# PROJECT SPECIFIC PLAN FOR SAMPLING OF MISCELLANEOUS AREAS FOR OSDF WAC ATTAINMENT

## SOIL AND DISPOSAL FACILITY PROJECT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

MAY 24, 2001

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

20600-PSP-0001
REVISION A
DRAFT

# PROJECT SPECIFIC PLAN FOR SAMPLING OF MISCELLANEOUS AREAS FOR OSDF WAC ATTAINMENT

**20600-PSP-0001**
**Revision A**
**Draft**

**May 24, 2001**

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**FERNALD ENVIRONMENTAL MONITORING PROJECT**

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ASL | analytical support level |
| ccpm | corrected counts per minute |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CLP | Contract Laboratory Program |
| COC | constituent of concern |
| CRDL | contract required detection limit |
| DOE | U.S. Department of Energy |
| DQO | Data Quality Objectives |
| EPA | U.S. Environmental Protection Agency |
| FEMP | Fernald Environmental Management Project |
| FTF | Fire Training Facility |
| GPC | gas proportional counter |
| HPGe | high-purity germanium (detector) |
| HWMU | Hazardous Waste Management Unit |
| ICP/AES | inductively coupled plasma/atomic emission spectroscopy |
| ICP/MS | inductively coupled plasma/mass spectroscopy |
| μg/kg | micrograms per kilogram |
| μg/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| ml | milliliter |
| OSDF | On-Site Disposal Facility |
| OU | Operable Unit |
| PCBs | polychlorinated biphenyls |
| pCi/g | picoCuries per gram |
| PID | photoionization detector |
| ppm | parts per million |
| PSP | Project Specific Plan |
| QA | Quality Assurance |
| RA | Removal Action |
| RCRA | Resource Conservation and Recovery Act |
| RI/FS | remedial investigation/feasibility study |
| ROD | Record of Decision |
| RSS | Radiation Scanning System |
| RTIMP | Real-Time Instrumentation Measurement Program |
| SCQ | Sitewide CERCLA Quality Assurance Project Plan |
| SED | Sitewide Environmental Database |
| SEP | Sitewide Excavation Plan |
| SP-7 | Soil Stockpile 7 |
| SWL | Solid Waste Landfill |
| TAL | Target Analyte List |
| TCLP | Toxicity Characteristic Leaching Procedure |
| V/FCN | Variance/Field Change Notice |
| VOC | volatile organic compound |
| WAC | waste acceptance criteria |
| WAO | Waste Acceptance Organization |

# 1.0 INTRODUCTION

## 1.1 PURPOSE

This project specific plan (PSP) has been developed to investigate miscellaneous waste acceptance criteria (WAC) attainment uncertainties at three locations of the Fernald Environmental Management Project (FEMP). These three locations include the northwest corner of the Former Production Area, the Solid Waste Landfill (SWL), and the Fire Training Facility (FTF). The location of these areas is illustrated on Figure 1-1.

The northwest corner of the Former Production Area, which is within Area 6 and will be sampled to ensure WAC compliance as required by the Sitewide Excavation Plan (SEP) and the WAC Attainment Plan for the On-Site Disposal Facility (OSDF). The existing data in this area is not sufficient to confirm WAC attainment, which is required before excavation or staging activities can be conducted in this area.

A small area in the southeastern quadrant of the SWL will be sampled to confirm/bound above-WAC uranium contamination identified at three locations during remedial investigation/feasibility study (RI/FS) characterization. One of the locations will also be sampled to investigate lead contamination that may exceed the Resource Conservation and Recovery Act (RCRA) regulatory level.

A single location in the FTF will be sampled to confirm previous WAC attainment determination using existing data for material that was excavated from the FTF and stored in drums.

Sampling activities carried out under this PSP will be performed in accordance with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), the SEP, the WAC Attainment Plan for the OSDF, and Data Quality Objectives (DQO) SL-048, Revision 5 (Appendix B).

## 1.2 KEY PROJECT PERSONNEL

The team members responsible for coordination of work in accordance with this PSP are listed in Table 1-1.

**TABLE 1-1**
**KEY PROJECT PERSONNEL**

| Title | Primary | Alternate |
|---|---|---|
| DOE Contact | Rob Janke | Kathi Nickel |
| Area Project Manager | Tom Crawford | Jyh-Dong Chiou |
| Characterization Manager | Frank Miller | Deanna Diallo |
| Real-time Instrumentation Measurement Program (RTIMP) Manager | Joan White | Dave Allen |
| RTIMP Field Lead | Dave Allen | Dale Seiller |
| Field Sampling Lead | Tom Buhrlage | Jim Hey |
| Surveying and Mapping Lead | Jim Schwing | Andy Clinton |
| Waste Acceptance Operations (WAO) Contact | Linda Barlow | Derek Rocket |
| FEMP Sample Management Office Contact | Denise Arico | Denise Arico |
| Data Management Lead | Deanna Diallo | Bill Westerman |
| Data Validation Contact | Vicky Zimmerman | Jim Cross |
| Quality Assurance Contact | Reinhard Friske | Mike Godber |
| Health and Safety Contact | Debbie Grant | Phil Thomas |

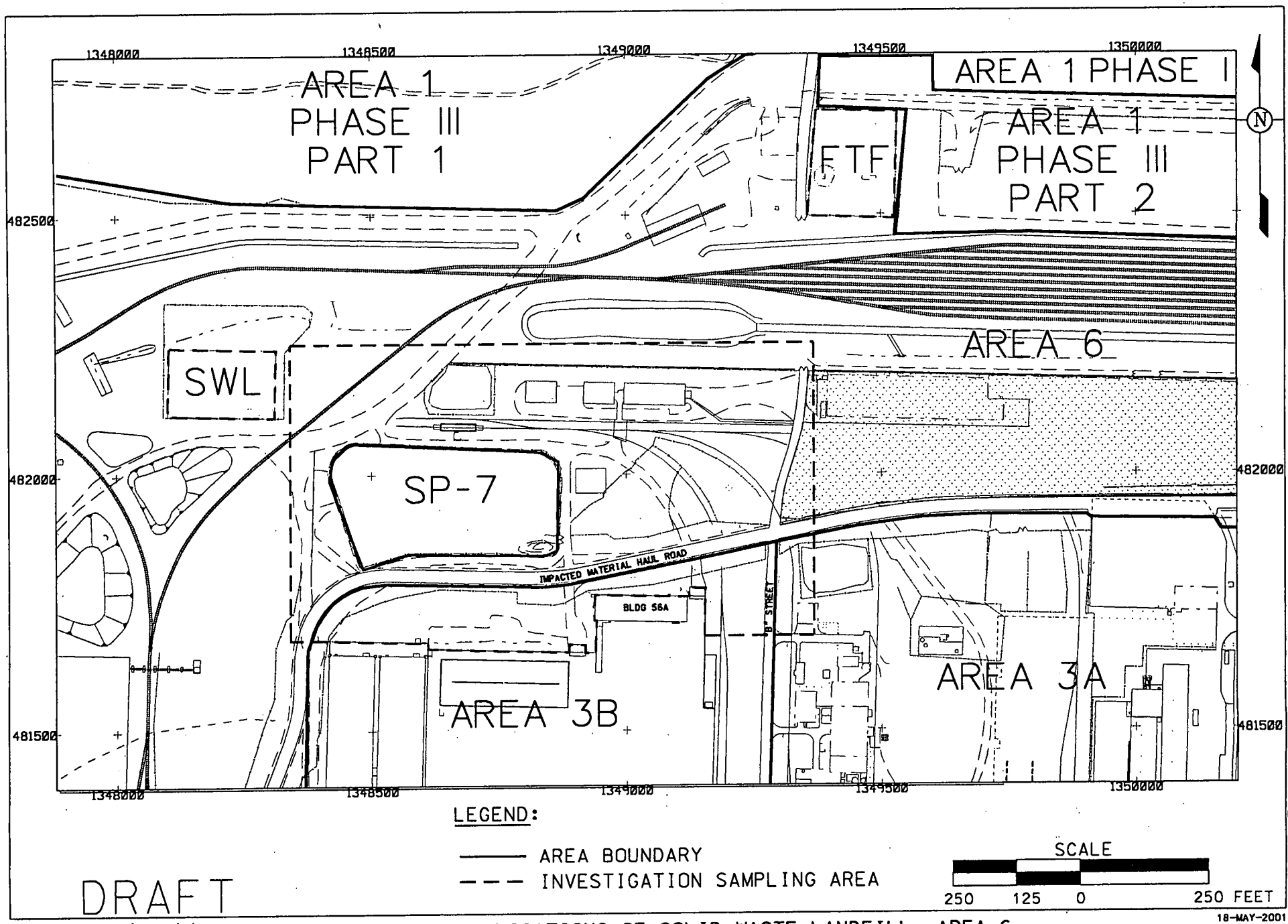


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FIGURE 1-1. LOCATIONS OF SOLID WASTE LANDFILL, AREA 6 AROUND SP-7 AND FIRE TRAINING FACILITY

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# 2.0 SAMPLING IN THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

## 2.1 HISTORY

The northwest corner of the Former Production Area was formerly located in Area 3 and due to area boundary adjustments is now located in Area 6. A historical data pull was collected from the Sitewide Environmental Database (SED). All historical data in the area is below OSDF WAC, except for two locations (Figure 2-1). Sample location zone 1-321-R is above-WAC [≥1030 parts per million (ppm)] for total uranium at two sample depth intervals. Sample depth interval 0.0 to 0.5 feet indicated total uranium contamination of 2521.17 ppm and sample depth interval 0.5 to 1.0 feet measured 1743.85 ppm. Sample location zone 1-273-R is above WAC for total uranium at three sample depth intervals. Sample depth interval 0.0 to 0.5 feet indicated total uranium contamination of 12321.30 pCi/g for total uranium, sample depth interval 0.5 to 1.0 measured is 4921.4 ppm and sample depth interval 1.0 to 1.5 measured 1050.0 ppm.

Recent Radiation Scanning System (RSS) was conducted in this area and detected no above-WAC measurements. Some areas were inaccessible to the real-time equipment. High RSS results identified in the Figure A-1 in Appendix A are not accurate results due to shine interference by nearby T-hoppers and physical sampling will be conducted in this area. All historical data locations are presented on Figure 2-1 and all historical physical WAC attainment data results are listed in Appendix A, Table A-1. Real-time gamma spectrometry and HPGe measurements over the surface were conducted in accordance with Variance/Field Change Notice (V/FCN) 20310-PSP-0001-2 of the RTIMP WAC Attainment Scanning Miscellaneous Areas PSP. All real-time data is presented in Appendix A (Figures A-1and A-2).

## 2.2 SCOPE

Under this PSP, soil sampling will be conducted to identify soil contamination above the OSDF WAC. The area to be sampled excludes Soil Stockpile 7 (SP-7), which is located within the investigation boundary. Samples will be collected where no data is currently available and bias sample locations will be collected based on real-time measurements and historical data. If above-WAC contamination is found, additional bias samples will be collected to adequately bound the above-WAC material. These additional sample locations and intervals will be identified in a V/FCN to this PSP.

## 2.3 DETERMINATION OF WAC CONSTITUENTS OF CONCERN

The WAC constituents of concern (COCs) retained for this area will be determined by evaluating each WAC constituent in remediation areas 3 and 6 (since a portion of the area was formerly located in Area 3), the historical physical data on Figure 2-1, and the real-time measurements listed in Appendix A (Figures A-1 and A-2).

### Radionuclides

The WAC radionuclide COCs within these remediation areas are total uranium, technetium-99, neptunium-237, and strontium-90. Although all but two historical samples from this area are below WAC, high real-time total uranium results were detected and co-located above-WAC technetium-99 has been detected in many areas of the site. Therefore, total uranium and technetium-99 will be retained as WAC COCs. The OSDF WAC limits for neptunium-237 and strontium-90, however, are much higher than detected concentrations at the site. The WAC for neptunium-237 is $3.12 \times 10^9$ picoCuries per gram (pCi/g), while the highest soil activity measured on site for neptunium-237 is 37.2 pCi/g. Similarly, the WAC for strontium-90 is $5.67 \times 10^{10}$ pCi/g, while the highest soil activity measured on site for strontium-90 is 47.6 pCi/g. Therefore, neptunium-237 and strontium-90 will not be retained as WAC COCs for this area.

### Organics

The WAC volatile organic COCs listed in the SEP within Areas 3 and 6 are bromodichloromethane, 1,1-dichloroethene, and tetrachloroethene. In addition to the WAC COCs listed for Areas 3 and 6, previous investigations of the Former Production Area have shown contamination of 1,2-dichloroethene and trichloroethene. Site process knowledge suggests no VOCs are expected to be present in this area. As a precaution, photoionization detector (PID) screening of all soil cores will be conducted during sampling. If sustained PID concentrations 5 parts per million (ppm) above background are detected, VOC analysis will be conducted for bromodichloromethane, 1,1-dichlorethene, 1,2-dichlorethene, tetrachloroethene, and trichloroethene and documented in a V/FCN.

### Metals

This area is not in any of the six geographical areas of the FEMP identified in the Operable Unit 5 Record of Decision (ROD) as having a reasonable potential for the presence of soil that qualifies as RCRA characteristic area. Based on this process knowledge, Toxicity Characteristic Leaching Procedure (TCLP) metals analyses will not be conducted in the sampling of this area.

Therefore, the following WAC COCs were retained for further investigation:

- Total uranium
- Technetium-99
- VOCs (if detected during PID screening).

## 2.4 WAC SAMPLING STRATEGY

In accordance with the SEP and OSDF WAC Attainment Plan, the number of samples determined to adequately characterize this area is collectively based on the historical data set, process knowledge of the area, and the highest real-time measurements. Samples locations were located where no physical data has been collected. Bias samples were placed where real-time measurements were high and one confirmation bias sample was placed at the above-WAC historical sample location zone 1-321-R. Bounding samples will be placed around historical sample location zone 1-273-R. All borings will be advanced to a depth of 3.5 feet into soil. A minimum of two sample depth intervals will be collected for analysis, 0.0 to 0.5 feet and 3.0 to 3.5 feet. If the sample point is in a gravel area, the 0.0 to 0.5 feet interval will be the first soil interval below the gravel. Additional bias samples may be collected as described in Section 5.3.

## 2.5 SELECTION OF WAC ATTAINMENT SAMPLE LOCATIONS

Sample locations are based on a combination of real-time data and historical sample locations. The proposed boring locations are shown on Figure 2-2. A minimum of 22 borings and 54 sample intervals will be collected and analyzed for Target Analyte List (TAL) A (Appendix D). Additional samples may be collected depending on field beta/gamma readings and/or PID readings (see Section 5.3). Sample locations will be surveyed and flagged with a location identifier prior to sampling.

### 2.5.1 REAL-TIME BIAS SAMPLE LOCATIONS

Four bias sample locations were selected based on real-time measurements. Sample locations A6-15, A6-16 and A6-17 are located where real-time measurements were inaccurate due to shine from the T- hoppers. Sample location A6-13 was selected because it is the location of the highest real-time result.

### 2.5.2 HISTORIAL BIAS SAMPLE LOCATIONS

Sample location A6-14 had a historical sample result of 2521.17 ppm at a depth of 0.0 to 0.5 feet and 1743.85 ppm at a depth of 0.5 to 1.0 feet for total uranium. Recent real-time measurements at this

location show total uranium less than 400 ppm. Since real-time measurements indicate this location is below-WAC only one physical sample will be placed at the original location to confirm below WAC.

