMPLING PROCEDURES | 3.1 | 3.0, 4.0 | APPEND E |
| 7. | SAMPLING CUSTODY | 3.0, 5.2 | 5.0 | APPEND I |
| 8. | CALIBRATION PROCEDURES AND FREQUENCY | 5.1 | 6.6.4 | APPEND E |
| 9. | ANALYTICAL PROCEDURES | 3.0 | 6.6.5 | APPEND D |
| 10. | DATA REDUCTION, VALIDATION, AND REPORTING | 4.0 | 6.6.6 | APPEND H |
| 11. | INTERNAL QC CHECKS AND FREQUENCY | 5.1 | 6.10 | APPEND F |
| 12. | PERFORMANCE AND SYSTEM AUDITS AND FREQUENCY | 5.1 and APPEND C | 6.11, 6.15 | APPEND F |
| 13. | PREVENTIVE MAINTENANCE PROCEDURE AND SCHEDULE | | 6.6.4 | |
| 14. | ROUTINE PROCEDURES FOR DATA ASSESSMENT (Precision, accuracy, and completeness of measurement parameters involved) | 5.2 and APPEND D | 6.6.6 | APPEND H |
| 15. | CORRECTIVE ACTION | 5.1 | 6.12 | APPEND F |
| 16. | QUALITY ASSURANCE REPORTS TO MANAGEMENT | 5.0 | 6.14 | APPEND F |

* Please refer to the August 1987 DOE Environmental Survey Manual.

** Reference EPA's "Interim Guidelines and Specifications for Preparing Quality Assurance Plans" (EPA 1983).

Table 5.2 summarizes sampling completeness for the INEL effort. Individual media-type sampling efforts for the INEL Site were as follows: surface soil, 100%; subsurface soil, 66%; sediment, 81%; surface water, 48%; groundwater, 100%; and air, 93%. The overall completeness was 81%. These percentages do not reflect any allowance for deleted or not collected samples. For the INEL Site, a total of 195 samples were deleted from the plan. Surface water sampling efforts (92 deletions) and subsurface soil sampling efforts (91 deletions) accounted for 183 of the deleted samples. Reasons for the deletion of the samples were numerous, but the most common ones were: (1) excessive time and cost to obtain samples, (2) drilling apparatus limitations, (3) sampling sites smaller than originally anticipated, (4) sampling depths not attainable because of bedrock or backfill with concrete blocks and/or basalt rocks, and (5) pond/pool conditions not suitable for the collection of all of the planned samples. If the reasons cited for the deletions of the samples are acceptable, then the INEL sampling effort by media and overall would be as follows: surface soil, 100%; sub-surface soil, 95%; sediment, 100%; surface water, 99%; groundwater, 100%; and air, 100%. The overall effort would be 98%, which meets the objective for completeness.

**Item 8. Calibration Procedures and Frequency.** An important factor in the collection of accurate field data is instrument calibration. The guidance provided in Table 6.1 of the INEL Sampling and Analysis Plan was followed; dates, standards, and problems were recorded in the field logbooks. In some cases, there were instrument stabilization problems, and where data are suspect, they are noted in the tables or text associated with each environmental problem (see Chapter 4.0).

**Item 11.** The INEL Sampling and Analysis Plan called for the collection of field blanks to provide an indication of the quality of field preservation handling techniques, trip blanks for volatile organic samples, and rinsate samples to check on equipment decontamination. The frequency of use for each of these quality controls is shown in Table 5.3. Table 5.4 lists the field QC samples requested at

Table 5.2. Field Sampling Completeness for the INEL Site

| Media Type | Number of Samples [a] Planned | Collected | Deleted | Not Collected |
|---|---|---|---|---|
| Surface Water[b] | 180 | 87 | 92[d] | 1[d] |
| Groundwater | 33 | 35[c] | 3[e] | 1[e] |
| Sediment | 42 | 34 | 8[f] | 0[f] |
| Surface soil | 6 | 6 | 0 | 0 |
| Subsurface soil | 314 | 207 | 91[g] | 16[g] |
| Air[h] | 14 | 13 | 1[i] | 0 |
| TOTAL | 589 | 382 | 195 | 18 |

(a) The samples in this table do not represent field preservation blanks, trip blanks, or rinsate samples for QC purposes.

(b) These samples include effluent in tanks, sumps, pipes, and pools.

(c) Six additional samples were taken. Refer to Sect. 4.7 [Environmental Problem 2 (Requests 404, 406, 407, 408, 414, and 415)] for information concerning these samples.

(d) Refer to Sect. 4.8 and 4.9 [Environmental Problem 3 (Requests 501, 504, 507, 510, 513, 516, and 519) and Environmental Problem 4 (Request 523)] for information concerning these samples.

(e) Refer to Sect. 4.7 [Environmental Problem 2 (Requests 508, 511, 514 and 517)] for information concerning these samples.

(f) Refer to Sect. 4.8 [Environmental Problem 3 (Requests 505, 506, 512, and 517)] for information concerning these samples.

(g) Refer to Sect. 4.8, 4.10, 4.12, and 4.14 [Environmental Problem 3 (Requests 505, 506, 512, 518, and 521) Environmental Problem 5 (Requests 802, 806, and 807) Environmental Problem 6 (Request 812) Environmental Problem 7 (Requests 815, 816, 817, 818, 819, and 821) Environmental Problem 9 (Requests 823, 824, and 827)] for information concerning these samples.

(h) For samples collected for soil-gas analysis, refer to Sect. 4.10 and 4.14 [Environmental Problem 5 (Request 803) and Environmental Problem 9 (Requests 825 and 826)] for information concerning these samples.

(i) Refer to Sect. 4.14 [Environmental Problem 9 (Request 825)] for information concerning this sample.

Table 5.3. Field QC Samples Planned for the INEL Site

| QC Sample Type | Analysis | Solids | Water | Air |
|---|---|---|---|---|
| Field Preservation Blanks[a] | Organics | NA | NA | NA |
| | Metals | NA | 1/20 | NA |
| | Radionuclides | NA | 1/20 | NA |
| Rinsate Blanks[a] | Organics | 1/20 | 1/20 | 1/20 |
| | Metals | 1/20 | 1/20 | 1/20 |
| | Radionuclides | 1/20 | 1/20 | 1/20 |
| Trip Blanks[a] | Organics | NR | 1/20 | 1/20 |
| | Metals | NR | NR | NR |
| | Radionuclides | NR | NR | NR |

NA = Not applicable or not available.
NR = Not required or not recommended.
1/20 = One QC sample for 1 to 20 samples, 2 for 20 to 40, 3 for 40 to 60, etc.

(a) Hand-held instruments were used to check all samples for potential radiological contamination.

TABLE 5.4 INEL SITE ENVIRONMENTAL SURVEY FIELD QC SAMPLES

| SAMPLE NUMBER | SAMPLE TYPE | TYPE LOCATION | MEDIUM | NUMBER ANALYSES REQUESTED | ANIONS | EXOTC | HAZ WAS | HE | METALS | O&G |
|---|---|---|---|---|---|---|---|---|---|---|
| INN01013A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN04016A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN05017A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN05017B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN07019A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN08010A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN14018A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN14018B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN16010A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN19013A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN23019A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN23019B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN25011A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN25011B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN26012A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN30018A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN35013A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN39017A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN47017A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN49019A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN50012A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN51013A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN52014A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN59011A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| INN59011B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN301136A | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN301136B | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN301136C | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN301136D | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN301136E | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN301136F | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN301136G | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN501252A | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN501252B | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN501252C | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN501252D | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN501252E | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071E | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN502071G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN502071H | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN502071I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

TABLE 5.4 INEL SITE ENVIRONMENTAL SURVEY FIELD QC SAMPLES

| SAMPLE NUMBER | SAMPLE TYPE | TYPE LOCATION | MEDIUM | NUMBER ANALYSES REQUESTED | ANIONS | EXOTC | HAZ WAS | HE | METALS | O&G |
|---|---|---|---|---|---|---|---|---|---|---|
| IN503050E | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN503050G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN503050H | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN503050I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053E | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN506053F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN506053G | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN506053H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN510253A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN510253B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN510253C | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN510253D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN510253E | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN510253F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN510253G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN510253H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN513256A | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN513256B | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN513256C | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN513256D | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN513256E | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN513256F | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259E | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN516259H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN516259I | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN516259J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259M | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259N | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259O | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259P | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078E | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

TABLE 5.4 INEL SITE ENVIRONMENTAL SURVEY FIELD QC SAMPLES

| SAMPLE NUMBER | SAMPLE TYPE | TYPE LOCATION | MEDIUM | NUMBER ANALYSES REQUESTED | ANIONS | EXOTC | HAZ WAS | HE | METALS | O&G |
|---|---|---|---|---|---|---|---|---|---|---|
| IN517078F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN517078H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN517078I | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN517078J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078M | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078N | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078O | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078P | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075A | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075B | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075C | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075D | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075E | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075F | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN522075G | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN522075H | QC RINSATE | DITCH | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN522075I | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075J | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075K | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075L | QC RINSATE | DITCH | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523134A | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523134B | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN523134C | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN523134D | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523134E | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523145A | FIELD BLNK | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN523145B | FIELD BLNK | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN523145C | FIELD BLNK | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523145D | FIELD BLNK | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN803111A | FIELD BLNK | LEACH POND | AIR | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN803122A | FIELD BLNK | LEACH POND | AIR | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN806216A | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN806216B | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN806216C | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN806216D | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN806216E | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN806216F | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN806216G | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104A | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104B | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104C | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104D | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104E | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN807104F | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN807104G | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104H | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104I | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN814136A | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN814136B | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN814136C | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

TABLE 5.4 INEL SITE ENVIRONMENTAL SURVEY FIELD QC SAMPLES

| SAMPLE NUMBER | SAMPLE TYPE | TYPE LOCATION | MEDIUM | NUMBER ANALYSES REQUESTED | ANIONS | EXOTC | HAZ WAS | HE | METALS | O&G |
|---|---|---|---|---|---|---|---|---|---|---|
| IN814136D | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN814136E | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN814136F | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN814136G | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN814136H | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN815217A | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN815217B | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN815217C | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN815217D | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN815217E | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN815217F | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN815217G | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN816218A | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN816218B | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN816218C | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN816218D | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN816218E | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN816218F | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN816218G | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN817173A | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN817173B | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN817173C | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN817173D | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN817173E | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN817173F | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN817173G | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN821077A | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN821077B | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN821077C | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN821077D | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN821077E | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN826049A | FIELD BLNK | TANK | AIR | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN826049B | FIELD BLNK | TANK | AIR | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827653A | QC RINSATE | TANK | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN827664A | QC RINSATE | TANK | SURF WATER | 1 | 0 | 0 | 0 | 0 | 1 | 0 |

TABLE 5.4 INEL SITE ENVIRONMENTAL SURVEY FIELD QC SAMPLES

| SAMPLE NUMBER | SAMPLE TYPE | TYPE LOCATION | MEDIUM | NUMBER ANALYSES REQUESTED | PCBS& OTHER EXTRA | PET HYDRO | RADS | SEMI-VOLS | SOIL GAS | VOLS |
|---|---|---|---|---|---|---|---|---|---|---|
| INN01013A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN04016A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN05017A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN05017B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN07019A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN08010A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN14018A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN14018B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN16010A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN19013A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN23019A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN23019B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN25011A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN25011B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN26012A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN30018A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN35013A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN39017A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN47017A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN49019A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN50012A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN51013A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN52014A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN59011A | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| INN59011B | TRIP BLANK | TRIP BLANK | WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN301136A | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN301136B | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN301136C | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN301136D | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN301136E | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| IN301136F | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN301136G | QC RINSATE | DRAINFIELD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN501252A | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN501252B | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN501252C | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN501252D | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN501252E | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN502071A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN502071B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN502071C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN502071D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN502071E | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN502071F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN502071I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN502071J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN502071K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN502071L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN503050A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN503050B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN503050C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN503050D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |

TABLE 5.4 INEL SITE ENVIRONMENTAL SURVEY FIELD QC SAMPLES

| SAMPLE NUMBER | SAMPLE TYPE | TYPE LOCATION | MEDIUM | NUMBER ANALYSES REQUESTED | PCBS& OTHER EXTRA | PET HYDRO | RADS | SEMI-VOLS | SOIL GAS | VOLS |
|---|---|---|---|---|---|---|---|---|---|---|
| IN503050E | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN503050F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN503050I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN503050J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN503050K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN503050L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN506053A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN506053B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN506053C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN506053D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN506053E | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN506053H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN506053I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN506053J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN510253A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN510253B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN510253C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN510253D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN510253E | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN510253F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN510253G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN510253H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN513256A | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN513256B | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN513256C | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN513256D | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN513256E | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN513256F | FIELD BLNK | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN516259A | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN516259B | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN516259C | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN516259D | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN516259E | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN516259F | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN516259G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN516259J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN516259K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN516259L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN516259M | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN516259N | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN516259O | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN516259P | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN517078A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN517078B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN517078C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN517078D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN517078E | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |

TABLE 5.4 INEL SITE ENVIRONMENTAL SURVEY FIELD QC SAMPLES

| SAMPLE NUMBER | SAMPLE TYPE | TYPE LOCATION | MEDIUM | NUMBER ANALYSES REQUESTED | PCBS& OTHER EXTRA | PET HYDRO | RADS | SEMI-VOLS | SOIL GAS | VOLS |
|---|---|---|---|---|---|---|---|---|---|---|
| IN517078F | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN517078G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN517078J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN517078K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN517078L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN517078M | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN517078N | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN517078O | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN517078P | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN522075A | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN522075B | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN522075C | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN522075D | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN522075E | QC RINSATE | WASTE POND | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN522075F | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075G | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075H | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN522075I | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN522075J | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN522075K | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN522075L | QC RINSATE | WASTE POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN523134A | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| IN523134B | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523134C | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523134D | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN523134E | QC RINSATE | CFA STP | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN523145A | FIELD BLNK | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523145B | FIELD BLNK | CFA STP | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN523145C | FIELD BLNK | CFA STP | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN523145D | FIELD BLNK | CFA STP | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN803111A | FIELD BLNK | LEACH POND | AIR | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN803122A | FIELD BLNK | LEACH POND | AIR | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN806216A | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN806216B | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN806216C | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN806216D | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN806216E | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN806216F | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN806216G | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN807104A | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN807104B | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN807104C | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN807104D | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN807104E | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104F | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN807104G | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN807104H | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN807104I | QC RINSATE | LEACH POND | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN814136A | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN814136B | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN814136C | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |

TABLE 5.4 INEL SITE ENVIRONMENTAL SURVEY FIELD QC SAMPLES

DRAFT DO NOT CITE

| SAMPLE NUMBER | SAMPLE TYPE | TYPE LOCATION | MEDIUM | NUMBER ANALYSES REQUESTED | PCBS& OTHER EXTRA | PET HYDRO | RADS | SEMI-VOLS | SOIL GAS | VOLS |
|---|---|---|---|---|---|---|---|---|---|---|
| IN814136D | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN814136E | QC RINSATE | BURN PITS | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN814136F | QC RINSATE | BURN PITS | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN814136G | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN814136H | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN815217A | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN815217B | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN815217C | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN815217D | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN815217E | QC RINSATE | BURN PITS | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN815217F | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN815217G | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN816218A | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN816218B | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN816218C | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN816218D | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN816218E | QC RINSATE | BURN PITS | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN816218F | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN816218G | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN817173A | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN817173B | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN817173C | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN817173D | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN817173E | QC RINSATE | BURN PITS | SURF WATER | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| IN817173F | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN817173G | QC RINSATE | BURN PITS | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN821077A | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN821077B | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN821077C | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN821077D | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| IN821077E | QC RINSATE | LEACH FLD | SURF WATER | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| IN826049A | FIELD BLNK | TANK | AIR | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN826049B | FIELD BLNK | TANK | AIR | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| IN827653A | QC RINSATE | TANK | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IN827664A | QC RINSATE | TANK | SURF WATER | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

the INEL Site. Two rinsate and four field preservation blank samples outlined in the plan were deleted/not collected. These were omitted in areas where most of the deletions of requested field samples occurred. Analytical results are discussed in Sect. 4.2.1. In cases where multiple bottles were indicated for a given analysis, only a single bottle was analyzed.

**Item 12. Performance and System Audits.** An EPA audit team conducted an on-site inspection to evaluate the sampling effort at the INEL Site to document the extent to which procedures identified in the INEL Sampling and Analysis Plan were being followed with respect to implementing specified field tests, field calibration, chain-of-custody, record keeping, quality assurance, sample handling, sample shipment, and sample collection techniques. The field sampling effort and the sample management facility were the focus of the inspection. The text of the EPA audit of field sampling activities can be found in Appendix C of this data document. No ORNL response was prepared.

## 5.2 Analytical QA/QC

Analytical QA/QC is divided into four major sections: analytical chemistry (5.2.1), radiological quality assurance (5.2.2), data management QA/QC (5.2.3), and the analytical QC summary (Appendix D).

Design and implementation of analytical QA plans for the DOE Environmental Survey have been based on the fundamental principle of "data of known quality." Although a Survey program such as this can effectively use data of varying quality levels, it is important that data users be provided with a data quality assessment for any given sample set. In this way, the Survey Team can interpret the analytical data from a programmatic perspective, while considering the analytical limitations imposed on the data. Data quality assessments require that all phases of laboratory support be designed to address the fundamental principles of precision, representativeness, accuracy, comparability, and completeness. The analytical QA program plan has accomplished this through the

use of standard procedures, quality control practices, data reporting requirements, and data quality evaluations. A brief summary of some of the major analytical QA components follows.

Sampling and analysis support to the DOE Environmental Survey is a very large-scale effort, requiring the contributions of a number of laboratories. From an analytical perspective, data comparability is ensured by adopting a program-wide set of standard analytical procedures, quality control practices, and reporting requirements. These procedures, which are documented in Appendix D to the DOE Environmental Survey Manual, are based on a number of well-documented, EPA-approved methods. In cases where a standard EPA method has not been developed for a given analyte, procedures that have been fully tested and documented were selected. All analytical procedures used for the laboratory analysis of INEL samples are described in Chapter 3.0 and cited in Chapter 6.0 of this data document. The majority of the nonradiological determinations for this program use the EPA CLP protocols. Radiological determinations use a series of procedures which have been developed and/or tested within the DOE national laboratory system. In this way, all of the participating laboratories are required to meet standard performance criteria regarding the precision and accuracy of their analyses. A summary of data quality objectives, as described in the defined EPA method, is presented in Table 5.5.

All participating laboratories have developed a series of Standard Operating Procedures (SOPs) which establish policies and practices for all phases of laboratory operations. The SOPs provide the basis for day-to-day operation of the laboratory, and serve as the foundation for a technical systems audit.

At a minimum, quality control practices adopted by the individual laboratories must include items mandated by the analytical protocols. In the case of inorganic determinations, these include the use of preparation blanks, calibration blanks, laboratory duplicate samples, laboratory control samples, matrix spikes, analytical spikes, interference check samples, and calibration verification

## Table 5.5. Data Quality Objectives

| Analyte(s) | Method | Precision | Accuracy |
|---|---|---|---|
| Volatile organics | 7/87 CLP SOW | As specified in protocol | As specified in protocol |
| Semivolatile organics | 7/87 CLP SOW | As specified in protocol | As specified in protocol |
| Pesticides/PCBs | 7/87 CLP SOW | As specified in protocol | As specified in protocol |
| Dioxins/furans | EPA 8280 | Not available | Not available |
| Inorganic metals | 7/87 CLP SOW | As specified in protocol | As specified in protocol |
| Potassium | * | Not available | Not available |
| Mercury | EPA 245.1 | 4 ug/L | 10% for conc. > 5 ug/L |
| Cyanide (soil) | EPA 9010 | STD DEV 0.1 mg/L | 20% (for waste water) |
| Cyanide (water) | EPA 335.2 | ± .031 mg/L CN @ +0.28 mg/L CN | - 15% bias @ 0.28 mg/L CN |

*Non-EPA methods are cited in Chaper 6.0 of this data document.

## Table 5.5. Data Quality Objectives (Continued)

| Analyte(s) | Method | Precision | Accuracy |
|---|---|---|---|
| Anions | EPA 300.0 | STD DEV 1 mg/L at 10 mg/L | 20% for drinking water<br>40% for waste water |
| Percent solids | EPA 160.3 | Not available | Not available |
| Hexavalent chromium | EPA 3060 and 7196 | Not available | Not available |
| Gross alpha & beta in water | Survey Manual | 20% @ 95% confidence level | 15% |
| Isotopic uranium | Survey Manual | 15% | Not available |
| Plutonium isotopes | Survey Manual | 20% | Not available |
| Gamma emitting nuclides | Survey Manual | As low as 1% | ± 6% |
| Total strontium | Survey Manual | 12% @ 95% confidence level | -5% bias (waste water);<br>+25% bias (soil) |
| Tritium | EPA 906.0 | 30% | 30% |

*Non-EPA methods are cited in Chaper 6.0 of this data document.

solutions. For organic determinations, these include rigorous tuning criteria, matrix spike samples, matrix spike duplicate samples, method blanks, internal standards, and surrogates. In addition to these requirements, which are imposed by the analytical protocols, the laboratory is required to monitor method performance over time.