Sample location A6-18 had a historical sample result of 12321.30 pCi/g at a depth of 0.0 to 0.5 feet, 4921.4 ppm at a depth of 0.5 to 1.0 feet and 1050.0 at a depth of 1.0 to 1.5 feet for total uranium. Real-time measurements at this location also indicate this location is above-WAC. HPGe measurements were taken approximately 6 feet from the original location to tentively bound the sample. These results are below WAC. Five bias samples will be placed in this area to bound the above-WAC contamination. A6-18 is at the original sample location and A6-19, A6-20, A6-21, A6-22 are 5 feet from the original location as shown in Figure 2-2. All five borings will be advanced to a depth of 5 feet. Sample intervals collected will be 0 to 0.5, 1.0 to 1.5, 2.5 to 3.0 and 4.5 to 5.0 feet.

## 2.6 SAMPLE IDENTIFICATION

All soil samples collected for laboratory analysis will be assigned a unique sample identifier, as listed in Appendix C, Table C-1. This identifier will consist of a prefix designating the area name (A6), followed by the sample point number (1 through 22), followed by the depth interval number, followed by a letter designating the type of sample ("R" for radionuclides). For example:

> A6-11-1-R is the sample collected from Area 6 at sample point 11 at depth interval 1 (0 to 0.5 feet) and is being analyzed for radionuclides.

Biased samples collected as a result of beta/gamma or PID screening will have a "B" designator after the sample interval number. An "R" will designate total uranium analysis and an "L" will designate VOC analysis. For example:

> A6-2-5-B-R is a biased sample collected at sample point 2 at depth interval 5 (2.0 to 2.5 feet) and is being analyzed for total uranium and technetium-99.

> A6-2-5-B-L is a biased sample collected based on a PID reading at depth interval 5.

If a boring location requires multiple borings due to encountering debris below the surface, or if a boring is moved after attempting the original location, the boring grid identifier will be designated with an alphabetic suffix (e.g., 7A or 7B). A maximum of three attempts will be made to collect the sample at the original boring location. Therefore, a sample collected during the second attempt at sample point 2 and depth interval 3 would be A6-2A-3-R.

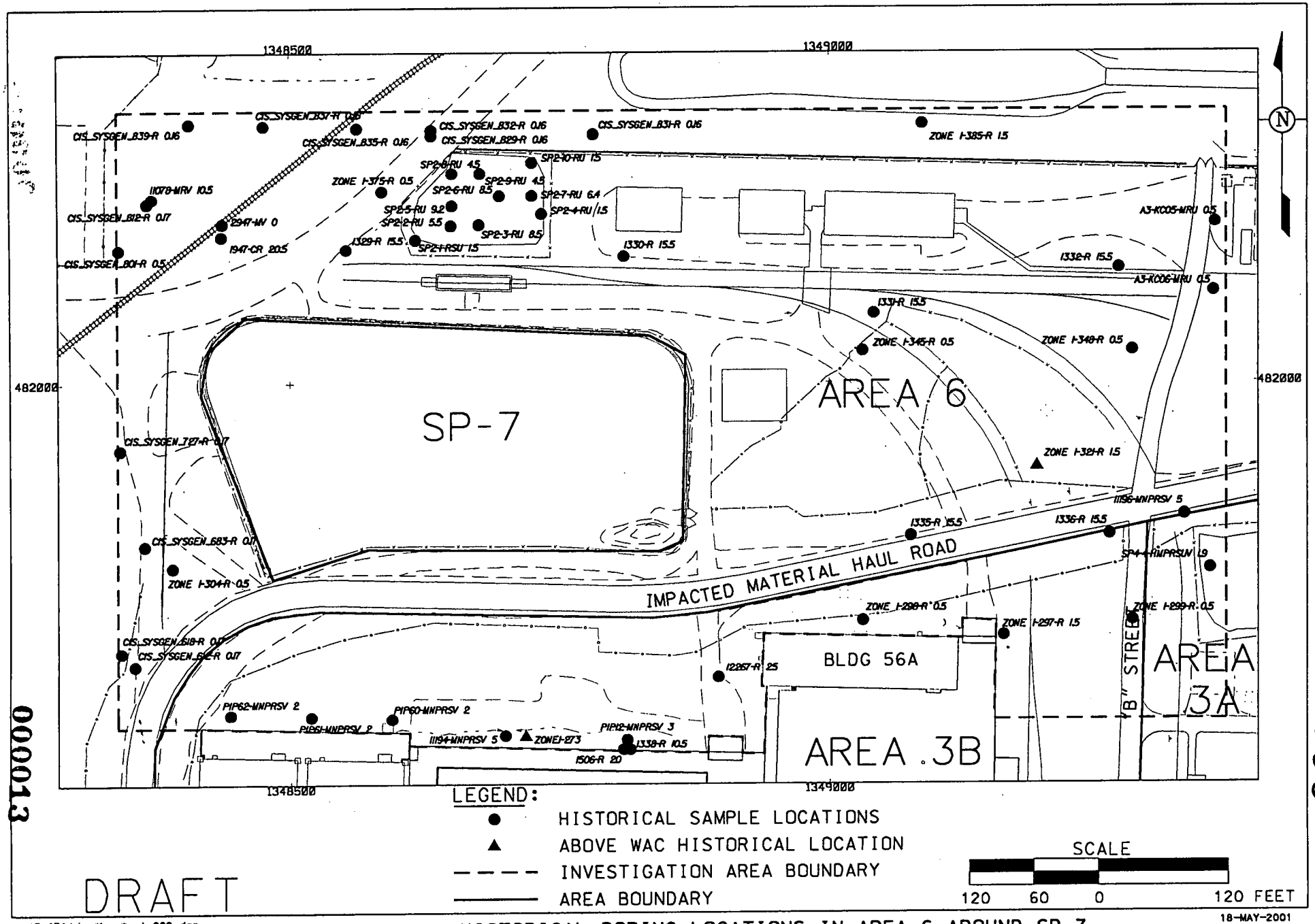


FIGURE 2-1. HISTORICAL BORING LOCATIONS IN AREA 6 AROUND SP-7

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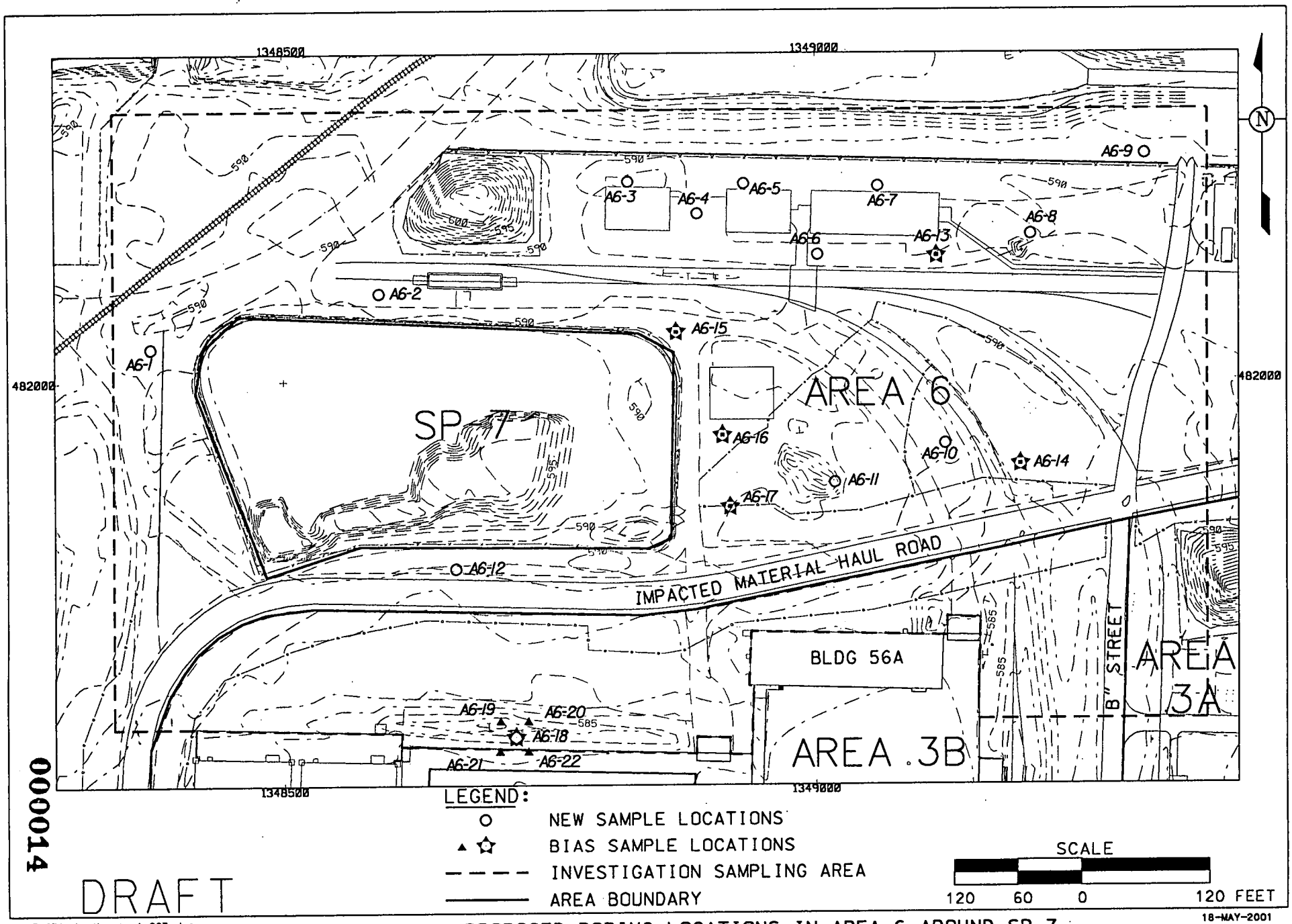


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FIGURE 2-2. PROPOSED BORING LOCATIONS IN AREA 6 AROUND SP-7

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# 3.0 SOLID WASTE LANDFILL SAMPLING

## 3.1 HISTORY

The Solid Waste Landfill (SWL) is located in the northeastern corner of Waste Storage Area, west of the Former Production Area. This landfill covers a flat, rectangular area of approximately 1 acre and has been inactive since 1986. Although its operational history is not well documented, limited operational records indicate that dumping commenced in mid-1974. The facility was planned as a sanitary landfill for non-burnable trash. Materials reportedly buried include non-burnable and non-radioactive solid wastes (cafeteria waste, rubbish, etc.), non-radioactive construction-related rubble, and double-bagged and bulk quantities of non-radioactive asbestos. A trenching investigation conducted in 1992 encountered burnable wastes (bagged trash and wood), possible burnable trash (respirator cartridges, asphalt roofing materials, medical wastes, firehoses, and rubber hoses/belts), and non-burnable wastes (unidentified high activity radioactive waste, medicine vials, bagged asbestos, ceramic tiles, possible magnesium fluoride, glass acid bottles, steel cables/cans, paint cans, and copper tubing). RI/FS borings (Figure 3-1) indicated the depth of waste material over most of the landfill to be 10 feet or less below current ground level, although a few borings detected waste material at depths up to 20 feet deep in the southeastern corner. Total volume of waste material is calculated to be approximately 14,425 cubic yards.

## 3.2 SCOPE

Seven borings will be completed to a depth of 8 feet to vertically and laterally bound an area of subsurface above-WAC total uranium contamination identified during RI/FS sampling at three boring locations in the southeastern quadrant of the SWL. One of the borings will also be sampled for TCLP lead at a location where total lead contamination was detected at a level greater than 20-times the TCLP regulatory limit.

## 3.3 DETERMINATION OF WAC AND RCRA COCs

A search of the SED for data from all borings in the SWL (Figure 3-1) was performed to identify all constituents present at concentrations that meet or exceed the OSDF WAC. Total uranium at three locations was identified as exceeding the OSDF WAC. The same data was reviewed to identify any constituents that exceed the regulatory limits for RCRA characteristic material. Total lead concentration at one location (also above WAC for uranium) exceeded the 20-times rule threshold.

The historical data for uranium and lead analysis at the three locations to be investigated (Figure 3-2) are listed in Appendix A, Table A-2.

## 3.4 SELECTION OF WAC ATTAINMENT SAMPLE LOCATIONS

Five borings to a depth of 8 feet will encircle the above-WAC total uranium contamination area to provide lateral bounding. Samples will be collected for total uranium analysis to a depth of 8 feet at the two locations where RI/FS sampling detected above-WAC levels of total uranium without nearby bounding at depth. One of the above-WAC uranium locations will also be sampled for TCLP lead to confirm that material at the depth at which a RI/FS sample for total lead exceeding the "20 times rule" was collected does not exceed RCRA TCLP regulatory limits (Figure 3-2).

## 3.5 SAMPLING STRATEGY

Above-WAC levels [≥1030 milligrams per kilogram (mg/kg)] of subsurface total uranium contamination were identified in RI/FS Borings 11036, 1986, and 1722 (Figure 3-2, Appendix A, Table A-2). A total uranium concentration of 1770 mg/kg was identified at a depth of 2.5 to 5 feet at Boring 11036, with vertical bounding at the next deepest sample interval of 15-17 feet (3.2 mg/kg). An above-WAC level of 1280 mg/kg total uranium was detected at a depth of 2.5 to 5 feet at Boring 1986, with vertical bounding at 5 to 7.5 feet (146 mg/kg). A total uranium result of 1247 mg/kg was identified at Boring 1722 at a depth of 3 to 4.5 feet, with vertical bounding at the next deepest sample interval of 11 to 13 feet (19.4 mg/kg). A total lead concentration of 147 mg/kg, exceeding 20-times the RCRA TCLP regulatory level (100 mg/kg), was also detected at a depth of 1.5to 3 feet at this boring.

A total of 36 total uranium samples will be collected at seven boring locations (Appendix C, Table C-2). Total uranium samples will be collected every foot below the surface where RI/FS samples were not collected at the lateral bounding points and every foot to a depth of 8 feet, for vertical bounding at the two above-WAC uranium borings without near interval vertical bounding. Also, two TCLP lead samples will be collected to identify possible RCRA characteristic lead material at one RI/FS location. (Figure 3-2).

Proposed Borings SWL-6 and SWL-7 will be completed beside RI/FS boring locations 11036 and 1722, respectively, to a depth of 8 feet, to provide vertical bounding of above-WAC total uranium (TAL B, Appendix D) contamination at those locations. Samples for TCLP lead analysis (TAL D, Appendix D)

will also be collected at depth intervals of 1.5 to 3 and 3 to 4 feet at Boring SWL-7 to ensure that lead contamination at that depth does not exceed the RCRA regulatory level (Figure 3-1, Table C-2). An additional five proposed borings, SWL-1 through SWL-5, will be completed to a depth of 8 feet, encircling the three RI/FS above-WAC- total uranium borings, to provide lateral bounding. Proposed borings SWL-2 through SWL-5 will be located near existing RI/FS boring locations that provide partial lateral bounding, and proposed boring SWL-1 will fill a bounding gap to the northwest of the above-WAC uranium area (Figure 3-2, Table C-2).

To avoid boring into disturbed material from the original RI/FS borings, side-by-side Borings SWL-4 through SWL-7 will be offset 2 feet from the nearby RI/FS borings. Borings SWL-2 and SWL-3 will be offset 8 and 5 feet, respectively, to avoid boring through disturbed material from nearby trenching activity done in 1992.

Collection of samples will not be required in the event of encountering perched water.