Data reporting procedures for the DOE Environmental Survey program were established with the objective of providing a technically defensible, legally admissible data set. Deliverables include CLP reporting forms for organics and inorganics, and reporting forms which provide appropriate levels of QC data for non-CLP analyte parameters. Data comparability is provided by the adoption of a program-wide set of defined deliverables. The INEL will be responsible for a comprehensive data archiving and closeout for the INEL Site. These case files include all of the raw data and documentation associated with a site in an auditable structure.

External evaluations of the quality of the analytical support effort for the DOE Environmental Survey provided an independent assessment of performance and technical systems. These external assessments of analytical performance included participation in EPA performance evaluation programs (round robins). Organic and inorganic laboratories received regular sets of performance evaluation samples from the EPA during the time INEL samples were being analyzed. These included quarterly blinds (CLP analytes) from EMSL-LV, water pollution series samples (classical analytes) from EMSL-Cincinnati, and quarterly round-robin samples (radiological determinations) from EMSL-LV. A summary of performance results pertinent to the INEL sampling and analysis time period appears in Appendix C. A related, but distinctly different, function was served by the technical systems audits performed by EPA (and NEIC). In this case, on-site evaluations of the laboratory operation were performed during and following the sampling and analysis period. These audits were a qualitative evaluation of the overall laboratory operation, including facilities, equipment, documentation, data validation, and quality control procedures.

### 5.2.1 Analytical Chemistry QA

Analytical support to the INEL sampling and analysis effort was provided by three laboratories within ORNL. Battelle Columbus Division (BCD), Columbus, OH, provided analytical services for the determination of organic parameters. Argonne National Laboratory-East (ARG-E), Argonne, IL, also provided analytical services for the determination of organics. Idaho National Engineering Laboratory (INEL), Idaho Falls, ID, provided analytical services for chromium(VI) analyses. Detailed data quality assessments are presented for the samples associated with a given environmental problem/location in Chapter 4.0. Results obtained for ARG-E analyses of volatiles, semivolatiles, and pesticides/PCBs were reviewed according to protocol defined in revision 3 of the SOP for Oak Ridge Data Validation. (A copy of this document appears in Appendix D.) The usability of "validated" organic data was based on the following criteria:

1. Holding times
2. Initial calibrations
3. Continuing calibration
4. Blanks
5. Tunes
6. Surrogates
7. Internal standards
8. Tentatively identified compounds
9. Pesticide retention standard
10. Analyte retention time (pesticide fraction)

All sample results were assigned a Quality Level of I, II, or III depending upon compliance with requirements for each of the ten review criteria.

Data quality assessment/data usability determination for ICP metals analyses performed at ORNL was determined using a procedure similar to that developed by the EPA for the use in EPA contract compliance determinations. The ORNL protocol, "Data Quality Evaluation--Preliminary Operating Procedure ICP (Including K)," appears in Appendix D of this data document. The preliminary protocol is designed to allow the determination of the utility or quality level of DOE Site Survey ICP and potassium (K) analyses. The format for this procedure also provides a summary of all QC problem areas. The following QC areas are reviewed:

1. Calibration verification
2. Preparation blank
3. Calibration blank
4. Spike recovery
5. Serial dilution
6. Interference check standard
7. Laboratory control standard
8. Duplicate analysis
9. Holding time

Each element in a given SDG is assigned a Quality Level of I, II, or III according to compliance with CLP limits in the above QC areas. Holding time compliance is calculated from the date of sample collection.

Data quality assessment/data usability determination for all other analytical methods was made using a modification of a checklist developed by INEL and documented in the Hanford Site Sampling and Analysis Data Document, Volume 1, April 1988. The checklist used to evaluate the quality of INEL results is entitled "Analysis Quality Level Evaluation" and can be found in Appendix D of this data document. The checklist addresses the same QC areas as the previously described assessments, but in a less rigorous manner. The checklist was used to verify that the components essential to sampling, analysis, and quality control

were integrated into the environmental problem evaluation. In general, data were evaluated on an SDG basis. The exception to this is when an analyte did not conform to the majority of analytes in a given analytical method. Data quality of this analyte was assessed separately and entered in the exception portion of the checklist. For those analytical methods in which a single analyte was determined or only a few sample requests were received, all data were combined to determine the quality of the analytical method.

To perform the evaluation, the pertinent information was included in the allowed space or attached to the checklist and referenced. The level of quality for a given determination was assessed according to the compliance of sample results to six performance criteria specified in the checklist. These performance criteria include determination of compliance to CLP requirements in the following categories:

1. Holding time
2. Duplicates
3. Blanks
4. Laboratory control standards
5. Calibration verification
6. Spike recovery

Holding time compliance was calculated from the date of sample collection. Data in compliance with all six performance criteria were assigned a Quality Level of I. A data Quality Level of II was assigned to SDGs in which the numerical average of non-compliance results for the six performance criteria was less than or equal to 20% of the required limits. A Quality Level of III was assigned to any data in which the average deviation from compliance was greater than 20%. Data quality results associated with the overall INEL data set are located in Chapter 4.0 of this data document.

In subsequent discussion, overall data quality for the INEL data set is presented in two formats:

1. Accomplishment of data quality objectives, and
2. Data quality by type of analysis.

#### 5.2.1.1 Accomplishment of Data Quality Objectives

Objectives for the overall data quality for the INEL data set were established in five data quality categories. The categories are completeness, representativeness, comparability, precision, and accuracy. Evaluations of the program's accomplishments within each category follow.

##### 5.2.1.1.1 Completeness

The characteristic of completeness measures the amount of data obtained compared to the amount expected or planned. The program objective was to obtain data for 90% of all samples planned for collection and not deleted. Analytical data were generated for 96% of all samples collected. This percentage increases to 99% when it is considered that analyses for 48 of the 73 collected pesticide samples were not required by verbal agreement with the DOE Office of Environmental Audit and Compliance. By general types of analysis, the percentage of samples for which analytical data were obtained for the INEL Site is as follows:

- Volatile organic compounds, 99%
- Semivolatile organic compounds, 100%
- Pesticides/PCBs, 34%
- Soil gases, 100%
- Dioxins, 100%
- Inorganic metals, 99%
- Chromium (VI), 100%

. Anions, 99%
. Radiological parameters, 98%

Program objectives for completeness were satisfied for all analytical methods with the exception of pesticides for the reason described in the first paragraph of this section. Instances where analytical data were not obtained were mainly the result of the following problems:

. Sample not collected
. Sample collected but not included in shipping cooler
. Sample collected but analysis not required according to DOE directive
. No data collected because of instrument failure

#### 5.2.1.1.2 Representativeness

Sampling and measurements were carefully conducted so that results were as representative as possible of the media (e.g., air, soil, water) and conditions being measured. Sampling protocols were selected and developed where necessary to meet those objectives. Sample handling protocols (e.g., splitting into aliquots, field and travel blanks, preservation, storage, transportation) were selected to evaluate and protect the representativeness of collected samples.

Recording procedures were used to document adherence to proper protocols for sampling, identifying samples, and maintaining sample integrity. INEL coolers containing samples to be analyzed by ANL-E, BCD, ORNL, or INEL were shipped by Federal Express and delivered to each respective laboratory's receiving department where the air bills were removed and retained. Coolers were then delivered to the chemistry section sample receiving room where they were opened and inventoried in a secure area. Two sets of forms filled out by the sampling team were received with each sample cooler: the "DOE Environmental Survey Chain of Custody for Inorganics/Organics" and the "Request for Analytical Services, Department of Environmental Management." Receiving information

which included cooler receipt dates and times, cooler and sample conditions, chain-of-custody status, and discrepancies were documented. Internal sample ID labels were attached to all samples. Folders were created to permanently file the packing lists, chain-of-custody (COC) records, login sheets, and sample tags. An internal chain-of-custody record was used when transferring samples outside of the custody of the sample login rooms. Samples designated for specific chemical analyses were delivered on the same or following day to the appropriate analyses groups where they were retained under appropriate storage conditions. The DOE Site Survey field sampling team was notified by phone of any discrepancies in sample identification.

Documentation discrepancies were noted at ORNL for one sample each from coolers 012, 022, 055, and 061. In these cases either the sample ID or tag number did not correspond to that shown on the COC. The discrepancies were corrected upon notification of the INEL field sampling team.

Proper cooling had not been maintained in coolers 037, 038, 040, 041, 042, 043, 073, and 087; samples were received by ORNL at ambient temperature. Four samples in cooler 027 were leaking upon receipt; these samples were still submitted for analysis. Six samples were listed on the COC for cooler 079 with no date/time collected and the samples were not present.

No irregularities in sample identification were noted in the case narratives supplied by the individual analysis groups at ANL-E, BCD, or INEL.

Field and travel blank results indicate that contamination of target analytes during sampling or sample transportation was minor. For all analytes, field and transportation contamination occurred in less than 15.6% of the individual batches of samples collected and shipped to the laboratories. The levels of contamination that did infrequently occur were low and did not require rejection of analytical data.

Analytical program objectives for representativeness were established for each analysis type. The quality control requirements monitored to evaluate representativeness were analyte-specific holding times. Table 5.6 shows the actual adherence to required extraction and analysis holding times and program objectives as percentages of samples analyzed. Holding times are calculated from the date of sample collection for all regular samples. Holding time requirements are those listed in Test Methods for Evaluating Solid Wastes, U.S. EPA SW-846, 3rd ed., November 1986. Values appearing within the parentheses denote the actual number of samples in compliance compared to the total number of samples analyzed. Anion holding times are calculated for aqueous analytes only, because no holding times have been established for soil and sediment samples. A holding time comparable to inorganic metals (180 days) was used to evaluate compliance for radiometric measurements.

The objective for adherence to the extraction holding times in the semivolatile organic analyses was not met. Exceeding the holding times for these analyses may have allowed degradation or transformation of the target analytes. The usual result of noncompliance to holding times is that the measured and reported concentrations may underestimate the true value of the analyte.

#### 5.2.1.1.3 Comparability

The characteristic of comparability reflects both internal consistency of measurements and the expression of results in units consistent with other organizations reporting similar data. Generating comparable data requires utilizing methodologies which produce comparable results (e.g., metals data obtained by total dissolution of soil is not comparable to data obtained by incomplete dissolution of soil, such as the normally used acid leaching methods) and conducting analyses with calibrated analytical instruments within the proper calibration ranges. To ensure comparability of analytical results, all program laboratories utilized only analytical methods specified in the experimental plan. A documented analytical procedure was selected for those determinations not

Table 5.6. Adherence to Holding Time Requirements

| | Analyses Within Holding Time Requirements (%) | | | |
|---|---|---|---|---|
| | Extraction Time | | Analysis Time | |
| Analysis Type | Analyses | Objective | Analyses | Objective |
| Volatiles | NA | | 98 (266 of 271) | 90 |
| Semivolatiles | 81 (13 of 16) | 85 | NA | |
| Pesticides/PCBs | 100 (25 of 25) | 85 | NA | |
| Inorganic Metals+ | 99 (581 of 587) | 98 | NA | |
| Mercury | NA | NA | 100 (276 of 276) | 90 |
| Anions | NA | NA | 73 (266 of 365)* | 50 |
| Rads | NA | NA | 100 (170 of 170) | 90 |

+ Calculation based on total results of ICP, GFAA, and CVAA analytes.

NA = Not applicable.

*Because various anions differ in holding time requirements, percentage compliance of this analytical method only was based on the number of analytes rather than on the number of aqueous samples.

specified in the environmental plan. Additionally, appropriate standard units were utilized for each measurement system, which yielded internally and externally comparable results, assuming other comparability criteria were met.

To monitor the ability of the laboratories to generate comparable data, quarterly blind (QB) performance samples from EPA (EMSL-LV) were analyzed for CLP analytes during the INEL analytical program. Similarly, EPA quarterly round-robin samples were used to assess comparability for radiological samples. The analytical program objective for comparability was to generate acceptable results for the CLP QB samples. This objective was satisfactorily accomplished for the inorganic and non-target list parameters analyzed. ORNL received scores of 94.1%, 96.3%, 89.5% and 86.7% for the inorganic QB2FY88, QB3FY88, QB4FY88 and QB1FY89 evaluations, respectively. The majority of organic parameters also received satisfactory scores. ANL-E scored 72.6% and 93.8% for organic QB2FY88 and QB3FY88, respectively. Organic QB4FY88 results received scores of 95.6% for the water sample and 100% for the soil sample. ANL-E received 71.6% for the organic QB1FY89 evaluation. The objective was not met for one of three organic evaluations by BCD. BCD scored 47.3%, 95.6%, and 93.8% for QB2-, QB3-, and QB4FY88. BCD was not participating in the EPA QB evaluation program during the first quarter of FY89.

Remedial action was taken by the laboratories to correct problems encountered with the analysis of inorganic and organic samples. A table summarizing these performance scores, copies of the respective EPA QB evaluation reports, and the remedial action responses from each laboratory are provided in Appendix C.

#### 5.2.1.1.4 Precision

Precision, the ability to replicate an analytical value, was evaluated through duplicate analysis of 5% to 10% of the samples analyzed. The program objectives for the precision of analytical measurements were to satisfy CLP precision control limits for 80% of all aqueous analyses and 70% of all soil

Table 5.7. Adherence to Precision Requirements

| Analysis Type | Analyses Within CLP Precision Requirements (%) | | | |
|---|---|---|---|---|
| | Water Samples | | Soil Samples | |
| | Analyses | Objective | Analyses | Objective |
| Volatiles | | | | |
| ANL-E | 100 (30 of 30) | 80 | 100 (30 of 30) | 70 |
| BCD | 100 (5 of 5) | 80 | 96 (24 of 25) | 70 |
| Semivolatiles | | | | |
| ANL-E | 100 (11 of 11) | 80 | 100 (11 of 11) | 70 |
| BCD | NS | 80 | 91 (10 of 11) | 70 |
| Pesticides/PCBs | | | | |
| ANL-E | 83 (5 of 6) | 80 | 100 (6 of 6) | 70 |
| BCD | NS | | NA | |
| Inorganic Metals + | 100 (174 of 174) | 80 | 99 (258 of 261) | 70 |
| Anions | 100 (45 of 45) | 80 | 93 (70 of 75) | 70 |
| Radiochemicals | 100 (45 of 45) | 80 | 93 (70 of 75) | 70 |

NS = No sample of this matrix type analyzed.

+ Calculation based on total results of ICP, GFAA, and CVAA analytes.

NA = No duplicate samples were prepared for this sample matrix.

**Note:** All calculations are based on the number of analytes in compliance for a given analytical method.

analyses. The reported data meet CLP precision criteria (RPD) for 98% of all aqueous measurements and 95% of all soil measurements. The adherence to precision requirements is summarized for each analysis method according to the sample matrix in Table 5.7. The values appearing within the parentheses denote the actual number of analytes in compliance with CLP requirements in comparison to the total number of analytes measured. The data quality objective was not met for pesticide analyses from BCD because no matrix spike sample was associated with the four samples analyzed.

#### 5.2.1.1.5 Accuracy

Accuracy, the ability to obtain a true value, is optimized and evaluated for an analytical system through specific quality control (QC) procedures and measurements. The exact QC procedures and measurements required to ensure acceptable accuracy depend on the method, but all chemical methods generally require instrument calibration, method blank analysis, check standard or laboratory control sample analysis (i.e., analysis of sample of known analyte concentration), and a matrix spike. Organic analyses usually incorporate additional QC procedures to optimize accuracy; the additional procedures referred to are internal standards and surrogate compounds added to every sample. Analytical determinations based on CLP protocol incorporated the required QC samples to assess the accuracy of analytical results. Similar QC samples were also included in all non-CLP procedures; QC results were calculated, but no determination of compliance was made because CLP requirements have not been established for these methods.

The program objective for accuracy of analytical measurements was to meet CLP tuning criteria for 90% of all GC/MS analyses. Evaluation of tuning criteria for volatiles and semivolatiles was performed by using the CLP Form V (GC/MS Tuning and Mass Calibration Form) for both the volatile and semivolatile fractions. Instrument tuning criteria for BCD were met for 99% and 100% of

volatile and semivolatile organic data, respectively. Instrument tuning criteria for ANL-E were met for 100% of volatile and semivolatile organic data.

The remaining results of accuracy of QC measurements associated with the INEL data are summarized in the categories of calibration (Table 5.8), blanks (Table 5.9), control samples (Table 5.10), and matrix spikes (Table 5.11). Also listed in the summaries for comparison are program objectives, where objectives have been established.

Entries for percentage compliance for initial and continuing calibration results are summarized in Table 5.8. Radiometric continuing calibrations were assumed to be in compliance if results fell within $\pm$10% of those observed for the initial calibration of the instrument. The ORNL analyses for anions also did not meet the 90% objective. All other calibration data met program objectives.

The results in Table 5.9 demonstrate that all blank measurements satisfied the program objectives and imply relatively contamination-free analyses.

Laboratory control sample analyses were not conducted for most types of analyses. Such analyses were performed for inorganic metals and radiochemical analytes. Results for laboratory control samples were considered to be in control for radiometric analysis if results were within $\pm$20% of the true value. Results presented in Table 5.10 show that all laboratory control sample analyses objectives were met.

The performance of matrix spike organic samples (Table 5.11) was based on the recovery of target compounds (TC), internal standard compounds (IC), and surrogate compounds (SC). The performance objective for matrix spike samples was not realized for the semivolatile soil TC spikes for BCD analyses. Recovery of target compounds from the BCD and ANL-E analyses for pesticides/PCB soil samples also did not meet performance objectives.

Table 5.8. Adherence to Calibration Requirements

| | Analyses With Acceptable Calibrations (%) | | | |
|---|---|---|---|---|
| | Water Samples | | Soil Samples | |
| Analysis Type | Analyses | Objective | Analyses | Objective |
| Volatiles | | | | |
| ANL-E | 100 (275 of 275) | 90 | 100 (198 of 198) | 90 |
| BCD | 100 (50 of 50) | 90 | 99 (158 of 160) | 90 |
| Semivolatiles | | | | |
| ANL-E | 100 (51 of 51) | 90 | 100 (85 of 85) | 90 |
| BCD | NS | | 100 (51 of 51) | 90 |
| Pesticides/PCBs | | | | |
| ANL-E | 97 (309 of 318)* | 90 | 97 (309 of 318)* | 90 |
| BCD | NS | | 100 (151 of 151) | 90 |
| Inorganic Metals+ | 99 (874 of 887) | 90 | 99(1630 of 1653) | 90 |
| Anions | 86 (505 of 586)* | 90 | 86 (505 of 586)* | 90 |
| Radiochemicals | 100 (114 of 114)* | 90 | 100 (114 of 114)* | 90 |

+ Calculations based on total of ICP, GFAA, and CVAA analytes.

* Instrument calibration used for both water and soil samples.

NS = No samples of this matrix type were analyzed.

Note: All calculations are based on the number of analytes in compliance for a given analytical method.

Table 5.9. Adherence to Method Blank Requirements

| | Analyses With Method Blanks Below CRDL (%) | | | |
|---|---|---|---|---|
| | Water Samples | | Soil Samples | |
| Analysis Type | Analyses | Objective | Analyses | Objective |
| Volatiles | | | | |
| ANL-E | 100 (544 of 544) | 95 | 98 (333 of 340) | 95 |
| BCD | 100 (35 of 35)* | 95 | 99 (766 of 770)* | 95 |
| Semivolatiles | | | | |
| ANL-E | 100 (65 of 65)* | 95 | 100 (65 of 65)* | 95 |
| BCD | NS | | 100 (65 of 65)* | 95 |
| Pesticides/PCBs | | | | |
| ANL-E | 100 (27 of 27)* | 95 | 100 (54 of 54)* | 95 |
| BCD | 100 (7 of 7)* | 95 | 100 (14 of 14)* | 95 |
| Inorganic Metals + | 99 (509 of 510) | 95 | 99 (664 of 665) | 95 |
| Anions | 100 (235 of 235)* | 95 | 100 (235 of 235)* | 95 |
| Radiochemicals | 100 (23 of 23) | 95 | 100 (34 of 34) | 95 |

+ Calculations based on total of ICP, GFAA, and CVAA analytes.

* Water blanks were used for both water and soil SDGs.

NS = No samples of this matrix submitted for analysis.