## 3.6 SAMPLE IDENTIFICATION

All soil samples collected for laboratory analysis will be assigned a unique sample identifier, as listed in Appendix C (Table C-2). This identifier will consist of a prefix designating the area name (SWL), followed by the sample point number (1 through 7), followed by the depth interval number, followed by a letter designating the type of sample ("R" for total uranium or "TM" for TCLP Lead). For example:

> SWL-6-2-R is the sample collected at sample point 6 at depth interval 2 (0.5 to 1.0 feet) in the Solid Waste Landfill and is being analyzed for total uranium.

Biased samples collected as a result of beta/gamma or PID surveys will have a "B" designator after the sample interval number. An "R" will designate total uranium analysis and "L" will designate VOC analysis. For example:

> SWL-2-5-B-L is a biased sample collected at sample point 2 at depth interval 5 (2.0 to 2.5 feet) and is being analyzed for VOCs.

If a boring location requires multiple borings due to refusal or encountering debris, subsequent attempts will use a boring identifier with an alphabetic suffix (e.g., 2A or 2B). A maximum of three attempts will be made to collect the sample at the original boring location. Therefore, a sample collected from sample depth interval 3 during the second attempt at sample point 2 would be SWL-2A-3-R.

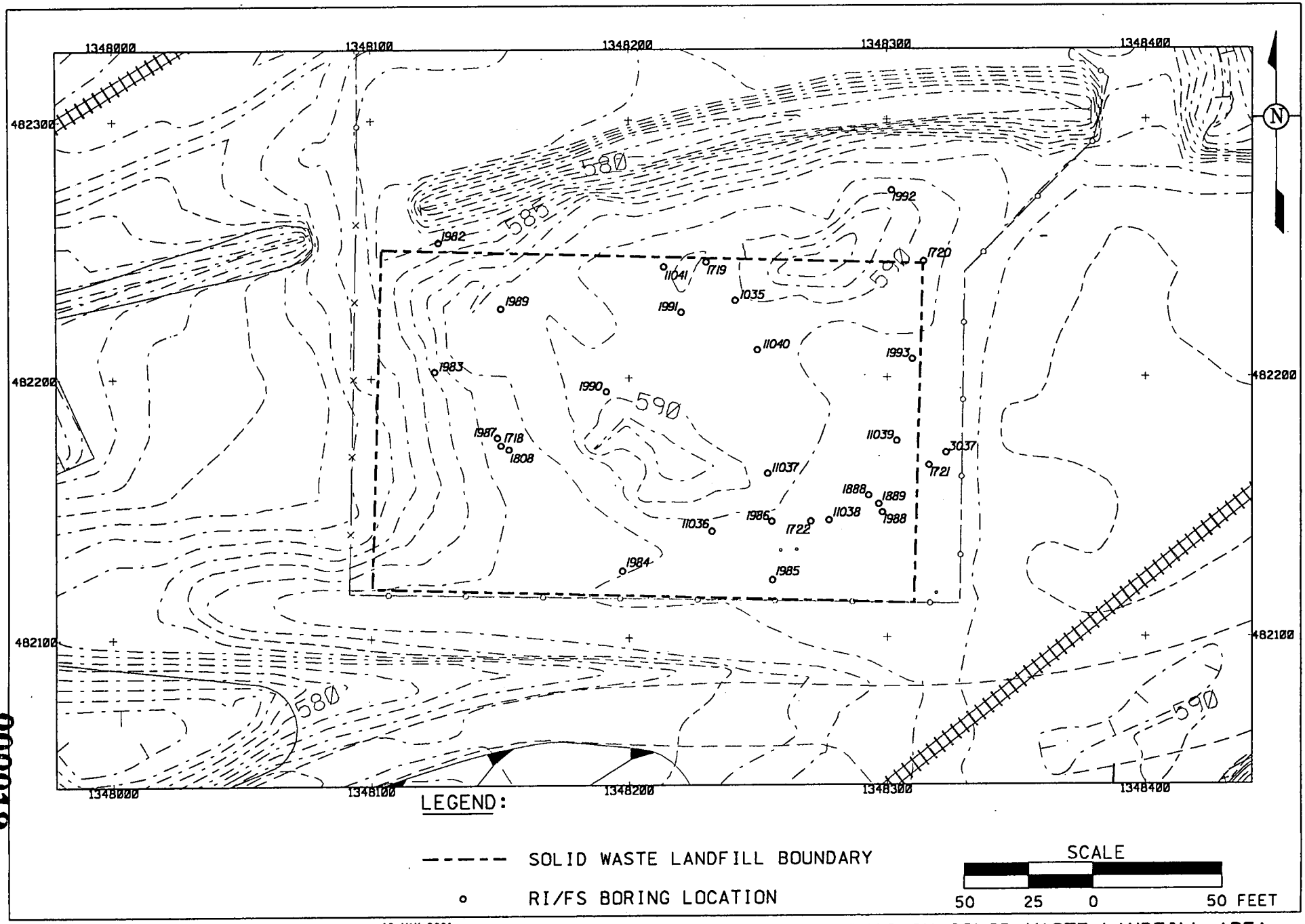


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FIGURE 3-1. HISTORICAL BORINGS IN SOLID WASTE LANDFILL AREA

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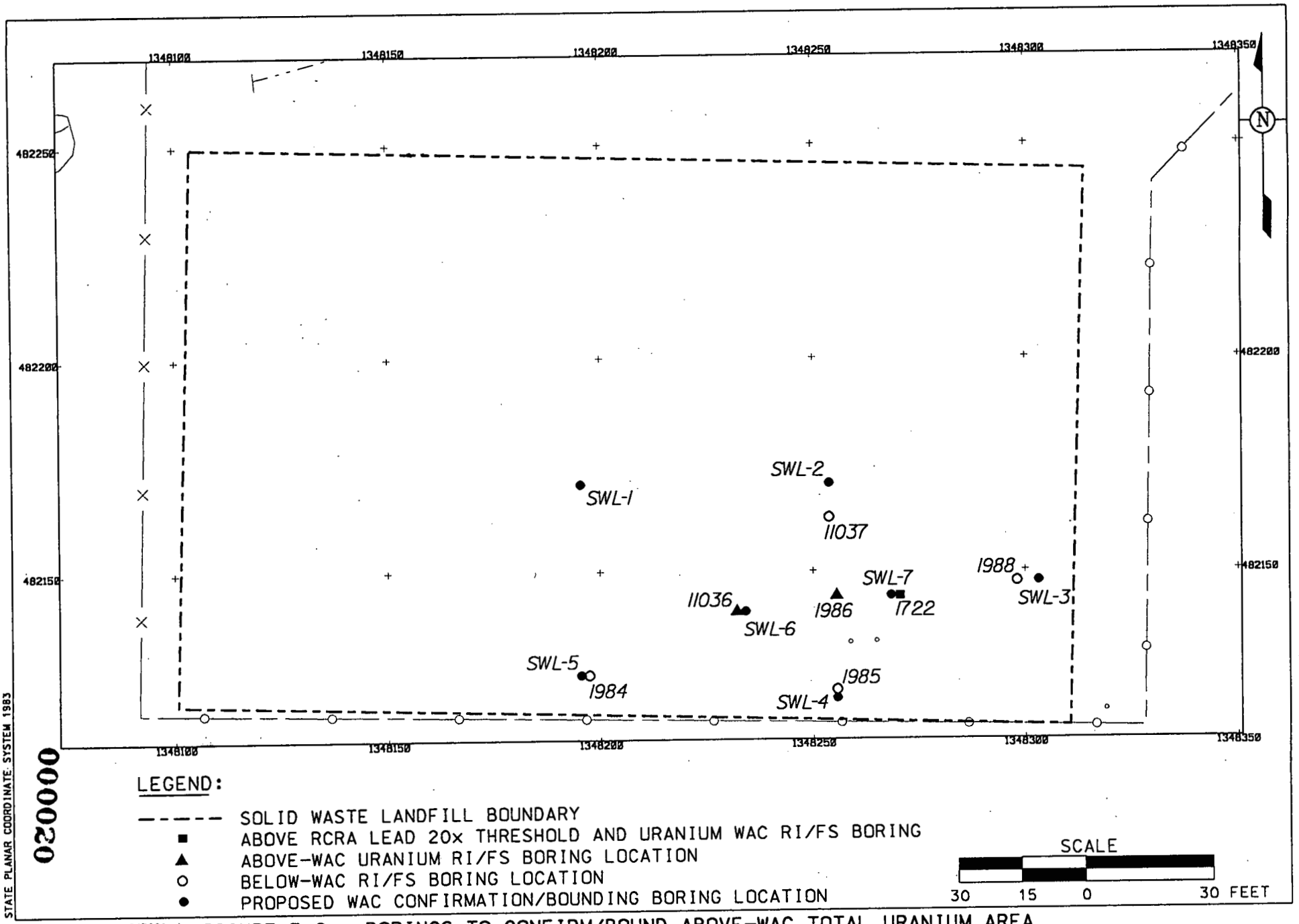


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FIGURE 3-2. BORINGS TO CONFIRM/BOUND ABOVE-WAC TOTAL URANIUM AREA AND POTENTIALLY LEAD RCRA CHARACTERISTIC LOCATION IN SOLID WASTE LANDFILL

# 4.0 FIRE TRAINING FACILITY SAMPLING

## 4.1 HISTORY

The Fire Training Facility (FTF) is located in Area 6 along the northern fence-line of the Former Production Area. The FTF was constructed in 1966 as a training facility for the Fernald Site fire department and the surrounding community fire departments. It operated from 1966 to 1990 and contained a block building, skid tank, open top tank, horizontal pressure vessel, metal burn areas, and a former drum storage area. The flammable and combustible substances used to start fires at the FTF were determined to have contained hazardous and radiological materials. As a result, the FTF site and components became contaminated with hazardous materials, low level radioactive materials, and low levels of Polychlorinated Biphenyls (PCBs).

In August 1991, the FTF was declared a Hazardous Waste Management Unit (HWMU) 1 under RCRA. The FTF was also identified as a Removal Action (RA) 28 subject to the regulations associated with CERCLA. Removal Action No. 28 was initiated in July 1994 and concluded in April 1995. The removal action included: removing each structure in the FTF; excavating each area of contamination in the FTF; collecting pre- and post-excavation samples of each area; and, back-filling each area. Sampling results were used to determine requirements for containerization and disposition of the resulting waste. The soil excavated was containerized and stockpiled and stored in a designated on-site storage facility pending final disposition.

## 4.2 SCOPE

Under this PSP, one soil sample will be collected to investigate possible soil contamination above the OSDF WAC for 4-nitroaniline. The WAC for 4-nitroaniline is 44.2 micrograms per kilogram ($\mu$g/kg). Because current analytical methods are unable to achieve reliable detection levels at the WAC for this constituent, the current U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) contract required detection limit (CRDL) of 830 $\mu$g/kg for 4-nitroaniline will be used as the WAC attainment value when evaluating data collected under this PSP.

## 4.3 DETERMINATION OF WAC COCs

One historical sample result (Sample ID 200105523) for 4-Nitroaniline identified an above-WAC result (Appendix A, Table A-3). This location will be resampled to confirm the original sample result. In addition to 4-nitroaniline, boron, carbazole, chloroethane, neptunium-237 and technetium-99 will be

analyzed. These WAC constituents were not initially analyzed for in this previous sample. Therefore, these constituents will also be analyzed to support OSDF WAC attainment.

## 4.4 SELECTION OF WAC ATTAINMENT SAMPLE LOCATIONS

This sample point will be located at the original location that indicated contamination above-WAC (Figure 4-1). The sample intervals will be collected and analyzed for TAL E and TAL F (Appendix D). This sample location will be surveyed and flagged prior to sampling.

## 4.5 SAMPLE IDENTIFICATION

All soil samples collected for laboratory analysis will be assigned a unique sample identifier, as listed in Appendix C, Table C-3. This identifier will consist of a prefix designating the area name (FTF), followed by the sample point number (1), followed by the interval number, followed by a letter designating the type of sample ("R" for radionuclides, "S" for semi-volatiles, "L" for volatiles, "M" for inorganics). For example:

> FTF-1-1-R is the sample collected at sample point 1 at depth interval 1 (0.0 to 0.5 feet) in the Fire Training Facility and is being analyzed for radionuclides.

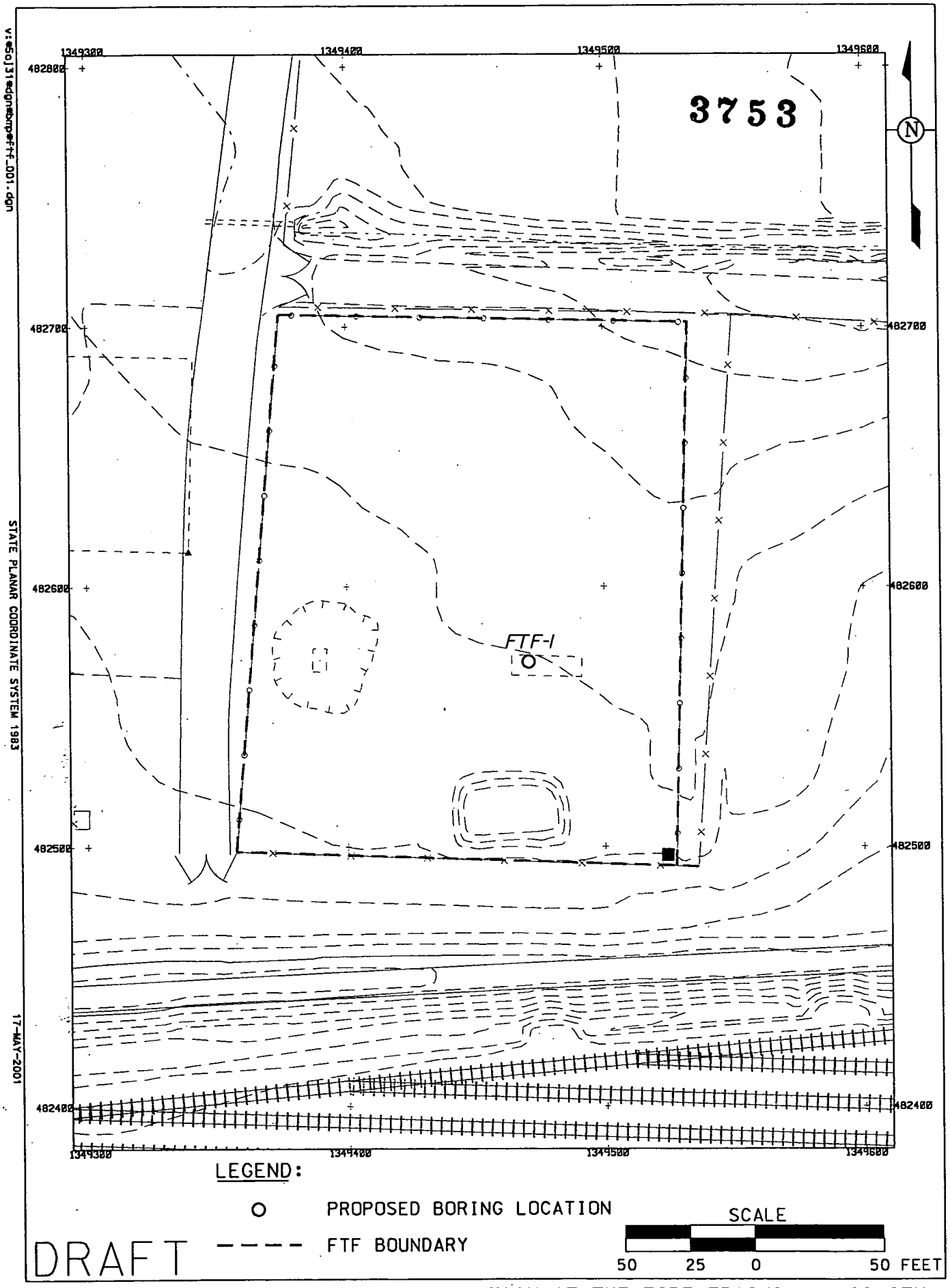


FIGURE 4-1. PROPOSED BORING LOCATION AT THE FIRE TRAINING FACILITY

# 5.0 SAMPLE COLLECTION METHODS

Samples will be collected using the Geoprobe® Model 5400 in accordance with Procedure EQT-06, Geoprobe® Model 5400 – Operation and Maintenance, where locations support the safe operation of the Geoprobe® vehicle. Hand augering or direct-push liner sampling will be conducted in accordance with Procedure SMPL-01, Solids Sampling, when the Geoprobe® cannot be used. At each sampling location, the surface vegetation within a 6-inch radius of the sample point will be removed using a stainless steel trowel or by hand with clean nitrile gloves while taking care to minimize the removal of any soil.