**Note:** All calculations are based on the number of analytes in compliance for a given analytical method.

Table 5.10. Adherence to Control Sample Requirements

| | Analyses With Acceptable Control Sample Analyses (%) | | | |
|---|---|---|---|---|
| | Water Samples | | Soil Samples | |
| Analysis Type | Analyses | Objective | Analyses | Objective |
| Volatiles | * | 80 | * | 80 |
| Semivolatiles | * | 80 | * | 80 |
| Pesticides/PCBs | * | 80 | * | 80 |
| Inorganic Metals + | 98 (171 of 174) | 80 | 93 (242 of 261) | 80 |
| Anions | NA | 80 | NA | 80 |
| Radiochemicals | 98 (39 of 40) | 80 | 100 (45 of 45) | 80 |

+ Calculations based on total of ICP, GFAA, and CVAA analytes.

*Not applicable.

NA = Not analyzed.

**Note:** All calculations are based on the number of analytes in compliance for a given analytical method.

Table 5.11. Adherence to Matrix Spike Requirements

| Analysis Type | Analyses With Acceptable Matrix Spike Analyses (%) Water Samples Analyses | | Water Samples Objective | Soil Samples Analyses | | Soil Samples Objective |
|---|---|---|---|---|---|---|
| Volatiles (TC) | | | | | | |
| ANL-E | 100 | (60 of 60) | 80 | 100 | (60 of 60) | 70 |
| BCD | 100 | (10 of 10) | 80 | 96 | (48 of 50) | 70 |
| Volatiles (IS) | | | | | | |
| ANL-E | 100 | (780 of 780)* | 90 | 100 | (594 of 594)* | 80 |
| BCD | 100 | (21 of 21) | 90 | 99 | (370 of 375) | 80 |
| Volatiles (SC) | | | | | | |
| ANL-E | 100 | (780 of 780)* | 90 | 100 | (594 of 594)* | 80 |
| BCD | 95 | (20 of 21) | 90 | 96 | (361 of 375) | 80 |
| Semivolatiles (TC) | | | | | | |
| ANL-E | 100 | (22 of 22) | 80 | 100 | (22 of 22) | 70 |
| BCD | | NS | | 55 | (12 of 22) | 70 |
| Semivolatiles (IS) | | | | | | |
| ANL-E | 100 | (84 of 84)* | 90 | 100 | (144 of 144)* | 80 |
| BCD | | NS | | 94 | (34 of 36) | 80 |
| Semivolatiles (SC) | | | | | | |
| ANL-E | 100 | (84 of 84)* | 90 | 100 | (144 of 144)* | 80 |
| BCD | | NS | | 100 | (36 of 36) | 80 |
| Pesticides/PCBs (TC) | | | | | | |
| ANL-E | 83 | (10 of 12) | 80 | 25 | (3 of 12) | 70 |
| BCD | | NA | 80 | 67 | (12 of 18) | 70 |
| Pesticides/PCBs (SC) | | | | | | |
| ANL-E | 100 | (7 of 7) | 90 | 100 | (14 of 14) | 80 |
| BCD | 100 | (2 of 2) | 90 | 100 | (15 of 15) | 80 |
| Inorganic Metals+ | 97 | (142 of 146) | 80 | 93 | (181 of 195) | 70 |
| Anions | 82 | (37 of 45) | 80 | 73 | (58 of 79) | 70 |
| Radiochemicals | 97 | (38 of 39) | 80 | 86 | (18 of 21) | 70 |

+ Calculations based on total of ICP, GFAA, and CVAA analytes.
NA = Matrix spikes not analyzed for this matrix.
NS = No samples of this matrix submitted for analysis.
* Results are the sum of both internal standards and surrogate compounds.
TC = Calculations based on the results of targent compound matrix spikes.
IS = Calculations based on the results of internal standard compound recovery.
SC = Calculations based on the results of surrogate compound recovery.

**Note:** All calculations are based on the number of analytes in compliance for a given analytical method.

Although not incorporated into the results listed in Table 5.11, CLP compliance for ICP serial dilutions for water and soil preparations was 97% and 89%, respectively.

#### 5.2.1.2 Data Quality by Type of Analysis

General observations and facts that should be considered when interpreting data from the INEL Site are provided in this section. Also included is a summary of the QA/QC protocol used for non-CLP methods. The discussions are presented by general type of analysis in the following order: volatiles, semivolatiles, pesticides/PCBs, soil gases, dioxins, inorganic metals, chromium (VI), anions, nitrate-N by flow injection analysis, percent solids, and radiological analytes.

##### 5.2.1.2.1 Volatile Organic Compounds

Approximately 65% of the requests for volatile analysis in INEL samples were performed by ANL-E. BCD analyzed the remaining samples associated with the following sites: Environmental Problem 3 (Requests 502, 503, 512, 514, 515, 520, 522); Environmental Problem 5 (Requests 801 and 802); and Environmental Problem 7 (Requests 814, 816, 817, 818, and 822).

**Volatile Organic Compound Analysis by ANL-E.** All samples analyzed by ANL-E met compliance for holding times. Additionally, all sample duplicate results, calibration data, and matrix spike results (TC, IS, and SC compounds) met CLP requirements. The soil laboratory blank was prepared using sand as the sample substitute. Both aqueous and soil laboratory blanks were found to be within CLP QC limits. Three blanks each contained a single target analyte above the respective CRDL. Because the CLP blank requirement was met, the presence of these contaminants at trace levels should have no significant impact on the sample data. Laboratory blanks from two SDGs contained the TIC 1,1,2-trichloro-1,2,2-trifluoroethane. The TIC was found at concentrations of less than 20 ug/kg in a total of 10 samples. The flag **BJ** is used on Form 1E of the

data packages to denote that the TIC is a contaminant found in the laboratory blank. This laboratory contaminant was traced to the laboratory refrigeration system and corrective actions have since eliminated the compound from current laboratory blank samples.

In general, the overall quality assessment for the CLP TCL results is Quality Level I. In addition, specifically identified TIC data have a Quality Level of II, while all unknown TIC data are assigned a Quality Level of III. Data for 1,1,2-trichloro-1,2,2-trifluoroethane are assigned a Quality Level of III in the two affected SDGs because of its presence in the blank.

Analytical results for volatile analysis are documented using the standard CLP data package format. On form 1E, **HC** is used as the abbreviation for hydrocarbon. An explanation is required in the redundant use of the term TIC. The CLP manual refers to TIC as an abbreviation for "tentatively identified compound"; however, the ANL-E data system uses TIC to identify the "total ion chromatogram." Therefore, in the CLP data packages, the reconstructed total ion chromatogram (RIC) is labeled TIC (total ion chromatogram).

**Volatile Organic Compound Analysis by BCD.** Ninety-seven samples were analyzed for volatile organic compounds by BCD. These samples consisted of soil, water, and QC samples. Sample IN503050A results were not reported due to an instrument failure. A number of discrepancies in data reporting appear in the data packages. Three trip blanks (INN16010A, INN49019A and INN52014A) are reported as soils, with values reported in units of ug/kg. BCD confirmed that the samples were aqueous, but they chose to report them as soils. In a number of instances, the DOE sample ID number and laboratory sample ID do not agree from CLP form to CLP form. None of the volatile forms are identified with an SDG number. SDG numbers were later assigned according to a follow-up letter transmitted by BCD. Because of the way the SDGs were established, no matrix spike/matrix spike duplicate (MS/MSD) samples were analyzed in SDG IN801017A. The SDG numbers were not used because of limitations in BCD software.

Holding time requirements were met for all samples with the exception of five samples from Requests 512 and 515. The noncompliance was due to the inability of the instrument to tune to 4-bromofluorobenzene (BFB).

The volatile soil blanks contain no blank soil matrix. They consist only of water, surrogates, and internal standards. Because no true soil blank was used, blank results for soil samples may not truly reflect the contaminants that may be present in this matrix type. No blank soil matrix was available at the time of analysis. No TICs or TCLs above the CLP limit were found in any of the blanks prepared with the samples. However, four blank analytes were detected at levels above the CRDL in the laboratory blanks.

With the exception of some low-level soils, volatile organic compound analyses were performed following the EPA's 7/87 CLP protocol. A reduced sample size of 2 to 4 g, rather than 5 g, was used in the extraction procedure for low-level soils in order to obtain more acceptable recoveries for surrogate and internal standard compounds. Ten samples were out of control for surrogate recoveries; the data are flagged on the reporting forms. Generally, BFB was recovered above the CLP limit.

The following samples were run and exceeded the CLP linear range requirements, although no peak saturation was observed: IN520028A and IN814056A for methylene chloride, IN816069A for acetone, IN816116A for acetone and 2-butanone, and IN816092A for acetone and 4-methyl-2-pentanone. Sample IN520028A was reanalyzed using a smaller sample size and is also being reported as IN520028ARE.

Sample IN502048A was run twice unsuccessfully. During the first run, the data system crashed and the second run clogged the purge and trap. The first run produced some data, but no surrogate recovery, and is being reported.

The reconstructed ion chromatogram (RIC) for GC/MS file 812613BLK appears as noise peaks followed by a straight line. The RIC was replotted and still appeared the same. The data are unaffected and are being reported.

A VOCOL™ (Supelco, Inc.), 60 m long by 0.75 mm ID with 1.5 um film glass capillary was employed for the analysis of these organic compounds. The target compound 1,1,2,2-tetrachloroethane and the surrogate compound BFB coelute during the analysis of the initial calibration standards for samples on the VOCOL™ column. Because 1,1,2,2-tetrachloroethane has a fragment ion at m/z 95 which is the primary quantitation ion for BFB, the average relative response factor (RRF) for BFB for the initial calibration was artificially high. This caused the surrogate recovery value of BFB in the method blanks to be less than the 86% minimum criteria. The ion at m/z 174 was, therefore, selected as the primary quantitation ion for BFB. Using the quantitation ion at m/z 174, an RRF was established for BFB which gave acceptable surrogate recoveries for BFB for all standards, blanks, and samples.

Because their coelution with target compounds made area measurements unreliable, quantitation of TIC compounds by BCD was based on peak height.

5.2.1.2.2 Semivolatile Organic Compounds

ANL-E analyzed thirteen samples and BCD analyzed three samples for semivolatile organic compounds. A summary of the more common analysis problems encountered by each laboratory and deviations from protocol follows.

**Semivolatile Organic Compound Analysis by ANL-E.** Three of the 13 regular samples were extracted from 1 to 4 days beyond the extraction holding time. Exceeding the holding times for these analyses may have allowed degradation or transformation of the target analytes. The usual result of non-compliance to holding times is that the measured and reported concentrations may underestimate the true value of the analyte.