Soil samples will be collected from the sample intervals identified in Appendix C. If additional volume is necessary, samples will be collected from adjacent intervals and recorded on the appropriate field documentation.

All borings will be completed to at least 0.5 to 1.0 feet below the estimated depth identified in Appendix C, for field screening purposes. If refusal is encountered during the soil borings, up to two additional borings within a 3-foot radius of the original point may be conducted. Boreholes in the northwest corner of the Former Production Area and the FTF area will be manually collapsed following sample collection to eliminate the possibility of injury to workers. Borings in the SWL, due to their depth, will require plugging with bentonite pellets or a bentonite grout slurry immediately after sampling is completed.

If pellets are used, they will be placed in the borehole in 2-foot intervals, then hydrated with potable water.

## 5.1 GEOPROBE METHODS

When the Geoprobe® is used, a Geoprobe® Model 5400 with the dual-tube or macro-core sampling system will be utilized to collect the target depth intervals for the soil samples specified in Appendix C. The dual tube must be used for borings with depths that exceed 5 feet, where perched water is expected, where significant surface soil contamination is known to exist, or where significant sidewall sloughing is anticipated. Multiple cores may be collected at each sampling location (not to exceed a 3-foot radius of the identified sample location) to obtain sufficient sample volume for analysis if complete sample recovery is not obtained.

## 5.2 MANUAL SAMPLING METHODS

If Geoprobe® accessibility is not possible, soil samples will be collected using a hand auger (typically 3-inch diameter) or other methods specified in SMPL-01, Solids Sampling. The hand auger will be advanced in approximately 6-inch increments. As with core sampling, multiple holes at one sampling location (not to exceed 3 feet apart) may have to be augered to obtain sufficient volume for laboratory analysis. The same hand auger may be used through the entire depth of a single boring but will be wiped visually clean. If a frisker reading is above background, the hand auger will be decontaminated to Level II. Borehole collapse will be monitored during core sampling to ensure sidewall slough is accounted for during augering and sample collection. The borehole will be manually collapsed following sample collection to eliminate the possibility of injury to workers.

## 5.3 BIASED SAMPLE SELECTION

At a minimum, the sample locations summarized in Appendix C will be collected. The soil from each boring will be radiologically screened using a beta/gamma (Geiger-Mueller) survey meter and all results will be recorded on the Field Activity Log (FAL). The entire length of the soil core (or cuttings in the case of hand augering) will be surveyed to determine any intervals with beta/gamma readings above 400 corrected counts per minute (ccpm), as established in Appendix D of the Area 2, Phase I Integrated Remedial Design Package. A biased sample will be collected from any interval exceeding 400 ccpm and analyzed for total uranium only (Appendix D, TAL B). If the entire soil core is found to be less than 400 ccpm, then no biased sample will be collected from that boring. Archive samples will be collected from the 6-inch intervals above and below any sample intervals that are above 400 ccpm. If the interval above or below is already designated for sampling, then no additional archive sample will be collected in that direction. In the event that biased sample intervals are above the total uranium WAC, the archive samples may be submitted for analysis in an attempt to vertically bound the contamination. All biased samples and associated analysis will be documented in a V/FCN.

The entire length of each boring will also be screened using a PID. For Geoprobe® cores, the core liners will be opened for PID screening. Any sample interval with sustained 5 ppm above-background reading on the PID will be subjected to a headspace analysis, in accordance with Procedure EQT-04, Photoionization Detector. Headspace analysis involves placing a small amount of soil into a sample container, covering the container opening with aluminum foil, placing the lid on the container, and placing it in an area where the temperature is greater than 60°F for 5 to 10 minutes. The container lid is then removed, the PID tip inserted through the aluminum foil, and a PID measurement collected for

10 seconds. The sample measurement will be recorded on the FAL. If the result of the headspace analysis is above 10 ppm, the sample interval will be submitted for VOC analysis (Appendix D, TAL C) and documented on a V/FCN.

## 5.4 SOIL SAMPLE PROCESSING AND ANALYSIS

The Geoprobe® soil cores or hand-augered soil cuttings will be laid out on clean plastic and the appropriate sample intervals (as defined in Appendix C) will be separated to obtain the necessary samples following radiological and PID field screening. Any debris (e.g., wood, concrete, metal) contained in a sample interval will be removed from the sample in the field and described on the FAL. Sampling and analytical requirements are summarized in Table 5-1. Radiological and inorganic analyses (Appendix D, TALs A, D and F) will be performed at the on-site laboratory. At the discretion of the laboratory manager, the listed method may be changed if the required detection limit is still met. Organics analyses (Appendix D, TALs C, E and G) will be sent to the Sample Processing Laboratory, where they will be prepared for shipment to an approved off-site laboratory in accordance with Procedure 9501, Shipping Samples to Offsite Laboratories. One alpha/beta screening sample from depth interval 1 (0 to 0.5 feet) will be collected and analyzed on site for samples being sent for off-site analysis.

## 5.5 EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated before transporting to the sampling site. Additionally, equipment will be decontaminated, including the core sampler cutting shoe, hand auger buckets, and other sample collection tools between boring locations. All decontamination will be Level II decontamination as specified in SMPL-01, Solids Sampling. If used, the core barrel portion of the core sampler will be wiped down between sample intervals and locations to remove visible soil or material. Decontamination of the core barrel will not be necessary when using a liner insert because the core barrel will not come into contact with the sample.

## 5.6 SAMPLE HANDLING AND SHIPPING

Samples will be processed in accordance with SMPL-01, Solids Sampling, to ensure they are documented properly and chain of custody and sample integrity are maintained. All samples will be transported from the field to the on-site Sample Processing Laboratory for analyses.

# TABLE 5-1
# SAMPLING AND ANALYTICAL REQUIREMENTS

| Analyte | TAL | Sample Matrix | Lab | ASL | Preservative | Holding Time | Container | Sample Mass (minimum) |
|---|---|---|---|---|---|---|---|---|
| Total Uranium<br>Technetium-99 | A, B | Solid | On-Site | B | None | 12 months | Appropriately-sized plastic or glass | 40 g |
| VOCs | C | Solid | Off-Site | B | Cool, 4°C | 14 days | 60 ml glass | Fill to no headspace (soil without rocks or debris) |
| TCLP Lead | D | Solid | On-Site | B | Cool, 4°C | 6 months | appropriately-sized amber glass | 300 g (soil without rocks or debris) |
| 4-Nitroaniline (SVOC)<br>Carbazole (SVOC)<br>Chloroethane (VOC) | E | Solid | Off-Site | B | Cool, 4°C | 14 days | 2X60 ml glass (SVOC)<br>60 ml glass (VOC) | Fill to no headspace (soil without rocks or debris) |
| Boron<br>Neptunium-237<br>Technetium-99 | F | Solid | On-Site | B | Cool, 4°C | 6 months | Appropriately-sized plastic or glass | 300 g |
| VOCs<br>(Trip Blank) | G | Water | Off-Site | B | Cool, 4°C<br>$H_2SO_4$,<br>pH<2 | 14 days | 3x40 ml glass | Fill to no headspace |
| Alpha/beta screen | N/A | Solid | On-site | N/A | None | None | Any container | 10 g |

ASL - analytical support level
SVOC – semi-volatile organic compound

Note: Sample container sizes for radiological samples may be changed in the field at the Field Sampling Lead's discretion.

# 6.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

## 6.1 FIELD QUALITY CONTROL SAMPLES, ANALYTICAL REQUIREMENTS AND DATA VALIDATION

In accordance with the requirements of DQO SL-048, Revision 5 (Appendix B), the field quality control, analytical, and data validation requirements are as follows:

- All laboratory analyses will be performed at ASL B
- All analytical data will require a certificate of analysis and 10 percent of the analytical data will also require the associated quality assurance/quality control results. A minimum of 10 percent of the analytical data from each laboratory will be validated to ASL B. All field data forms will be validated
- If VOC samples are collected, one trip blank will be taken each day that VOC samples are collected or one per 20 VOC samples that are collected, whichever is more frequent. In addition, a lab matrix spike duplicate will be designated on the Chain of Custody form for each organic release sent for off-site analysis.

If any sample collection or analysis methods are used that are not in accordance with the SCQ, the Project Manager and Characterization Manager must determine if the qualitative data from the samples will be beneficial to WAC attainment decision making. If the data will be beneficial, the Project Manager and Characterization Manager will ensure that:

- The PSP is revised through a V/FCN to include references confirming that the new method is sufficient to support data needs,
- Variations from the SCQ methodology are documented in the PSP, or
- Data validation of the affected samples is requested or qualifier codes of J (estimated) and R (rejected) be attached to detected and non-detected results, respectively.

## 6.2 PROJECT-SPECIFIC PROCEDURES, MANUALS AND DOCUMENTS

To assure consistency and data integrity, field activities in support of this PSP will follow the requirements and responsibilities outlined in controlled procedures and manufacturer operational manuals. Applicable procedures and manuals include the following:

- 9501, Shipping Samples to Offsite Labs
- RM-0021, Safety Performance Requirements Manual
- SMPL-01, Solids Sampling
- SMPL-21, Collection of Field Quality Control Samples

- EQT-04, Photoionization Detector
- EQT-06, Geoprobe® Model 5400 Operation and Maintenance Manual
- PSP for Real Time Instrumentation Measurement Program WAC Attainment Scanning in Miscellaneous Areas
- Sitewide CERCLA Quality Assurance Project Plan (SCQ)
- Sitewide Excavation Plan (SEP)
- WAC Attainment Plan for the OSDF.

## 6.3 PROJECT REQUIREMENTS FOR INDEPENDENT ASSESSMENTS

Project management has ultimate responsibility for the quality of the work processes and the results of the sampling activities covered by this PSP. The Quality Assurance (QA) organization may conduct independent assessments of the work process and operations to assure the quality of performance. Assessment will encompass technical and procedural requirements of this PSP and the SCQ. Independent assessments will be performed by conducting a surveillance. Surveillances will be planned and documented according to Section 12.3 of the SCQ.

## 6.4 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes or variances, the Field Sampling Lead must obtain written or verbal approval (electronic mail is acceptable) from the Characterization Lead, the QA Representative, and the WAO Representative before the changes may be implemented. Changes to the PSP will be noted in the applicable FALs and on a V/FCN. QA must receive the completed V/FCN, which includes the signatures of the Characterization Manager, Sampling Lead, Project Manager, WAO, QA, and Real-Time Lead, if applicable, within seven working days of implementation of the change.

# 7.0 HEALTH AND SAFETY

The Health and Safety Lead, Field Sampling Leads, and team members will assess the safety of performing sampling activities on the surfaces of the areas to be sampled. This will include vehicle positioning limitations, fall hazards, and vehicle stability of the Geoprobe®.

Technicians will conform to precautionary surveys performed by personnel representing the Radiological Control, Safety, and Industrial Hygiene organizations. All work on this project will be performed in accordance with applicable Environmental Monitoring procedures, RM-0021 (Safety Performance Requirements Manual), Fluor Fernald work permits, penetration permits, and other applicable permits. Concurrence with applicable safety permits (indicated by the signature of each field team member assigned to this project) is required by each team member in the performance of their assigned duties.

The Field Sampling Lead will ensure that each technician performing sampling related to this project has been trained to the relevant sampling procedures, including safety precautions. Technicians who do not sign project safety and technical briefing forms will not participate in the execution of sampling activities related to the completion of assigned project responsibilities. A copy of applicable safety permits/surveys issued for worker safety and health will be posted at the sampling area during sampling activities. A safety briefing will be conducted before initiating field activities. Sample team members and lab analytical personnel should be aware of the possible presence of asbestos in material collected from the SWL and of possible high levels of radium (>2000 pCi/g) in samples collected from Borings A6-18, A6-19, A6-20, A6-21 and A6-22. Appropriate safety precautions should be taken regarding these potential hazards.

**All emergencies shall be reported immediately on extension 911, or to the Site Communications Center at 648-6511 (if using a cellular phone), or using a radio and contacting "CONTROL" on Channel 11.**

# 8.0 DATA MANAGEMENT

A data management process will be implemented to satisfy data end use requirements after completion of field activities. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on a FAL, which should be sufficiently detailed to allow accurate reconstruction of the events at a later date without reliance on memory. Sample Collection Logs will be completed according to protocol specified in Appendix B of the SCQ and in applicable procedures. These forms will be maintained in loose-leaf form and uniquely numbered following the field sampling event. At least weekly, a copy of all field logs will be sent to the Characterization Lead.

All field measurements, observations, and sample collection information associated with physical sample collection will be recorded, as applicable, on the Sample Collection Log, the FAL, and the Chain of Custody/Request for Analysis Form as required. The sample collection method will be specified in the FAL. Borehole Abandonment Logs are not required. The PSP number will be on all documentation associated with these sampling activities.

Samples will be assigned a unique sample identifier, as explained in Sections 2.6, 3.6 and 4.5 and listed in Appendix C. This unique sample identifier will appear on the Sample Collection Log and Chain of Custody/Request for Analysis and will be used to identify the samples during analysis, data entry, and data management.

Technicians and the field data coordinator will review all field data for completeness and accuracy and then forward the data package to the Data Validation Contact for field data package validation and validation of 10 percent of all analytical data packages. The field data package will be filed in the records of the Environmental Management Project.

The Sample and Data Management organization will perform data entry into the SED. After data are in the SED, the Data Group Form (FS-F-5157) will be completed by a WAO representative with concurrence from the Characterization Lead. Field logs will be maintained in loose-leaf form during the field recording activities and will be uniquely numbered. The analytical data validation requirements are outlined in Section 6.1.