Semivolatile organic compound analyses are prone to their own unique set of contamination problems. Phthalates are a very common contaminant in semivolatile analyses. These compounds are used as plasticizers and are easily extracted with organic solvents and often introduced to samples or their associated extracts at numerous points in the sample analysis process. The INEL samples and blank contained phthalates. The di-n-butylphthalate and bis(2-ethylhexyl)phthalate are ubiquitous compounds and usually observed as contaminants. A few of the INEL samples also contained phenol. Because the blank also contained the target compound, the values are qualified with a B flag on Form I of the data packages. Some non-TCL compounds continually appear in the samples and are known to be from the reagent water used for blanks and to rinse the glassware. Since these compounds continually appear in all samples and occasionally in the blanks, but are not sample TICs, they are not listed on Form I SV-TIC or on the quantitation report. These compounds are listed in Table 5.12.

The internal standard for perylene-$_{d12}$ is above the allowed QC limit in two samples (IN523021C and IN523032A). This was probably caused by the large amount of alkanes in the samples, which caused a matrix effect. No corrective action is required if only one internal standard recovery is out of the QC limit.

The quality level for the above semivolatile data was Quality Level II except for the compounds di-n-butylphathalate and bis(2-ethylhexyl)phathalate, which are data Quality Level III in samples.

**Semivolatile Organic Compound Analysis by BCD.** The three soil samples from Environmental Problem 5 (Request 801) were analyzed within the required extraction holding time. The blank for the soil samples included only reagents; no blank soil matrix was used. No compounds above the CLP limit were found in the blank prepared with the soil samples. Although TC spike compound recoveries were poor, duplicate spike results indicate that matrix effects may be

Table 5.12. System Contaminants Present in ANL-E Reconstructed Total Ion Chromatograms

| Tentative Identification | Scan No. | Retention Time, min |
|---|---|---|
| Acetic acid, 1-methylethyl ester | 420 | 7:00 |
| Octane, 4-methyl- | 469 | 7:49 |
| Oxirane, tetramethyl- | 472 | 7:52 |
| Heptane, 2,3,6-trimethyl- | 481 | 8:01 |
| Octane, 3-methyl- | 484 | 8:04 |
| 2-Hexanone, 6-(acetyloxy)- | 566 | 9:26 |
| 2-Cyclohexen-1-one | 586 | 9:46 |
| 5-Hexen-2-one, 5-methyl- | 611 | 10:11 |
| 2(5H)-Furanone, 5,5-dimethyl- | 613 | 10:13 |
| 2-Butanol, 3-methyl-, acetate | 677 | 11:17 |
| 3-Heptanone, 2,4-dimethyl- | 689 | 11:29 |
| Cyclohexanol, 4-chloro-, trans- | 745 | 12:25 |
| 1-Octyn-3-ol, 4-ethyl- | 748 | 12:28 |
| Cyclohexane, 1,2-dichloro-, trans- | 810 | 13:30 |
| Propanoic acid, 2-methyl-, ester | 1573 | 26:13 |
| Phthalate ester | 1872 | 31:12 |
| Hexanedioic acid, mono(2-ethylhexyl)ester | 2243 | 37:23 |

the cause of this noncompliance. The compound 4-nitrophenol was not detected in either the spike or the matrix spike duplicate sample. This may indicate that the CRQL for this compound may be too low.

Quantitation of TIC compounds by BCD was based on peak height because their coelution with target compounds made area measurements unreliable.

#### 5.2.1.2.3 Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) in water and soil samples were determined using the 7/87 CLP SOW. ANL-E analyzed 14 regular samples from Environmental Problem 3 (Requests 507 and 508) and Environmental Problem 5 (Request 804). BCD analyzed ten soil and one water sample from Environmental Problem 3 (Requests 503 and 509) and Environmental Problem 7 (Request 818).

**PCB Analysis by ANL-E.** All samples extracted by ANL-E met holding time requirements. The amount of surrogate added to all the samples was ten times the amount called for in the CLP procedure. Percent recoveries were calculated accordingly. Matrix spiking solution was mistakenly added to sample IN507010A. This sample was used as the matrix spike and matrix spike duplicate. All of the sample was used so that the sample could not be re-extracted. The levels of spiked compounds found in sample IN507010A correspond well with what was spiked, so no detectable quantities of pesticides were present in the sample.

On Form IX Pest, the %D's for 4,4'-DDT, endosulfansulfate, and endrin ketone are above compliance limits. Since none of the samples contain these compounds, this should not affect data quality. On Form IX Pest for sample confirmation, 4,4'-DDT, alpha-BHC, beta-BHC, delta-BHC, endosulfansulfate, and methoxychlor have a high %D. Since none of the samples contain these compounds, this should not affect the data quality.

The percent recoveries of lindane (127% compared to 123% acceptable level) and endrin (126% compared to 121% acceptable level) in the MSD for water samples were slightly above QC limits. The percent recoveries for 9 of 12 MS/MSD components were also outside limits. Most values were only slightly above the control limits. Noncompliance to both sets of QC requirements was caused by the coeluting Aroclor 1260 background in the sample.

**PCB Analysis by BCD.** The PCB samples were analyzed following the EPA's 7/87 CLP SOW with one exception: a capillary megabore column (DB-608, 30 m x 0.53 mm ID, 0.83 um film) was used as the primary column. All of the individual target compounds (pesticides) are resolvable. No secondary column analyses were performed because only PCB analysis was requested, and no PCBs were determined to be present based upon the results of the primary analysis. Any pesticides that may have been present would have been present at levels significantly below the CRQL.

All samples were extracted within the extraction holding limit. The blank for the SDG containing samples from Requests 503 and 509 was contaminated with pesticides, although no PCBs were present in the blank. Because only PCB analysis was requested, the preliminary "hits" were not confirmed and no pesticides were reported. In this same SDG, the MSD sample (IN509012BMSD) recovery was low for all seven compounds added. It was noted that the volume collected after GPC was low for this sample. Because the recovery was low for one spiked sample, all of the RPDs were out of control. In the SDG containing samples from Request 818, insufficient sample was received for analysis of an unspiked sample, an MS, and an MSD. Therefore, only an MS was extracted for this group of samples. Only one liter of the water sample was received for analysis. Therefore, no associated matrix spike or matrix spike duplicate could be extracted and analyzed for this matrix.

#### 5.2.1.2.4 Soil Gases

The analysis of soil gases in 13 samples is based on the volatile organic analysis method of the EPA's 7/87 CLP SOW. An external standard method was used for quantitation of analytes. The initial and continuing calibration curves were prepared using the low-level volatile compound CLP methodology. The calibration curves met CLP criteria. The response factors, based on calibration curves derived from water, were used to quantitate analytes that were thermally desorbed from the Carbotrap multibed desorption tubes received from the field. The total desorbate was delivered to the analytical packed GC column.

The results were reported on Form 1A as total nanograms of analyte found per tube. The weight of the sample used and level of analysis on Form 1A are left blank because these entries are not applicable.

The retention times of analytes obtained from the directly desorbed Carbotrap tubes were slightly different from those obtained using the water calibration curves. The presence of TCL compounds in the samples were confirmed by manually comparing the mass spectra of all TCL compounds detected in the sample with mass spectra obtained from the corresponding standards.

The analysis of internal standards, surrogates, and matrix spikes or matrix spike duplicates was not possible. The corresponding CLP forms were, therefore, not used. Because no internal standards were added to the Carbotrap tubes, the area and amount of internal standard from the daily 50 ppb water calibration were used to quantitate TICs. On Form 1E, the flag BJ is used to indicate that the TIC (hexamethyl disiloxane, column bleed) was also detected in the blank runs.

Data from a blank Carbotrap tube were used to complete Form 4A. Form 6A was included to show that the response factors met CLP criteria. A Form 6A' was developed to tabulate response factors using the external standards method. The response factors are based on 100, 250, 500, 750 and 1000 ng standards.

The data quality level for these samples is Quality Level III, using the SOP for Oak Ridge Data Validation (Rev. 7/26/88) and for Determination of Oak Ridge Data Usability (Rev. 7/29/88). The results for the positively identified volatile TCL compounds (except for selected methylene chloride data) and TICs (except for hexamethyl disiloxane) are usable. The exceptions above are because methylene chloride was detected in several of the unused Carbotrap multibed desorption tubes and because of column bleed.

#### 5.2.1.2.4 Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans

The analysis of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs) was performed under the guidelines of the EPA Contract Laboratory Program's IFB WA86-K357, "Statement of Work for Dioxin Analysis, Soil/Sediment and Water Matrices, Multi-Concentration, Selected Ion Monitoring (SI< GC/MS Analysis 9/1/86." The SOW is based on EPA Method 8280 found in Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, SW-846.

The case narrative supplied with the dioxin data package states that 16 soil samples, three native spikes, and three method blanks were received by BCD. No shipping report or organic traffic report accompanied the data set.

The protocol defined in EPA Method 8280 was used to evaluate the quality of data generated for dioxin analyses. The procedure is directed toward low-resolution mass spectrometry, whereas the actual analyses were carried out using high-resolution mass spectrometry. The protocol requires the analysis of duplicate samples. However, no rinsate, field blanks, or duplicate samples were received at BCD for analysis.

All samples must be extracted within 30 days of sample collection; analysis must be completed within 45 days of collection. The extraction limit was exceeded by

6 days for four soil samples: IN818016, IN818027, IN818038, and IN818049. A single water sample (IN818136) was extracted 2 days beyond the limit. The analysis holding time was exceeded for all samples; typically, samples were analyzed approximately 95 days from sample collection.

More than 95% of the calibration data met performance criteria. Sample results are presented in the data package under headings of "Conc" (concentration) if detected, or "MPC" (Maximum Possible Concentration) if not detected. Table 7 of the data package includes results in units of $ng/gm^2$. The units probably should be ng/gm.

One of the laboratory method blanks was found to contain low levels of HpCDD, OCDD, HxCDF, and OCDF. These levels of contamination are quite low and should not affect consideration of the data. The other method blank was free of any contamination; the daily solvent blank analyses were also free of any detectable contamination.

The internal standard recoveries are generally well within the suggested limits (40% to 120%). Several cases of high recoveries (>140%) are noted, while no samples suffered significant losses of the labelled internal standard.

#### 5.2.1.2.5 Inorganic Metals

In general, inorganic analyses were performed according to DOE Environmental Survey protocol; however, some deviations from the stated protocol did occur. A brief discussion of the more common deviations and protocol violations and their impact follows.