# APPENDIX A

# HISTORICAL WAC DATA

TABLE A-1
HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| 061455 | P1P61 | 1,1-Dichloroethene | 481689.29 | 1348519.38 | 1.50 | 2.00 | 5.00 | ug/kg | U |
| SP4-4-TL | SP4-4 | 1,1-Dichloroethene | 481827.00 | 1349353.00 | 0.00 | 1.50 | 5.00 | mg/L | U |
| 061463 | P1P60 | 1,1-Dichloroethene | 481687.29 | 1348594.37 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| 061470 | P1P62 | 1,1-Dichloroethene | 481691.39 | 1348444.48 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| SP4-4-B1-L | SP4-4 | 1,1-Dichloroethene | 481827.00 | 1349353.00 | 1.50 | 1.90 | 10.00 | ug/kg | U |
| SP4-4-L | SP4-4 | 1,1-Dichloroethene | 481827.00 | 1349353.00 | 0.00 | 1.50 | 10.00 | ug/kg | U |
| 099161 | P1P3 | 1,1-Dichloroethene | 481693.36 | 1349126.47 | 0.00 | 1.00 | 11.00 | ug/kg | U |
| 099162 | P1P3 | 1,1-Dichloroethene | 481693.36 | 1349126.47 | 2.00 | 3.00 | 11.00 | ug/kg | U |
| 121183 | 11196 | 1,1-Dichloroethene | 481876.64 | 1349329.08 | 1.00 | 1.50 | 11.00 | ug/kg | U |
| 122072 | 11194 | 1,1-Dichloroethene | 481671.30 | 1348699.84 | 0.00 | 0.50 | 11.00 | UG/KG | U |
| 122087 | 11194 | 1,1-Dichloroethene | 481671.30 | 1348699.84 | 4.50 | 5.00 | 11.00 | UG/KG | U |
| 121186 | 11196 | 1,1-Dichloroethene | 481876.64 | 1349329.08 | 2.50 | 3.00 | 12.00 | ug/kg | U |
| 119492 | 11078 | 1,1-Dichloroethene | 482173.00 | 1348372.56 | 0.00 | 10.00 | 12.00 | ug/kg | U |
| 122081 | 11194 | 1,1-Dichloroethene | 481671.30 | 1348699.84 | 2.50 | 3.00 | 12.00 | UG/KG | U |
| 099173 | P1P12 | 1,1-Dichloroethene | 481667.17 | 1348812.69 | 0.00 | 1.00 | 12.00 | UG/KG | U |
| 099176 | P1P12 | 1,1-Dichloroethene | 481667.17 | 1348812.69 | 2.00 | 3.00 | 12.00 | UG/KG | U |
| 111385 | 2947 | 1,1-Dichloroethene | 482149.42 | 1348437.72 | 0.00 | 0.00 | 12.00 | ug/kg | UJ |
| 121179 | 11196 | 1,1-Dichloroethene | 481876.64 | 1349329.08 | 0.00 | 0.50 | 13.00 | ug/kg | U |
| 122076 | 11194 | 1,1-Dichloroethene | 481671.30 | 1348699.84 | 1.00 | 1.50 | 13.00 | UG/KG | U |
| 121192 | 11196 | 1,1-Dichloroethene | 481876.64 | 1349329.08 | 4.50 | 5.00 | 14.00 | ug/kg | U |
| 061455 | P1P61 | 1,2-Dichloroethene (Total) | 481689.29 | 1348519.38 | 1.50 | 2.00 | 5.00 | ug/kg | U |
| 061463 | P1P60 | 1,2-Dichloroethene (Total) | 481687.29 | 1348594.37 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| 061470 | P1P62 | 1,2-Dichloroethene (Total) | 481691.39 | 1348444.48 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| 099161 | P1P3 | 1,2-Dichloroethene (Total) | 481693.36 | 1349126.47 | 0.00 | 1.00 | 11.00 | ug/kg | U |
| 099162 | P1P3 | 1,2-Dichloroethene (Total) | 481693.36 | 1349126.47 | 2.00 | 3.00 | 11.00 | ug/kg | U |
| 121183 | 11196 | 1,2-Dichloroethene (Total) | 481876.64 | 1349329.08 | 1.00 | 1.50 | 11.00 | ug/kg | U |
| 122072 | 11194 | 1,2-Dichloroethene (Total) | 481671.30 | 1348699.84 | 0.00 | 0.50 | 11.00 | UG/KG | U |
| 122087 | 11194 | 1,2-Dichloroethene (Total) | 481671.30 | 1348699.84 | 4.50 | 5.00 | 11.00 | UG/KG | U |
| 121186 | 11196 | 1,2-Dichloroethene (Total) | 481876.64 | 1349329.08 | 2.50 | 3.00 | 12.00 | ug/kg | U |
| 119492 | 11078 | 1,2-Dichloroethene (Total) | 482173.00 | 1348372.56 | 0.00 | 10.00 | 12.00 | ug/kg | U |
| 122081 | 11194 | 1,2-Dichloroethene (Total) | 481671.30 | 1348699.84 | 2.50 | 3.00 | 12.00 | UG/KG | U |
| 099173 | P1P12 | 1,2-Dichloroethene (Total) | 481667.17 | 1348812.69 | 0.00 | 1.00 | 12.00 | UG/KG | U |
| 099176 | P1P12 | 1,2-Dichloroethene (Total) | 481667.17 | 1348812.69 | 2.00 | 3.00 | 12.00 | UG/KG | U |
| 111385 | 2947 | 1,2-Dichloroethene (Total) | 482149.42 | 1348437.72 | 0.00 | 0.00 | 12.00 | ug/kg | UJ |
| 121179 | 11196 | 1,2-Dichloroethene (Total) | 481876.64 | 1349329.08 | 0.00 | 0.50 | 13.00 | ug/kg | U |



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## TABLE A-1
## HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| 122076 | 11194 | 1,2-Dichloroethene (Total) | 481671.30 | 1348699.84 | 1.00 | 1.50 | 13.00 | UG/KG | U |
| 121192 | 11196 | 1,2-Dichloroethene (Total) | 481876.64 | 1349329.08 | 4.50 | 5.00 | 14.00 | ug/kg | U |
| 061455 | P1P61 | 1,2-Dichloropropane | 481689.29 | 1348519.38 | 1.50 | 2.00 | 5.00 | ug/kg | U |
| SP2-1-S | SP2-1 | 4-Nitroaniline | 482134.00 | 1348617.00 | 0.00 | 1.50 | 820.00 | ug/kg | U |
| 121183 | 11196 | 4-Nitroaniline | 481876.64 | 1349329.08 | 1.00 | 1.50 | 940.00 | ug/kg | U |
| 122072 | 11194 | 4-Nitroaniline | 481671.30 | 1348699.84 | 0.00 | 0.50 | 950.00 | UG/KG | UJ |
| 122087 | 11194 | 4-Nitroaniline | 481671.30 | 1348699.84 | 4.50 | 5.00 | 950.00 | UG/KG | UJ |
| 121186 | 11196 | 4-Nitroaniline | 481876.64 | 1349329.08 | 2.50 | 3.00 | 990.00 | ug/kg | U |
| 122076 | 11194 | 4-Nitroaniline | 481671.30 | 1348699.84 | 1.00 | 1.50 | 1000.00 | UG/KG | UJ |
| 122081 | 11194 | 4-Nitroaniline | 481671.30 | 1348699.84 | 2.50 | 3.00 | 1000.00 | UG/KG | UJ |
| 121179 | 11196 | 4-Nitroaniline | 481876.64 | 1349329.08 | 0.00 | 0.50 | 1100.00 | ug/kg | U |
| 121192 | 11196 | 4-Nitroaniline | 481876.64 | 1349329.08 | 4.50 | 5.00 | 1100.00 | ug/kg | UJ |
| 061455 | P1P61 | 4-Nitroaniline | 481689.29 | 1348519.38 | 1.50 | 2.00 | 1800.00 | ug/kg | U |
| 061470 | P1P62 | 4-Nitroaniline | 481691.39 | 1348444.48 | 1.50 | 2.00 | 1800.00 | ug/kg | U |
| 099161 | P1P3 | 4-Nitroaniline | 481693.36 | 1349126.47 | 0.00 | 1.00 | 1800.00 | ug/kg | U |
| 099162 | P1P3 | 4-Nitroaniline | 481693.36 | 1349126.47 | 2.00 | 3.00 | 1800.00 | ug/kg | U |
| 099173 | P1P12 | 4-Nitroaniline | 481667.17 | 1348812.69 | 0.00 | 1.00 | 1900.00 | UG/KG | U |
| 099176 | P1P12 | 4-Nitroaniline | 481667.17 | 1348812.69 | 2.00 | 3.00 | 2000.00 | UG/KG | U |
| 061463 | P1P60 | 4-Nitroaniline | 481687.29 | 1348594.37 | 1.50 | 2.00 | 2100.00 | ug/kg | U |
| SP4-4-P | SP4-4 | alpha-Chlordane | 481827.00 | 1349353.00 | 0.00 | 1.50 | 1.70 | ug/kg | U |
| 121183 | 11196 | alpha-Chlordane | 481876.64 | 1349329.08 | 1.00 | 1.50 | 1.90 | ug/kg | U |
| 122087 | 11194 | alpha-Chlordane | 481671.30 | 1348699.84 | 4.50 | 5.00 | 1.90 | UG/KG | U |
| 121186 | 11196 | alpha-Chlordane | 481876.64 | 1349329.08 | 2.50 | 3.00 | 2.00 | ug/kg | U |
| 122076 | 11194 | alpha-Chlordane | 481671.30 | 1348699.84 | 1.00 | 1.50 | 2.10 | UG/KG | U |
| 122081 | 11194 | alpha-Chlordane | 481671.30 | 1348699.84 | 2.50 | 3.00 | 2.10 | UG/KG | U |
| 121179 | 11196 | alpha-Chlordane | 481876.64 | 1349329.08 | 0.00 | 0.50 | 2.20 | ug/kg | U |
| 121192 | 11196 | alpha-Chlordane | 481876.64 | 1349329.08 | 4.50 | 5.00 | 2.30 | ug/kg | U |
| 122072 | 11194 | alpha-Chlordane | 481671.30 | 1348699.84 | 0.00 | 0.50 | 5.10 | UG/KG | J |
| 061450 | P1P61 | alpha-Chlordane | 481689.29 | 1348519.38 | 0.00 | 0.50 | 89.00 | ug/kg | U |
| 099161 | P1P3 | alpha-Chlordane | 481693.36 | 1349126.47 | 0.00 | 1.00 | 93.00 | ug/kg | U |
| 099162 | P1P3 | alpha-Chlordane | 481693.36 | 1349126.47 | 2.00 | 3.00 | 93.00 | ug/kg | U |
| 061465 | P1P62 | alpha-Chlordane | 481691.39 | 1348444.48 | 0.00 | 0.50 | 94.00 | ug/kg | U |
| 099173 | P1P12 | alpha-Chlordane | 481667.17 | 1348812.69 | 0.00 | 1.00 | 96.00 | UG/KG | U |
| 061458 | P1P60 | alpha-Chlordane | 481687.29 | 1348594.37 | 0.00 | 0.50 | 100.00 | ug/kg | U |
| 099176 | P1P12 | alpha-Chlordane | 481667.17 | 1348812.69 | 2.00 | 3.00 | 100.00 | UG/KG | U |

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TABLE A-1
HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| SP2-1-S | SP2-1 | bis(2-Chloroisopropyl) ether | 482134.00 | 1348617.00 | 0.00 | 1.50 | 330.00 | ug/kg | U |
| 061455 | P1P61 | bis(2-Chloroisopropyl) ether | 481689.29 | 1348519.38 | 1.50 | 2.00 | 370.00 | ug/kg | U |
| 099161 | P1P3 | bis(2-Chloroisopropyl) ether | 481693.36 | 1349126.47 | 0.00 | 1.00 | 370.00 | ug/kg | U |
| 099162 | P1P3 | bis(2-Chloroisopropyl) ether | 481693.36 | 1349126.47 | 2.00 | 3.00 | 370.00 | ug/kg | U |
| 061470 | P1P62 | bis(2-Chloroisopropyl) ether | 481691.39 | 1348444.48 | 1.50 | 2.00 | 380.00 | ug/kg | U |
| 121183 | 11196 | bis(2-Chloroisopropyl) ether | 481876.64 | 1349329.08 | 1.00 | 1.50 | 380.00 | ug/kg | U |
| 122072 | 11194 | bis(2-Chloroisopropyl) ether | 481671.30 | 1348699.84 | 0.00 | 0.50 | 380.00 | UG/KG | UJ |
| 122087 | 11194 | bis(2-Chloroisopropyl) ether | 481671.30 | 1348699.84 | 4.50 | 5.00 | 380.00 | UG/KG | UJ |
| 099173 | P1P12 | bis(2-Chloroisopropyl) ether | 481667.17 | 1348812.69 | 0.00 | 1.00 | 390.00 | UG/KG | U |
| 121186 | 11196 | bis(2-Chloroisopropyl) ether | 481876.64 | 1349329.08 | 2.50 | 3.00 | 400.00 | ug/kg | U |
| 122081 | 11194 | bis(2-Chloroisopropyl) ether | 481671.30 | 1348699.84 | 2.50 | 3.00 | 400.00 | UG/KG | UJ |
| 099176 | P1P12 | bis(2-Chloroisopropyl) ether | 481667.17 | 1348812.69 | 2.00 | 3.00 | 410.00 | UG/KG | U |
| 122076 | 11194 | bis(2-Chloroisopropyl) ether | 481671.30 | 1348699.84 | 1.00 | 1.50 | 420.00 | UG/KG | UJ |
| 061463 | P1P60 | bis(2-Chloroisopropyl) ether | 481687.29 | 1348594.37 | 1.50 | 2.00 | 440.00 | ug/kg | U |
| 121179 | 11196 | bis(2-Chloroisopropyl) ether | 481876.64 | 1349329.08 | 0.00 | 0.50 | 440.00 | ug/kg | U |
| 121192 | 11196 | bis(2-Chloroisopropyl) ether | 481876.64 | 1349329.08 | 4.50 | 5.00 | 450.00 | ug/kg | U |
| 061455 | P1P61 | Bromodichloromethane | 481689.29 | 1348519.38 | 1.50 | 2.00 | 5.00 | ug/kg | U |
| 061463 | P1P60 | Bromodichloromethane | 481687.29 | 1348594.37 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| 061470 | P1P62 | Bromodichloromethane | 481691.39 | 1348444.48 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| SP4-4-B1-L | SP4-4 | Bromodichloromethane | 481827.00 | 1349353.00 | 1.50 | 1.90 | 10.00 | ug/kg | U |
| SP4-4-L | SP4-4 | Bromodichloromethane | 481827.00 | 1349353.00 | 0.00 | 1.50 | 10.00 | ug/kg | U |
| 099161 | P1P3 | Bromodichloromethane | 481693.36 | 1349126.47 | 0.00 | 1.00 | 11.00 | ug/kg | U |
| 099162 | P1P3 | Bromodichloromethane | 481693.36 | 1349126.47 | 2.00 | 3.00 | 11.00 | ug/kg | U |
| 121183 | 11196 | Bromodichloromethane | 481876.64 | 1349329.08 | 1.00 | 1.50 | 11.00 | ug/kg | U |
| 122072 | 11194 | Bromodichloromethane | 481671.30 | 1348699.84 | 0.00 | 0.50 | 11.00 | UG/KG | U |
| 122087 | 11194 | Bromodichloromethane | 481671.30 | 1348699.84 | 4.50 | 5.00 | 11.00 | UG/KG | U |
| 121186 | 11196 | Bromodichloromethane | 481876.64 | 1349329.08 | 2.50 | 3.00 | 12.00 | ug/kg | U |
| 119492 | 11078 | Bromodichloromethane | 482173.00 | 1348372.56 | 0.00 | 10.00 | 12.00 | ug/kg | U |
| 122081 | 11194 | Bromodichloromethane | 481671.30 | 1348699.84 | 2.50 | 3.00 | 12.00 | UG/KG | U |
| 099173 | P1P12 | Bromodichloromethane | 481667.17 | 1348812.69 | 0.00 | 1.00 | 12.00 | UG/KG | U |
| 099176 | P1P12 | Bromodichloromethane | 481667.17 | 1348812.69 | 2.00 | 3.00 | 12.00 | UG/KG | U |
| 111385 | 2947 | Bromodichloromethane | 482149.42 | 1348437.72 | 0.00 | 0.00 | 12.00 | ug/kg | UJ |
| 121179 | 11196 | Bromodichloromethane | 481876.64 | 1349329.08 | 0.00 | 0.50 | 13.00 | ug/kg | U |
| 122076 | 11194 | Bromodichloromethane | 481671.30 | 1348699.84 | 1.00 | 1.50 | 13.00 | UG/KG | U |
| 121192 | 11196 | Bromodichloromethane | 481876.64 | 1349329.08 | 4.50 | 5.00 | 14.00 | ug/kg | U |