**ICP Analyses.** CLP protocol provides for the analysis of only soil and water samples. To meet the needs of the DOE Site Survey Program, as much as possible of the CLP protocol was followed in the analysis of other sample types. In one case, six radioactive soil samples (i.e., IN502015C, IN502026C, IN502037C,

IN502048C, IN502059C, and IN502060C) from the TRA 1952 warm waste pond for Environmental Problem 3 were analyzed for chromium by ICP. Because of the radioactive nature of these samples, a Perkin-Elmer sequential ICP adapted for radioactive work was used for the analysis. Several modifications were made to the CLP soil preparation method for these radioactive samples. Scandium was added as an internal standard to help correct matrix effects. Step 5 of the ICP preparation procedure was omitted; hydrochloric acid was not added to prevent corrosion of the stainless-steel glove box which surrounds the ICP torch housing. Also, samples were diluted to a final volume of 100 mL, rather than 200 mL, to improve the method detection limit (MDL).

There were also several deviations from the CLP QA/QC requirements in the analyses of these six samples. The calibration verification solution was not an independent standard; the verification and calibration standards came from the same source. An aqueous laboratory control sample, rather than a solid one, was analyzed with the soil samples. To minimize exposure to radiation, the analyst did not prepare a serial dilution. Also, the CRDL and holding time were not met; the holding time was exceeded by three months. These latter noncompliances, however, did not have a serious impact on the data because high concentrations of chromium were measured in these soils.

A spike and a method duplicate were analyzed with these radioactive soils. A 62% recovery and a 12% duplicate difference were obtained for these QC samples, respectively.

All other determinations for ICP metals were made with a JY-48 polychromator. The Survey MDLs, but not the CLP CRDLs, could be met for arsenic, lead, and selenium. The MDLs for these three analytes were, therefore, used to evaluate the sample data. The CLP CRDLs were met for all of the other analytes.

There were several calibration nonconformances. Difficulty was encountered in maintaining calibration within the 10% CLP limit for the aluminum and sodium

primary channels. A ±20% deviation from the true values of the calibration verifications for these two analytes was considered acceptable. The noncompliance of two verification results for selenium affected soil sample IN816092H, which came from the CFA Landfill II area for Environmental Problem 7. The selenium result for this sample may be slightly elevated. For all other calibration verification noncompliances, either the sample results were not affected, or the results were affected but the data could still be used. Two zinc noncompliances also occurred for some calibration blanks. The zinc result for the calibration blank associated with four sediment samples that were taken from the TRA chemical/corrosive pond area (Environmental Problem 3) and with eight soils from the CFA sanitary drain field (Environmental Problem 1) exceeded the 20 ug/L CRDL by 1 ug/L. The zinc results for these solids may, therefore, be slightly elevated. In the second case, contamination of the autosampler test tubes was responsible for a high blank value for zinc (i.e., 347 ug/L). Seventeen soil samples from the TRA/ETR cooling tower basin (Environmental Problem 9) were possibly affected. Zinc results for these latter samples may be biased approximately +70 mg/kg.

The spike recovery for antimony was consistently low for all soil and sediment digestions. A reason for this poor recovery could not be determined by the analyst. The low spike recoveries for arsenic were most likely the result of volatilization losses which occurred during sample preparation. Water samples that were collected from several wells for Environmental Problem 2 (i.e., Well ANL-8, Well ANL-W-1, Well ANP-1, Well CFA-1, Well FET-1, Well SL-1, Well TRA-1, and the fire station well), from the ANL-W disposal pond for Environmental Problem 3, and from the CFA sewage treatment plant for Environmental Problem 4 were possibly affected by this volatilization loss. Because the antimony and arsenic results for these samples may be biased low, they should be interpreted with care. Sample inhomogeneity and matrix interferences were the suspected causes of the inadequate recoveries observed for barium and copper.

Because the analysis results of the solid laboratory control sample indicate the possibility of positive bias for aluminum in soil and sediment samples, aluminum data for solids should be interpreted with care.

Two method blanks were always prepared with each group of samples. In two cases, zinc was detected in a preparation blank at a level slightly above the CRDL. One group of 16 aqueous samples and another group of 17 solids were affected. The aqueous samples consisted of well water taken from several USGS wells for Environmental Problem 2 (i.e., wells USGS-19, -27, -37, and -82); pond water from the TRA northernmost warm waste pond for Environmental Problem 3; and QC rinsate water from CFA Landfill I, CFA Landfill II, and the BORAX trash dump areas for Environmental Problem 7. The solids came from several waste pond areas for Environmental Problem 3. These waste pond zones include the TRA 1952 northernmost warm waste pond, the TRA northernmost cold waste pond, the TRA chemical/corrosive pond, the TAN/TSF disposal pond, the TAN/LOFT disposal pond, and the ICPP percolation pond. Because the result for zinc in the second preparation blank that was prepared with each group was in compliance, none of these samples were redigested or reanalyzed.

Duplicate and serial dilution results which did not comply with the CLP limits have been flagged according to protocol. Sample inhomogeneity was most likely responsible for the inadequate precisions observed for calcium and copper in some solid samples.

**GFAA Analyses.** Soil and water samples for INEL were analyzed for antimony, arsenic, cadmium, chromium, lead, selenium, silver, and thallium by graphite furnace atomic absorption (GFAA). Two method blanks were prepared with each sample group. All blanks met CLP performance criteria. All analytical results met CLP requirements. No holding times were missed.

**CVAA Analyses.** Mercury was quantified using cold vapor flameless atomic absorption spectrometry (CVAA). Two method blanks were prepared with each

sample group. All blanks met CLP performance criteria. All QC results except for one aqueous spike were satisfactory; the spike recovery was biased by +119%. Samples IN503050F and IN506053E from the TRA 1952 waste ponds for Environmental Problem 3 were affected by this noncompliance. This nonconformance is indicated on the CLP forms. No holding times were missed.

**Potassium.** A flame photometric procedure was used to determine the concentration of potassium in INEL samples. The CLP protocol for sample preparation and analysis, and the QA/QC protocol specified for the ICP method were followed. Two noncompliance situations arose. One calibration verification result was out of compliance because it was overlooked during the analysis; the 90% to 110% CLP control limit range was exceeded by +10%. Some soil samples from the CFA Landfill I and II areas (Requests 815 and 816 for Environmental Problem 7) were affected. Also, the 80% to 120% control range was exceeded by +10% for an aqueous laboratory control sample that was prepared with some USGS well water samples (i.e., Requests 815 and 816 for Environmental Problem 7; Requests 409, 410, 416, 421, and 422 for Environmental Problem 2; and Requests 504 and 522 for Environmental Problem 3). These samples were not digested. All other quality control results were acceptable. No holding times were missed.

#### 5.2.1.2.7 Hexavalent Chromium

A total of 32 soil samples collected from the ETR cooling tower basin for Environmental Problem 9 were analyzed for hexavalent chromium [i.e., chromium(VI)] by the analytical division of INEL. A non-CLP/non-EPA method was used. All holding times for samples were met. To ensure as complete an extraction as possible, two extractions were performed on all samples and spikes except on those belonging to one sample group. The additional step was omitted from this last SDG because chromium(VI) was not detected in any of the spike or sample extracts of the other three groups. Only 1 of 32 spikes was recovered satisfactorily; all other sample spikes exhibited either poor recovery or

no recovery at all. Because of the unstable nature of chromium(VI), a certified soil lab control standard was not available for analysis. Judging from the rapid reductions of the chromium(VI) spikes that were observed, the presence of large amounts of hexavalent chromium in these soils was not expected. A preparation blank was used for blank subtraction purposes. Hexavalent chromium was not detected in any sample or method duplicate.

#### 5.2.1.2.8 Anions

Chloride, fluoride, nitrate$^{-N}$, phosphate$^{-P}$, and sulfate were analyzed in 133 samples using ion chromatography with conductance detection. CLP protocol was not followed in complete detail. An anion standard prepared from NBS materials was used to calibrate the instrument. Proper detector response was verified at this time by comparison to the previous day's standard responses. An in-house prepared quality control solution and a five-anion standard or NBS standards were analyzed following each calibration. Also, an EPA solution was used to verify the instrument calibration for the reanalysis of water sample IN510253C taken from the TAN/TSF disposal pond for Environmental Problem 3. Nonreproducible results were first obtained for this water sample for reasons unknown to the analyst. There were numerous noncompliances for the calibration verification results. Calibration responses varied from the expected values by -25% to +37%. These noncompliances are documented on the forms.

The recommended MDLs for anions in water were not met; the MDLs at maximum instrument sensitivity were 0.23 mg/L for nitrate$^{-N}$; 0.33 mg/L for phosphate$^{-P}$; and 1 mg/L for chloride, fluoride, and sulfate. To improve the MDLs for soil analysis, a larger gram-portion of solid sample (i.e, 10 g rather than a 0.25 g) was extracted and a more sensitive attenuator setting (i.e., 3 uMHO) was used. The MDLs for anions in soils were 0.23 mg/kg for nitrate$^{-N}$, 0.33 mg/kg for phosphate$^{-P}$, and 1 mg/kg for the other anions.

Forty-five aqueous samples exceeded the 48-hour holding time for nitrate$^{-N}$. The 48-hour holding time for phosphate was exceeded in 54 cases. Four aqueous samples taken from the TAN/TSF disposal pond for Environmental Problem 3 were delivered to the laboratory 3 days late. All other anion holding times were met. Solids were analyzed within 48-hours following their extraction.

A sample duplicate was not analyzed with every sample group. Also, duplicate injections of solid preparations were analyzed rather than injections of duplicate extractions. The information on anions in soil and sediment samples that is presented in Table 5.7 summarizes the precision obtained for the analysis, rather than for the method.

Spikes were not added to the solids before the extraction step; rather, the final extracts were spiked. Therefore, the analysis results for the spiked solids may not provide accurate information about the effect which the sample matrix has on the digestion.

#### 5.2.1.2.9 Nitrate$^{-N}$ by Flow Injection Analysis

Nine INEL water samples were analyzed by flow injection analysis (FIA) rather than by ion chromatography to meet the holding time requirement for nitrate$^{-N}$. Prior to analysis by FIA, portions of samples for Environmental Problem 2 (IN403015J and IN403026J from Well USGS-27 and IN420016J from Well USGS-82) and Environmental Problem 3 (IN501014F, IN501025F, IN501036F, IN501047F, IN501058F, and IN501069F from the TRA 1952 northernmost warm waste pond) were preserved with acid and refrigerated. Preservation extended the nitrate$^{-N}$ holding time to 28 days. All analyses were performed within this time frame. Although there were no CLP guidelines for FIA, calibration blanks, verification solutions, laboratory control solutions, a duplicate, and a spike were analyzed with these samples. All QC results except for those of the spike were within the CLP compliance limits that are used for inorganic metal analyses. The 73.3% spike recovery for nitrate deviated slightly from the 75% to 125% CLP criteria.

#### 5.2.1.2.10 Percent Solids

ORNL maintained the accuracy of the percent solids determination by checking daily the temperature of the drying oven with a thermometer located at the top of the oven. The temperature exceeded the 103°C-105°C range by 1°C on 4 of the 82 days that INEL samples were dried. The greatest deviation during this was -2.0°C occurring on just two days. The Mettler balance was calibrated approximately four months prior to the analysis of INEL samples. The analytical balance was again calibrated midway through the analysis of INEL samples. The calibration of the electronic balance was checked daily using Class S metric weights at the 1-, 5-, 10-, and 100-g levels. The measured mass did not vary by more than +0.4 mg from the known value at the 1-, 5-, and 10-g levels. The measured value at the 100-g level did not vary outside the range of -1.3 to +3.6 mg from the known value. A single measurement of percent solids was made for each sample. Duplicate determinations were done at a frequency of approximately 20%.

### 5.2.2 Radiological Quality Assurance

The basic purpose of the QA program for the ORNL Low-Level Radiochemical Analysis Group (LLRAG) is to ensure that the data produced are of sufficient quality, accuracy, and completeness so that valid interpretations can be made. This purpose is accomplished by assuring that: (1) proper sample procedures are followed; (2) the instruments yield accurate, reproducible results; and (3) adequate information is available concerning each sample. All aspects of the work carried out by the LLRAG are thoroughly documented.

The basic QA program for LLRAG has many aspects. Only the QC aspects of the QA program that concern accuracy and reproducibility of measurements, however, are summarized in this data report. These aspects include results of

routine standards (both primary and secondary), blanks for background measurements, and analysis of interlaboratory comparison standards.

Approximately 5% of the total number of samples analyzed for the study were control samples. A control sample could be any of the following:

Spike - A sample aliquot with a known amount of analyte added.

In-house - An in-house sample with a known concentration of analyte.

EMSL - A control sample from the EPA laboratory in Las Vegas (EMSL-LV).

EML - A control sample from the EML laboratory in New York.

Appendix E Table E.1 shows the laboratory performance on these samples, identifying the sample type, the type of control, the nuclide measured, the result obtained, and the known value or expected result. The R value in the table is the ratio of the result obtained and the expected result expressed as a percent and indicates the level of performance. For the DOE Survey, an R value between 80 and 120 is considered acceptable.

#### 5.2.2.1 Gross Alpha-Beta Measurements

In order to ensure accuracy of the results obtained by the gross alpha-beta measurements, a beta standard traceable to NBS was counted daily when the LB-4000 instrument was in use, and blanks (i.e., backgrounds) for both alpha and beta were also obtained daily. In addition to these routine checks, prior to initiation of the measurements of INEL samples, the instrument underwent a full calibration that included the determination of plateaus.

The results of the daily calibration checks, done with a beta standard (RNS2-40B) consisting of strontium-90 and yttrium-90, are presented in Appendix E Table E.2. No alpha efficiencies for the LB-4000 are available for inclusion in this report; the beta efficiency alone is used to check the calibration of the instrument (the instrument counts both alpha and beta simultaneously). The mean beta efficiency of the LB-4000 was 35.7% with a standard deviation of 2.5% and a range of 31.15 to 41.70%. The results of daily measurements of beta efficiency for each detector are included in Appendix E Table E.3. All beta efficiency measurement checks indicated a result within the acceptable range of $\pm$4% for each of the 12 detectors on the LB-4000. Because all beta efficiency checks indicated results within the acceptable range, the instruments can be considered to have been accurately calibrated and sufficiently constant during the time period that INEL samples were measured.

The results of the background (i.e., blank) measurements are also given in Appendix E Table E.3 for alpha and beta, respectively. Examination of these tables indicates that the backgrounds were relatively constant throughout the measurement period of INEL samples. The alpha background of the LB-4000 had a mean of 0.03 cpm, a standard deviation of 0.02 cpm, and a range of 0 to 0.32 cpm. The beta background of the LB-4000 had a mean of 0.99 cpm, a standard deviation of 0.24 cpm, and a range of 0.61 to 1.91 cpm. Both the alpha and the beta backgrounds of the instrument, therefore, were of low enough levels that they did not adversely affect the measurements.

#### 5.2.2.2 Isotopic Alpha Measurements

Alpha measurements on individual isotopes (e.g., plutonium-239) are performed using silicon surface barrier detectors coupled to a Nuclear Data ND-9900 system. During the period of time that the INEL samples were being counted, four new detectors were brought on-line (numbered 5-8). Detectors formerly numbered 5-12 were renumbered 9-16. Detectors 1-4 were also brought back on-line. The mean alpha efficiency of the ND-9900 was 19.6% with a standard deviation of

2.0% and a range of 14% to 23%. The mean alpha background of the ND-9900 was 0.006 cpm with a standard deviation of 0.003 cpm and a range of 0 to 0.015 cpm. All of the measurement checks show results within the acceptable range, indicating that the ND-9900 was operating properly during the period of the INEL measurements. The efficiency and background data for each of the 12 detectors are given in Appendix E Table E.4.

Data on the calibration of the 12 detectors in this system are presented in Table E.5. These data indicate that each detector in the system was well within the specified calibration limits during the time period of the INEL measurements.

#### 5.2.2.3 Gamma Spectral Measurements

In order to ensure accuracy and reproducibility of results obtained by the gamma spectral measurements (gamma scans), a secondary standard consisting of cesium-137 and cobalt-60 was counted daily; a mixed-radionuclide standard traceable to NBS was counted routinely; and backgrounds (i.e., blanks) were counted routinely. The gamma standards are used to check that the energy calibration and efficiency of the instrument remains constant. The mixed-radionuclide standard is used as an additional verification of proper instrument operation and a check of the energy and efficiency calibration.

LLRAG utilizes six gamma-ray detectors which are attached to a common computer (a MicroVAX) for data collection and analysis. Because detector 6 was out of service during the analysis of the INEL samples, ORNL used only the five operational detectors.

Appendix E Table E.6 presents the results of the daily checks with the gamma standards for each of the five detectors. The count rates, centroids, and peak widths for the cesium-137 661 keV and cobalt-60 1332 keV peaks are used in the QC check. Unfortunately, a portion of this data was unavailable for inclusion in this data document. Examination of the data in Table E.6 indicates that the

data were very constant during the INEL measurements. Because results from the EPA Cross Check and EML Intracomparison Program samples that were analyzed during this time period were all within acceptable limits, it should be acceptable to conclude that the gamma detectors were operating properly during the analysis period of the INEL samples.

Appendix E Table E.7 presents a summary of the measured intensities of all the gamma rays observed in the background (i.e., blanks) for the five gamma-ray detectors. The data indicate that the background was low and relatively constant.

#### 5.2.2.4 Liquid Scintillation Measurements

Tritium samples were counted using a Packard 460C Tri-Carb liquid scintillation counter. A Packard tritium standard is counted daily to ensure the accuracy and reproducibility of the results obtained by the system. Backgrounds (i.e., blanks) are also counted daily. The results for the standard and background counts performed during the time that the INEL samples were counted are given in Appendix Table E.8, along with the efficiency data for that time period. The background for the 460C was 12.8 cpm, with a standard deviation of 0.7 cpm and a range of 11.5 to 14.1 cpm. The efficiency of the 460C was 58.6%, with a standard deviation of 0.1% and a range of 58.4 to 58.9%. All the data indicate that the 460C was accurately calibrated, sufficiently constant, and had a low enough background such that no degradation of sample results occurred during the period of the INEL sample measurements.

#### 5.2.2.5 Interlaboratory Comparisons

During the period of the INEL measurements, LLRAG participated in the following programs and tested for the following isotopes:

**EML Intracomparison Program:**

| | | | |
|---|---|---|---|
| Soil: | Strontium-90 | Water: | Hydrogen-3 |
| | Cesium-137 | | Manganese-54 |
| | Plutonium-239 | | Cobalt-57 |
| | Americium-241 | | Cobalt-60 |
| | Uranium (pCi) | | Strontium-90 |
| | | | Cesium-134 |
| | | | Cesium-137 |
| | | | Plutonium-239 |
| | | | Americium-241 |
| | | | Uranium (pCi) |

**EPA Cross Check Program:**

| | |
|---|---|
| Uranium | Gross alpha |
| Strontium-90 | Gross beta |
| Cesium-137 | Plutonium-239 |
| Chromium-51 | Cobalt-60 |
| Zinc-65 | Ruthenium-106 |
| Cesium-134 | Hydrogen-3 |

The results measured by LLRAG and presented in Appendix E Tables E.9 and E.10 did not exceed the warning limits, indicating that sufficiently accurate results were being obtained by LLRAG procedures and instruments.

### 5.2.2.6 Conclusions

The results of the QC checks presented above indicate that the performances of the alpha-beta instrument and the gamma-ray spectrometers were adequate to ensure accuracy and reproducibility of the results obtained using them. In

addition, the background seen by each instrument/detector was sufficiently low and sufficiently constant to ensure accurate removal of background effects.

### 5.2.3 Data Management QA/QC

All analytical data entered into the Data Management System (DMS) goes through a series of verification and validation (V&V) routines to ensure that the data are of the highest quality possible. These V&V routines are designed to capture two potential types of data errors: transcription and consistency.

Data transcription problems (i.e., data entry errors) can be eliminated through the use of electronic data transfer techniques. For INEL data, all ICP data and most organic data were electronically transferred from the instruments to the data base. The remaining, manually-entered data were initially reviewed for legibility, entered, and then 100% visually checked for accuracy. All transcription errors are corrected at the time of discovery and are not documented.

Data consistency problems consist of miscoded information, missing data, incomplete data, and conflicting sample identification codes. After the information has been entered into the data base and all transcription problems corrected, the data are then printed and returned to the field team supervisor or analytical chemist for review. During this review, any missing or incomplete data are corrected and sent back for addition to the data base. Miscoded information is corrected and documented. Conflicting sample identification codes are reviewed and resolved by data management personnel working with field and analytical staff.

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