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## TABLE A-1
## HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| SP2-1-S | SP2-1 | Carbazole | 482134.00 | 1348617.00 | 0.00 | 1.50 | 43.00 | ug/kg | J |
| 121183 | 11196 | Carbazole | 481876.64 | 1349329.08 | 1.00 | 1.50 | 380.00 | ug/kg | U |
| 122072 | 11194 | Carbazole | 481671.30 | 1348699.84 | 0.00 | 0.50 | 380.00 | UG/KG | UJ |
| 122087 | 11194 | Carbazole | 481671.30 | 1348699.84 | 4.50 | 5.00 | 380.00 | UG/KG | UJ |
| 121186 | 11196 | Carbazole | 481876.64 | 1349329.08 | 2.50 | 3.00 | 400.00 | ug/kg | U |
| 122081 | 11194 | Carbazole | 481671.30 | 1348699.84 | 2.50 | 3.00 | 400.00 | UG/KG | UJ |
| 122076 | 11194 | Carbazole | 481671.30 | 1348699.84 | 1.00 | 1.50 | 420.00 | UG/KG | UJ |
| 121179 | 11196 | Carbazole | 481876.64 | 1349329.08 | 0.00 | 0.50 | 440.00 | ug/kg | U |
| 121192 | 11196 | Carbazole | 481876.64 | 1349329.08 | 4.50 | 5.00 | 450.00 | ug/kg | U |
| SP4-4-B1-L | SP4-4 | Chloroethane | 481827.00 | 1349353.00 | 1.50 | 1.90 | 10.00 | ug/kg | UJ |
| SP4-4-L | SP4-4 | Chloroethane | 481827.00 | 1349353.00 | 0.00 | 1.50 | 10.00 | ug/kg | UJ |
| 061455 | P1P61 | Chloroethane | 481689.29 | 1348519.38 | 1.50 | 2.00 | 11.00 | ug/kg | U |
| 061470 | P1P62 | Chloroethane | 481691.39 | 1348444.48 | 1.50 | 2.00 | 11.00 | ug/kg | U |
| 099161 | P1P3 | Chloroethane | 481693.36 | 1349126.47 | 0.00 | 1.00 | 11.00 | ug/kg | U |
| 099162 | P1P3 | Chloroethane | 481693.36 | 1349126.47 | 2.00 | 3.00 | 11.00 | ug/kg | U |
| 121183 | 11196 | Chloroethane | 481876.64 | 1349329.08 | 1.00 | 1.50 | 11.00 | ug/kg | U |
| 122072 | 11194 | Chloroethane | 481671.30 | 1348699.84 | 0.00 | 0.50 | 11.00 | UG/KG | U |
| 122087 | 11194 | Chloroethane | 481671.30 | 1348699.84 | 4.50 | 5.00 | 11.00 | UG/KG | U |
| 121186 | 11196 | Chloroethane | 481876.64 | 1349329.08 | 2.50 | 3.00 | 12.00 | ug/kg | U |
| 119492 | 11078 | Chloroethane | 482173.00 | 1348372.56 | 0.00 | 10.00 | 12.00 | ug/kg | U |
| 122081 | 11194 | Chloroethane | 481671.30 | 1348699.84 | 2.50 | 3.00 | 12.00 | UG/KG | U |
| 099173 | P1P12 | Chloroethane | 481667.17 | 1348812.69 | 0.00 | 1.00 | 12.00 | UG/KG | U |
| 099176 | P1P12 | Chloroethane | 481667.17 | 1348812.69 | 2.00 | 3.00 | 12.00 | UG/KG | U |
| 111385 | 2947 | Chloroethane | 482149.42 | 1348437.72 | 0.00 | 0.00 | 12.00 | ug/kg | UJ |
| 061463 | P1P60 | Chloroethane | 481687.29 | 1348594.37 | 1.50 | 2.00 | 13.00 | ug/kg | U |
| 121179 | 11196 | Chloroethane | 481876.64 | 1349329.08 | 0.00 | 0.50 | 13.00 | ug/kg | U |
| 122076 | 11194 | Chloroethane | 481671.30 | 1348699.84 | 1.00 | 1.50 | 13.00 | UG/KG | U |
| 121192 | 11196 | Chloroethane | 481876.64 | 1349329.08 | 4.50 | 5.00 | 14.00 | ug/kg | U |
| SP4-4-TM | SP4-4 | Mercury | 481827.00 | 1349353.00 | 0.00 | 1.50 | 0.00 | ug/L | UNV |
| 119492 | 11078 | Mercury | 482173.00 | 1348372.56 | 0.00 | 10.00 | 0.00 | ug/L | U |
| 1338-06/25/9 | 1338 | Mercury | 481658.14 | 1348815.42 | 0.00 | 0.00 | 0.00 | MG/L | NV |
| 1338-09/17/9 | 1338 | Mercury | 481658.14 | 1348815.42 | 0.00 | 0.00 | 0.00 | MG/L | NV |
| 099112 | 1338 | Mercury | 481658.14 | 1348815.42 | 0.00 | 0.00 | 0.00 | MG/L | U |
| 120446F | 1338 | Mercury | 481658.14 | 1348815.42 | 0.00 | 0.00 | 0.00 | MG/L | U |
| 111385 | 2947 | Mercury | 482149.42 | 1348437.72 | 0.00 | 0.00 | 0.00 | ug/L | UJ |



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TABLE A-1
HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| GW921208-8 | 1338 | Mercury | 481658.14 | 1348815.42 | 0.00 | 0.00 | 0.00 | MG/L | UNV |
| 121183 | 11196 | Mercury | 481876.64 | 1349329.08 | 1.00 | 1.50 | 0.06 | mg/kg | U |
| 122072 | 11194 | Mercury | 481671.30 | 1348699.84 | 0.00 | 0.50 | 0.06 | MG/KG | U |
| 122076 | 11194 | Mercury | 481671.30 | 1348699.84 | 1.00 | 1.50 | 0.06 | MG/KG | U |
| 122081 | 11194 | Mercury | 481671.30 | 1348699.84 | 2.50 | 3.00 | 0.06 | MG/KG | U |
| 122087 | 11194 | Mercury | 481671.30 | 1348699.84 | 4.50 | 5.00 | 0.06 | MG/KG | U |
| 121179 | 11196 | Mercury | 481876.64 | 1349329.08 | 0.00 | 0.50 | 0.08 | mg/kg | U |
| 121192 | 11196 | Mercury | 481876.64 | 1349329.08 | 4.50 | 5.00 | 0.08 | mg/kg | U |
| 121186 | 11196 | Mercury | 481876.64 | 1349329.08 | 2.50 | 3.00 | 0.10 | mg/kg | U |
| 099161 | P1P3 | Mercury | 481693.36 | 1349126.47 | 0.00 | 1.00 | 0.11 | mg/kg | U |
| 099162 | P1P3 | Mercury | 481693.36 | 1349126.47 | 2.00 | 3.00 | 0.11 | mg/kg | U |
| 099173 | P1P12 | Mercury | 481667.17 | 1348812.69 | 0.00 | 1.00 | 0.11 | MG/KG | U |
| 099176 | P1P12 | Mercury | 481667.17 | 1348812.69 | 2.00 | 3.00 | 0.11 | MG/KG | U |
| 061458 | P1P60 | Mercury | 481687.29 | 1348594.37 | 0.00 | 0.50 | 0.12 | mg/kg | U |
| 061465 | P1P62 | Mercury | 481691.39 | 1348444.48 | 0.00 | 0.50 | 0.16 | mg/kg | - |
| 061450 | P1P61 | Mercury | 481689.29 | 1348519.38 | 0.00 | 0.50 | 0.20 | mg/kg | - |
| 099176 | P1P12 | Neptunium-237 | 481667.17 | 1348812.69 | 2.00 | 3.00 | 0.03 | PCI/G | UJ |
| 099173 | P1P12 | Neptunium-237 | 481667.17 | 1348812.69 | 0.00 | 1.00 | 0.05 | PCI/G | UJ |
| 099161 | P1P3 | Neptunium-237 | 481693.36 | 1349126.47 | 0.00 | 1.00 | 0.20 | pCi/g | UJ |
| 099162 | P1P3 | Neptunium-237 | 481693.36 | 1349126.47 | 2.00 | 3.00 | 0.50 | pCi/g | UJ |
| 005387 | ZONE 1-321 | Neptunium-237 | 481921.40 | 1349192.97 | 0.00 | 0.50 | 0.60 | pCi/g | U |
| 005390 | ZONE 1-297 | Neptunium-237 | 481765.40 | 1349161.97 | 0.00 | 0.50 | 0.60 | pCi/g | U |
| 005403 | ZONE 1-385 | Neptunium-237 | 482241.61 | 1349086.57 | 0.00 | 0.50 | 0.60 | pCi/g | U |
| 005499 | ZONE 1-375 | Neptunium-237 | 482179.40 | 1348585.97 | 0.00 | 0.17 | 0.60 | pCi/g | U |
| 005500 | ZONE 1-375 | Neptunium-237 | 482179.40 | 1348585.97 | 0.17 | 0.33 | 0.60 | pCi/g | U |
| 005501 | ZONE 1-375 | Neptunium-237 | 482179.40 | 1348585.97 | 0.33 | 0.50 | 0.60 | pCi/g | U |
| 005502 | ZONE 1-304 | Neptunium-237 | 481829.39 | 1348390.97 | 0.00 | 0.17 | 0.60 | pCi/g | U |
| 005503 | ZONE 1-304 | Neptunium-237 | 481829.39 | 1348390.97 | 0.17 | 0.33 | 0.60 | pCi/g | U |
| 005504 | ZONE 1-304 | Neptunium-237 | 481829.39 | 1348390.97 | 0.33 | 0.50 | 0.60 | pCi/g | U |
| 005952 | ZONE 1-345 | Neptunium-237 | 482029.40 | 1349030.97 | 0.00 | 0.50 | 0.60 | pCi/g | U |
| 005955 | ZONE 1-348 | Neptunium-237 | 482029.41 | 1349280.97 | 0.00 | 0.50 | 0.60 | pCi/g | U |
| 005970 | ZONE 1-298 | Neptunium-237 | 481779.40 | 1349030.97 | 0.00 | 0.50 | 0.60 | pCi/g | U |
| 006019 | ZONE 1-299 | Neptunium-237 | 481779.40 | 1349280.97 | 0.00 | 0.50 | 0.60 | pCi/g | U |
| 006020 | ZONE 1-299 | Neptunium-237 | 481779.41 | 1349281.05 | 0.00 | 0.50 | 0.60 | pCi/g | U |
| 006021 | ZONE 1-299 | Neptunium-237 | 481779.41 | 1349281.05 | 0.00 | 0.50 | 0.60 | pCi/g | U |



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**TABLE A-1**
**HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA**

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| 050005 | 1338 | Neptunium-237 | 481658.14 | 1348815.42 | 0.00 | 0.50 | 0.60 | PCI/G | U |
| 005293 | ZONE 1-273 | Neptunium-237 | 481670.40 | 1348718.00 | 0.50 | 1.00 | 0.60 | PCI/G | U |
| 005294 | ZONE 1-273 | Neptunium-237 | 481670.40 | 1348718.00 | 1.00 | 1.50 | 0.60 | PCI/G | U |
| 005292 | ZONE 1-273 | Neptunium-237 | 481670.40 | 1348718.00 | 0.00 | 0.50 | 0.60 | PCI/G | UJ |
| 005388 | ZONE 1-321 | Neptunium-237 | 481921.40 | 1349192.97 | 0.50 | 1.00 | 0.60 | pCi/g | UNV |
| 005389 | ZONE 1-321 | Neptunium-237 | 481921.40 | 1349192.97 | 1.00 | 1.50 | 0.60 | pCi/g | UNV |
| 005391 | ZONE 1-297 | Neptunium-237 | 481765.40 | 1349161.97 | 0.50 | 1.00 | 0.60 | pCi/g | UNV |
| 005392 | ZONE 1-297 | Neptunium-237 | 481765.40 | 1349161.97 | 1.00 | 1.50 | 0.60 | pCi/g | UNV |
| 005404 | ZONE 1-385 | Neptunium-237 | 482241.61 | 1349086.57 | 0.50 | 1.00 | 0.60 | pCi/g | UNV |
| 005405 | ZONE 1-385 | Neptunium-237 | 482241.61 | 1349086.57 | 1.00 | 1.50 | 0.60 | pCi/g | UNV |
| 099173 | P1P12 | Strontium-90 | 481667.17 | 1348812.69 | 0.00 | 1.00 | 0.49 | PCI/G | UJ |
| 005390 | ZONE 1-297 | Strontium-90 | 481765.40 | 1349161.97 | 0.00 | 0.50 | 0.50 | pCi/g | U |
| 005403 | ZONE 1-385 | Strontium-90 | 482241.61 | 1349086.57 | 0.00 | 0.50 | 0.50 | pCi/g | U |
| 005499 | ZONE 1-375 | Strontium-90 | 482179.40 | 1348585.97 | 0.00 | 0.17 | 0.50 | pCi/g | U |
| 005503 | ZONE 1-304 | Strontium-90 | 481829.39 | 1348390.97 | 0.17 | 0.33 | 0.50 | pCi/g | U |
| 005504 | ZONE 1-304 | Strontium-90 | 481829.39 | 1348390.97 | 0.33 | 0.50 | 0.50 | pCi/g | U |
| 005952 | ZONE 1-345 | Strontium-90 | 482029.40 | 1349030.97 | 0.00 | 0.50 | 0.50 | pCi/g | U |
| 005955 | ZONE 1-348 | Strontium-90 | 482029.41 | 1349280.97 | 0.00 | 0.50 | 0.50 | pCi/g | U |
| 005970 | ZONE 1-298 | Strontium-90 | 481779.40 | 1349030.97 | 0.00 | 0.50 | 0.50 | pCi/g | U |
| 006019 | ZONE 1-299 | Strontium-90 | 481779.40 | 1349280.97 | 0.00 | 0.50 | 0.50 | pCi/g | U |
| 006020 | ZONE 1-299 | Strontium-90 | 481779.41 | 1349281.05 | 0.00 | 0.50 | 0.50 | pCi/g | U |
| 006021 | ZONE 1-299 | Strontium-90 | 481779.41 | 1349281.05 | 0.00 | 0.50 | 0.50 | pCi/g | U |
| 005293 | ZONE 1-273 | Strontium-90 | 481670.40 | 1348718.00 | 0.50 | 1.00 | 0.50 | PCI/G | U |
| 005294 | ZONE 1-273 | Strontium-90 | 481670.40 | 1348718.00 | 1.00 | 1.50 | 0.50 | PCI/G | U |
| 005388 | ZONE 1-321 | Strontium-90 | 481921.40 | 1349192.97 | 0.50 | 1.00 | 0.50 | pCi/g | UNV |
| 005389 | ZONE 1-321 | Strontium-90 | 481921.40 | 1349192.97 | 1.00 | 1.50 | 0.50 | pCi/g | UNV |
| 005391 | ZONE 1-297 | Strontium-90 | 481765.40 | 1349161.97 | 0.50 | 1.00 | 0.50 | pCi/g | UNV |
| 005392 | ZONE 1-297 | Strontium-90 | 481765.40 | 1349161.97 | 1.00 | 1.50 | 0.50 | pCi/g | UNV |
| 005502 | ZONE 1-304 | Strontium-90 | 481829.39 | 1348390.97 | 0.00 | 0.17 | 0.60 | pCi/g | - |
| 099161 | P1P3 | Strontium-90 | 481693.36 | 1349126.47 | 0.00 | 1.00 | 0.86 | pCi/g | J |
| 099176 | P1P12 | Strontium-90 | 481667.17 | 1348812.69 | 2.00 | 3.00 | 0.90 | PCI/G | UJ |
| 005404 | ZONE 1-385 | Strontium-90 | 482241.61 | 1349086.57 | 0.50 | 1.00 | 1.20 | pCi/g | NV |
| 005405 | ZONE 1-385 | Strontium-90 | 482241.61 | 1349086.57 | 1.00 | 1.50 | 1.20 | pCi/g | NV |
| 005387 | ZONE 1-321 | Strontium-90 | 481921.40 | 1349192.97 | 0.00 | 0.50 | 1.30 | pCi/g | - |
| 050005 | 1338 | Strontium-90 | 481658.14 | 1348815.42 | 0.00 | 0.50 | 1.40 | PCI/G | UJ |

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## TABLE A-1
## HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| 005292 | ZONE 1-273 | Strontium-90 | 481670.40 | 1348718.00 | 0.00 | 0.50 | 3.10 | PCI/G | - |
| 099162 | P1P3 | Strontium-90 | 481693.36 | 1349126.47 | 2.00 | 3.00 | 3.34 | pCi/g | J |
| 099173 | P1P12 | Technetium-99 | 481667.17 | 1348812.69 | 0.00 | 1.00 | 0.40 | PCI/G | UJ |
| 099176 | P1P12 | Technetium-99 | 481667.17 | 1348812.69 | 2.00 | 3.00 | 0.43 | PCI/G | UJ |
| 006020 | ZONE 1-299 | Technetium-99 | 481779.41 | 1349281.05 | 0.00 | 0.50 | 0.90 | pCi/g | UJ |
| 006021 | ZONE 1-299 | Technetium-99 | 481779.41 | 1349281.05 | 0.00 | 0.50 | 0.90 | pCi/g | UJ |
| 005293 | ZONE 1-273 | Technetium-99 | 481670.40 | 1348718.00 | 0.50 | 1.00 | 0.90 | PCI/G | UJ |
| 005294 | ZONE 1-273 | Technetium-99 | 481670.40 | 1348718.00 | 1.00 | 1.50 | 0.90 | PCI/G | UJ |
| 005292 | ZONE 1-273 | Technetium-99 | 481670.40 | 1348718.00 | 0.00 | 0.50 | 0.90 | PCI/G | UNV |
| SP2-6-R | SP2-6 | Technetium-99 | 482175.10 | 1348695.00 | 7.00 | 8.50 | 0.95 | pCi/g dry | UNV |
| SP4-4-R | SP4-4 | Technetium-99 | 481827.00 | 1349353.00 | 0.00 | 1.50 | 0.96 | pCi/g dry | U |
| 005387 | ZONE 1-321 | Technetium-99 | 481921.40 | 1349192.97 | 0.00 | 0.50 | 1.00 | pCi/g | U |
| 005390 | ZONE 1-297 | Technetium-99 | 481765.40 | 1349161.97 | 0.00 | 0.50 | 1.00 | pCi/g | U |
| 005499 | ZONE 1-375 | Technetium-99 | 482179.40 | 1348585.97 | 0.00 | 0.17 | 1.00 | pCi/g | U |
| 005502 | ZONE 1-304 | Technetium-99 | 481829.39 | 1348390.97 | 0.00 | 0.17 | 1.00 | pCi/g | U |
| 005503 | ZONE 1-304 | Technetium-99 | 481829.39 | 1348390.97 | 0.17 | 0.33 | 1.00 | pCi/g | U |
| 005504 | ZONE 1-304 | Technetium-99 | 481829.39 | 1348390.97 | 0.33 | 0.50 | 1.00 | pCi/g | U |
| 005500 | ZONE 1-375 | Technetium-99 | 482179.40 | 1348585.97 | 0.17 | 0.33 | 1.00 | pCi/g | UJ |
| 005501 | ZONE 1-375 | Technetium-99 | 482179.40 | 1348585.97 | 0.33 | 0.50 | 1.00 | pCi/g | UJ |
| 005952 | ZONE 1-345 | Technetium-99 | 482029.40 | 1349030.97 | 0.00 | 0.50 | 1.00 | pCi/g | UJ |
| 005955 | ZONE 1-348 | Technetium-99 | 482029.41 | 1349280.97 | 0.00 | 0.50 | 1.00 | pCi/g | UJ |
| 005970 | ZONE 1-298 | Technetium-99 | 481779.40 | 1349030.97 | 0.00 | 0.50 | 1.00 | pCi/g | UJ |
| 006019 | ZONE 1-299 | Technetium-99 | 481779.40 | 1349280.97 | 0.00 | 0.50 | 1.00 | pCi/g | UJ |
| 099161 | P1P3 | Technetium-99 | 481693.36 | 1349126.47 | 0.00 | 1.00 | 1.00 | pCi/g | UJ |
| 099162 | P1P3 | Technetium-99 | 481693.36 | 1349126.47 | 2.00 | 3.00 | 1.00 | pCi/g | UJ |
| 005388 | ZONE 1-321 | Technetium-99 | 481921.40 | 1349192.97 | 0.50 | 1.00 | 1.00 | pCi/g | UNV |
| 005389 | ZONE 1-321 | Technetium-99 | 481921.40 | 1349192.97 | 1.00 | 1.50 | 1.00 | pCi/g | UNV |
| 005391 | ZONE 1-297 | Technetium-99 | 481765.40 | 1349161.97 | 0.50 | 1.00 | 1.00 | pCi/g | UNV |
| 005392 | ZONE 1-297 | Technetium-99 | 481765.40 | 1349161.97 | 1.00 | 1.50 | 1.00 | pCi/g | UNV |
| 005404 | ZONE 1-385 | Technetium-99 | 482241.61 | 1349086.57 | 0.50 | 1.00 | 1.00 | pCi/g | UNV |
| SP2-1-R | SP2-1 | Technetium-99 | 482134.00 | 1348617.00 | 0.00 | 1.50 | 1.00 | pCi/g dry | UNV |
| SP2-8-R | SP2-8 | Technetium-99 | 482196.10 | 1348651.00 | 3.00 | 4.50 | 1.00 | pCi/g dry | UNV |
| 005405 | ZONE 1-385 | Technetium-99 | 482241.61 | 1349086.57 | 1.00 | 1.50 | 1.10 | pCi/g | NV |
| SP2-10-R | SP2-10 | Technetium-99 | 482206.00 | 1348725.00 | 0.00 | 1.50 | 1.10 | pCi/g dry | UNV |
| SP2-2-R | SP2-2 | Technetium-99 | 482147.10 | 1348650.00 | 4.00 | 5.50 | 1.10 | pCi/g dry | UNV |



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## TABLE A-1
## HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| SP2-3-R | SP2-3 | Technetium-99 | 482148.00 | 1348676.00 | 7.00 | 8.50 | 1.10 | pCi/g dry | UNV |
| SP2-4-R | SP2-4 | Technetium-99 | 482158.10 | 1348734.00 | 0.00 | 1.50 | 1.10 | pCi/g dry | UNV |
| SP2-5-R | SP2-5 | Technetium-99 | 482166.00 | 1348651.00 | 8.00 | 9.20 | 1.10 | pCi/g dry | UNV |
| SP2-7-R | SP2-7 | Technetium-99 | 482175.10 | 1348725.00 | 5.00 | 6.40 | 1.10 | pCi/g dry | UNV |
| SP2-9-R | SP2-9 | Technetium-99 | 482196.00 | 1348677.00 | 3.00 | 4.50 | 1.20 | pCi/g dry | UNV |
| 005403 | ZONE 1-385 | Technetium-99 | 482241.61 | 1349086.57 | 0.00 | 0.50 | 3.40 | pCi/g | - |
| SP4-4-TL | SP4-4 | Tetrachloroethene | 481827.00 | 1349353.00 | 0.00 | 1.50 | 5.00 | mg/L | U |
| 061455 | P1P61 | Tetrachloroethene | 481689.29 | 1348519.38 | 1.50 | 2.00 | 5.00 | ug/kg | UJ |
| 061463 | P1P60 | Tetrachloroethene | 481687.29 | 1348594.37 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| 061470 | P1P62 | Tetrachloroethene | 481691.39 | 1348444.48 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| SP4-4-B1-L | SP4-4 | Tetrachloroethene | 481827.00 | 1349353.00 | 1.50 | 1.90 | 10.00 | ug/kg | U |
| SP4-4-L | SP4-4 | Tetrachloroethene | 481827.00 | 1349353.00 | 0.00 | 1.50 | 10.00 | ug/kg | U |
| 099161 | P1P3 | Tetrachloroethene | 481693.36 | 1349126.47 | 0.00 | 1.00 | 11.00 | ug/kg | U |
| 099162 | P1P3 | Tetrachloroethene | 481693.36 | 1349126.47 | 2.00 | 3.00 | 11.00 | ug/kg | U |
| 121183 | 11196 | Tetrachloroethene | 481876.64 | 1349329.08 | 1.00 | 1.50 | 11.00 | ug/kg | U |
| 122072 | 11194 | Tetrachloroethene | 481671.30 | 1348699.84 | 0.00 | 0.50 | 11.00 | UG/KG | U |
| 122087 | 11194 | Tetrachloroethene | 481671.30 | 1348699.84 | 4.50 | 5.00 | 11.00 | UG/KG | U |
| 121186 | 11196 | Tetrachloroethene | 481876.64 | 1349329.08 | 2.50 | 3.00 | 12.00 | ug/kg | U |
| 119492 | 11078 | Tetrachloroethene | 482173.00 | 1348372.56 | 0.00 | 10.00 | 12.00 | ug/kg | U |
| 122081 | 11194 | Tetrachloroethene | 481671.30 | 1348699.84 | 2.50 | 3.00 | 12.00 | UG/KG | U |
| 099173 | P1P12 | Tetrachloroethene | 481667.17 | 1348812.69 | 0.00 | 1.00 | 12.00 | UG/KG | U |
| 099176 | P1P12 | Tetrachloroethene | 481667.17 | 1348812.69 | 2.00 | 3.00 | 12.00 | UG/KG | U |
| 111385 | 2947 | Tetrachloroethene | 482149.42 | 1348437.72 | 0.00 | 0.00 | 12.00 | ug/kg | UJ |
| 121179 | 11196 | Tetrachloroethene | 481876.64 | 1349329.08 | 0.00 | 0.50 | 13.00 | ug/kg | U |
| 122076 | 11194 | Tetrachloroethene | 481671.30 | 1348699.84 | 1.00 | 1.50 | 13.00 | UG/KG | U |
| 121192 | 11196 | Tetrachloroethene | 481876.64 | 1349329.08 | 4.50 | 5.00 | 14.00 | ug/kg | U |
| SP4-4-TS | SP4-4 | Toxaphene | 481827.00 | 1349353.00 | 0.00 | 1.50 | 10.00 | mg/L | U |
| SP4-4-P | SP4-4 | Toxaphene | 481827.00 | 1349353.00 | 0.00 | 1.50 | 67.00 | ug/kg | U |
| 061450 | P1P61 | Toxaphene | 481689.29 | 1348519.38 | 0.00 | 0.50 | 180.00 | ug/kg | U |
| 061465 | P1P62 | Toxaphene | 481691.39 | 1348444.48 | 0.00 | 0.50 | 190.00 | ug/kg | U |
| 099161 | P1P3 | Toxaphene | 481693.36 | 1349126.47 | 0.00 | 1.00 | 190.00 | ug/kg | U |
| 099162 | P1P3 | Toxaphene | 481693.36 | 1349126.47 | 2.00 | 3.00 | 190.00 | ug/kg | U |
| 121183 | 11196 | Toxaphene | 481876.64 | 1349329.08 | 1.00 | 1.50 | 190.00 | ug/kg | U |
| 122072 | 11194 | Toxaphene | 481671.30 | 1348699.84 | 0.00 | 0.50 | 190.00 | UG/KG | U |
| 122087 | 11194 | Toxaphene | 481671.30 | 1348699.84 | 4.50 | 5.00 | 190.00 | UG/KG | U |



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## TABLE A-1
## HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| 099173 | P1P12 | Toxaphene | 481667.17 | 1348812.69 | 0.00 | 1.00 | 190.00 | UG/KG | U |
| 121186 | 11196 | Toxaphene | 481876.64 | 1349329.08 | 2.50 | 3.00 | 200.00 | ug/kg | U |
| 061458 | P1P60 | Toxaphene | 481687.29 | 1348594.37 | 0.00 | 0.50 | 200.00 | ug/kg | U |
| 099176 | P1P12 | Toxaphene | 481667.17 | 1348812.69 | 2.00 | 3.00 | 200.00 | UG/KG | U |
| 122076 | 11194 | Toxaphene | 481671.30 | 1348699.84 | 1.00 | 1.50 | 210.00 | UG/KG | U |
| 122081 | 11194 | Toxaphene | 481671.30 | 1348699.84 | 2.50 | 3.00 | 210.00 | UG/KG | U |
| 121179 | 11196 | Toxaphene | 481876.64 | 1349329.08 | 0.00 | 0.50 | 220.00 | ug/kg | U |
| 121192 | 11196 | Toxaphene | 481876.64 | 1349329.08 | 4.50 | 5.00 | 230.00 | ug/kg | U |
| 061455 | P1P61 | Trichloroethene | 481689.29 | 1348519.38 | 1.50 | 2.00 | 5.00 | ug/kg | U |
| SP4-4-TL | SP4-4 | Trichloroethene | 481827.00 | 1349353.00 | 0.00 | 1.50 | 5.00 | mg/L | U |
| 061463 | P1P60 | Trichloroethene | 481687.29 | 1348594.37 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| 061470 | P1P62 | Trichloroethene | 481691.39 | 1348444.48 | 1.50 | 2.00 | 6.00 | ug/kg | U |
| SP4-4-B1-L | SP4-4 | Trichloroethene | 481827.00 | 1349353.00 | 1.50 | 1.90 | 10.00 | ug/kg | U |
| SP4-4-L | SP4-4 | Trichloroethene | 481827.00 | 1349353.00 | 0.00 | 1.50 | 10.00 | ug/kg | U |
| 099161 | P1P3 | Trichloroethene | 481693.36 | 1349126.47 | 0.00 | 1.00 | 11.00 | ug/kg | U |
| 099162 | P1P3 | Trichloroethene | 481693.36 | 1349126.47 | 2.00 | 3.00 | 11.00 | ug/kg | U |
| 121183 | 11196 | Trichloroethene | 481876.64 | 1349329.08 | 1.00 | 1.50 | 11.00 | ug/kg | U |
| 122072 | 11194 | Trichloroethene | 481671.30 | 1348699.84 | 0.00 | 0.50 | 11.00 | UG/KG | U |
| 122087 | 11194 | Trichloroethene | 481671.30 | 1348699.84 | 4.50 | 5.00 | 11.00 | UG/KG | U |
| 121186 | 11196 | Trichloroethene | 481876.64 | 1349329.08 | 2.50 | 3.00 | 12.00 | ug/kg | U |
| 119492 | 11078 | Trichloroethene | 482173.00 | 1348372.56 | 0.00 | 10.00 | 12.00 | ug/kg | U |
| 122081 | 11194 | Trichloroethene | 481671.30 | 1348699.84 | 2.50 | 3.00 | 12.00 | UG/KG | U |
| 099173 | P1P12 | Trichloroethene | 481667.17 | 1348812.69 | 0.00 | 1.00 | 12.00 | UG/KG | U |
| 099176 | P1P12 | Trichloroethene | 481667.17 | 1348812.69 | 2.00 | 3.00 | 12.00 | UG/KG | U |
| 111385 | 2947 | Trichloroethene | 482149.42 | 1348437.72 | 0.00 | 0.00 | 12.00 | ug/kg | UJ |
| 121179 | 11196 | Trichloroethene | 481876.64 | 1349329.08 | 0.00 | 0.50 | 13.00 | ug/kg | U |
| 122076 | 11194 | Trichloroethene | 481671.30 | 1348699.84 | 1.00 | 1.50 | 13.00 | UG/KG | U |
| 121192 | 11196 | Trichloroethene | 481876.64 | 1349329.08 | 4.50 | 5.00 | 14.00 | ug/kg | U |
| 122088 | 11194 | Uranium, Total | 481671.30 | 1348699.84 | 4.50 | 5.00 | 2.10 | MG/KG | - |
| 121193 | 11196 | Uranium, Total | 481876.64 | 1349329.08 | 4.50 | 5.00 | 2.70 | mg/kg | J |
| SP4-4-R | SP4-4 | Uranium, Total | 481827.00 | 1349353.00 | 0.00 | 1.50 | 3.38 | ug/g dry | NV |
| 121197 | 11196 | Uranium, Total | 481876.64 | 1349329.08 | 1.00 | 1.50 | 3.40 | mg/kg | - |
| 121187 | 11196 | Uranium, Total | 481876.64 | 1349329.08 | 2.50 | 3.00 | 3.60 | mg/kg | J |
| 099162 | P1P3 | Uranium, Total | 481693.36 | 1349126.47 | 2.00 | 3.00 | 4.23 | mg/kg | J |
| 122082 | 11194 | Uranium, Total | 481671.30 | 1348699.84 | 2.50 | 3.00 | 5.30 | MG/KG | - |



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## TABLE A-1
## HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| A3-KC05-1 | A3-KC05 | Uranium, Total | 482148.77 | 1349357.82 | 0.00 | 0.50 | 7.07 | ug/g dry | - |
| 000677 | 1506 | Uranium, Total | 481658.14 | 1348809.32 | 14.50 | 15.00 | 8.00 | MG/KG | - |
| 099161 | P1P3 | Uranium, Total | 481693.36 | 1349126.47 | 0.00 | 1.00 | 8.49 | mg/kg | J |
| 119493 | 11078 | Uranium, Total | 482173.00 | 1348372.56 | 0.00 | 10.00 | 11.00 | ug/g | NV |
| 019811 | 1329 | Uranium, Total | 482125.08 | 1348552.79 | 2.00 | 2.50 | 11.00 | mg/kg | UNV |
| 019817 | 1329 | Uranium, Total | 482125.08 | 1348552.79 | 5.00 | 5.50 | 11.00 | mg/kg | UNV |
| 019827 | 1329 | Uranium, Total | 482125.08 | 1348552.79 | 10.00 | 10.50 | 11.00 | mg/kg | UNV |
| 019833 | 1330 | Uranium, Total | 482118.18 | 1348810.17 | 2.00 | 2.50 | 11.00 | mg/kg | UNV |
| 019839 | 1330 | Uranium, Total | 482118.18 | 1348810.17 | 5.00 | 5.50 | 11.00 | mg/kg | UNV |
| 019850 | 1330 | Uranium, Total | 482118.18 | 1348810.17 | 10.50 | 11.00 | 11.00 | mg/kg | UNV |
| 019857 | 1331 | Uranium, Total | 482064.10 | 1349041.44 | 3.00 | 3.50 | 11.00 | mg/kg | UNV |
| 019861 | 1331 | Uranium, Total | 482064.10 | 1349041.44 | 5.00 | 5.50 | 11.00 | mg/kg | UNV |
| 019872 | 1331 | Uranium, Total | 482064.10 | 1349041.44 | 10.50 | 11.00 | 11.00 | mg/kg | UNV |
| 019883 | 1332 | Uranium, Total | 482106.42 | 1349268.50 | 5.00 | 5.50 | 11.00 | mg/kg | UNV |
| 019943 | 1335 | Uranium, Total | 481857.65 | 1349075.66 | 2.00 | 2.50 | 11.00 | mg/kg | UNV |
| 019959 | 1335 | Uranium, Total | 481857.65 | 1349075.66 | 10.00 | 10.50 | 11.00 | mg/kg | UNV |
| 019961 | 1336 | Uranium, Total | 481858.67 | 1349259.84 | 0.00 | 0.50 | 11.00 | mg/kg | UNV |
| 019967 | 1336 | Uranium, Total | 481858.67 | 1349259.84 | 3.00 | 3.50 | 11.00 | mg/kg | UNV |
| 019973 | 1336 | Uranium, Total | 481858.67 | 1349259.84 | 6.00 | 6.50 | 11.00 | mg/kg | UNV |
| 019981 | 1336 | Uranium, Total | 481858.67 | 1349259.84 | 10.00 | 10.50 | 11.00 | mg/kg | UNV |
| 054283 | 1329 | Uranium, Total | 482125.08 | 1348552.79 | 15.00 | 15.50 | 11.00 | mg/kg | UNV |
| 054303 | 1330 | Uranium, Total | 482118.18 | 1348810.17 | 15.00 | 15.50 | 11.00 | mg/kg | UNV |
| 054323 | 1331 | Uranium, Total | 482064.10 | 1349041.44 | 15.00 | 15.50 | 11.00 | mg/kg | UNV |
| 054343 | 1332 | Uranium, Total | 482106.42 | 1349268.50 | 15.00 | 15.50 | 11.00 | mg/kg | UNV |
| 054403 | 1335 | Uranium, Total | 481857.65 | 1349075.66 | 15.00 | 15.50 | 11.00 | mg/kg | UNV |
| 054423 | 1336 | Uranium, Total | 481858.67 | 1349259.84 | 15.00 | 15.50 | 11.00 | mg/kg | UNV |
| 111647 | 1947 | Uranium, Total | 482137.40 | 1348437.02 | 19.00 | 20.50 | 11.00 | mg/kg | UNV |
| 111649 | 1947 | Uranium, Total | 482137.40 | 1348437.02 | 8.00 | 10.00 | 11.00 | mg/kg | UNV |
| 119156 | 11078 | Uranium, Total | 482173.00 | 1348372.56 | 2.00 | 2.50 | 11.00 | mg/kg | UNV |
| 119161 | 11078 | Uranium, Total | 482173.00 | 1348372.56 | 5.00 | 5.50 | 11.00 | mg/kg | UNV |
| 119169 | 11078 | Uranium, Total | 482173.00 | 1348372.56 | 10.00 | 10.50 | 11.00 | mg/kg | UNV |
| 019949 | 1335 | Uranium, Total | 481857.65 | 1349075.66 | 5.00 | 5.50 | 11.00 | mg/kg | UNV |
| 050025 | 1338 | Uranium, Total | 481658.14 | 1348815.42 | 10.00 | 10.50 | 11.00 | MG/KG | UNV |
| 000667 | 1506 | Uranium, Total | 481658.14 | 1348809.32 | 9.50 | 10.00 | 12.00 | MG/KG | - |
| 000687 | 1506 | Uranium, Total | 481658.14 | 1348809.32 | 19.50 | 20.00 | 12.00 | MG/KG | - |

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## TABLE A-1
## HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| SS-46-086 | CIS_SYSGEN_801 | Uranium, Total | 482125.38 | 1348341.90 | 0.00 | 0.50 | 16.79 | mg/kg | NV |
| 019894 | 1332 | Uranium, Total | 482106.42 | 1349268.50 | 10.50 | 11.00 | 17.00 | mg/kg | NV |
| 019807 | 1329 | Uranium, Total | 482125.08 | 1348552.79 | 0.00 | 0.50 | 18.00 | mg/kg | NV |
| 005955 | ZONE 1-348 | Uranium, Total | 482029.41 | 1349280.97 | 0.00 | 0.50 | 18.29 | mg/kg | - |
| 019851 | 1331 | Uranium, Total | 482064.10 | 1349041.44 | 0.00 | 0.50 | 19.00 | mg/kg | NV |
| 122077 | 11194 | Uranium, Total | 481671.30 | 1348699.84 | 1.00 | 1.50 | 19.10 | MG/KG | - |
| SS-46-389 | CIS_SYSGEN_618 | Uranium, Total | 481750.19 | 1348343.64 | 0.00 | 0.17 | 19.19 | mg/kg | NV |
| 099176 | P1P12 | Uranium, Total | 481667.17 | 1348812.69 | 2.00 | 3.00 | 20.30 | MG/KG | J |
| 005501 | ZONE 1-375 | Uranium, Total | 482179.40 | 1348585.97 | 0.33 | 0.50 | 20.99 | mg/kg | J |
| SS-46-373 | CIS_SYSGEN_727 | Uranium, Total | 481938.28 | 1348342.78 | 0.00 | 0.17 | 21.29 | mg/kg | NV |
| 019879 | 1332 | Uranium, Total | 482106.42 | 1349268.50 | 3.00 | 3.50 | 22.00 | mg/kg | NV |
| 005500 | ZONE 1-375 | Uranium, Total | 482179.40 | 1348585.97 | 0.17 | 0.33 | 23.09 | mg/kg | J |
| 121180 | 11196 | Uranium, Total | 481876.64 | 1349329.08 | 0.00 | 0.50 | 23.09 | mg/kg | J |
| 019939 | 1335 | Uranium, Total | 481857.65 | 1349075.66 | 0.00 | 0.50 | 27.00 | mg/kg | NV |
| 005970 | ZONE 1-298 | Uranium, Total | 481779.40 | 1349030.97 | 0.00 | 0.50 | 27.29 | mg/kg | - |
| SP2-8-R | SP2-8 | Uranium, Total | 482196.10 | 1348651.00 | 3.00 | 4.50 | 30.70 | ug/g dry | NV |
| SP2-7-R | SP2-7 | Uranium, Total | 482175.10 | 1348725.00 | 5.00 | 6.40 | 31.20 | ug/g dry | NV |
| SS-46-345 | CIS_SYSGEN_829 | Uranium, Total | 482231.49 | 1348631.91 | 0.00 | 0.16 | 35.68 | mg/kg | NV |
| 061464 | P1P62 | Uranium, Total | 481691.39 | 1348444.48 | 0.00 | 0.50 | 35.97 | mg/kg | NV |
| 019829 | 1330 | Uranium, Total | 482118.18 | 1348810.17 | 0.00 | 0.50 | 36.00 | mg/kg | NV |
| SS-46-371 | CIS_SYSGEN_612 | Uranium, Total | 481737.84 | 1348356.31 | 0.00 | 0.17 | 36.28 | mg/kg | UNV |
| A3-KC06-1 | A3-KC06 | Uranium, Total | 482084.45 | 1349356.21 | 0.00 | 0.50 | 36.70 | ug/g dry | NV |
| SP2-1-R | SP2-1 | Uranium, Total | 482134.00 | 1348617.00 | 0.00 | 1.50 | 36.80 | ug/g dry | NV |
| 005504 | ZONE 1-304 | Uranium, Total | 481829.39 | 1348390.97 | 0.33 | 0.50 | 37.53 | mg/kg | J |
| 061457 | P1P60 | Uranium, Total | 481687.29 | 1348594.37 | 0.00 | 0.50 | 38.96 | mg/kg | NV |
| SP2-4-R | SP2-4 | Uranium, Total | 482158.10 | 1348734.00 | 0.00 | 1.50 | 39.30 | ug/g dry | NV |
| 019873 | 1332 | Uranium, Total | 482106.42 | 1349268.50 | 0.00 | 0.50 | 43.00 | mg/kg | NV |
| SP2-6-R | SP2-6 | Uranium, Total | 482175.10 | 1348695.00 | 7.00 | 8.50 | 43.50 | ug/g dry | NV |
| SP2-5-R | SP2-5 | Uranium, Total | 482166.00 | 1348651.00 | 8.00 | 9.20 | 43.60 | ug/g dry | NV |
| 005952 | ZONE 1-345 | Uranium, Total | 482029.40 | 1349030.97 | 0.00 | 0.50 | 43.78 | mg/kg | - |
| 050011 | 1338 | Uranium, Total | 481658.14 | 1348815.42 | 3.00 | 3.50 | 49.00 | MG/KG | NV |
| 006021 | ZONE 1-299 | Uranium, Total | 481779.41 | 1349281.05 | 0.00 | 0.50 | 51.00 | ug/g | - |
| SP2-10-R | SP2-10 | Uranium, Total | 482206.00 | 1348725.00 | 0.00 | 1.50 | 52.30 | ug/g dry | NV |
| 006020 | ZONE 1-299 | Uranium, Total | 481779.41 | 1349281.05 | 0.00 | 0.50 | 53.00 | ug/g | - |
| SS-46-419 | CIS_SYSGEN_683 | Uranium, Total | 481849.63 | 1348365.37 | 0.00 | 0.17 | 53.07 | mg/kg | NV |

## TABLE A-1
## HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| SP2-3-R | SP2-3 | Uranium, Total | 482148.00 | 1348676.00 | 7.00 | 8.50 | 53.20 | ug/g dry | NV |
| 006019 | ZONE 1-299 | Uranium, Total | 481779.40 | 1349280.97 | 0.00 | 0.50 | 53.74 | mg/kg | - |
| 061449 | P1P61 | Uranium, Total | 481689.29 | 1348519.38 | 0.00 | 0.50 | 53.96 | mg/kg | NV |
| 005503 | ZONE 1-304 | Uranium, Total | 481829.39 | 1348390.97 | 0.17 | 0.33 | 54.59 | mg/kg | J |
| 119153 | 11078 | Uranium, Total | 482173.00 | 1348372.56 | 0.00 | 0.50 | 59.00 | mg/kg | NV |
| 000650 | 1506 | Uranium, Total | 481658.14 | 1348809.32 | 1.00 | 1.50 | 60.00 | MG/KG | - |
| SP2-9-R | SP2-9 | Uranium, Total | 482196.00 | 1348677.00 | 3.00 | 4.50 | 60.50 | ug/g dry | NV |
| 099173 | P1P12 | Uranium, Total | 481667.17 | 1348812.69 | 0.00 | 1.00 | 60.60 | MG/KG | J |
| 050015 | 1338 | Uranium, Total | 481658.14 | 1348815.42 | 5.00 | 5.50 | 73.00 | MG/KG | NV |
| 000657 | 1506 | Uranium, Total | 481658.14 | 1348809.32 | 4.50 | 5.00 | 91.00 | MG/KG | - |
| SP2-2-R | SP2-2 | Uranium, Total | 482147.10 | 1348650.00 | 4.00 | 5.50 | 105.00 | ug/g dry | NV |
| 005499 | ZONE 1-375 | Uranium, Total | 482179.40 | 1348585.97 | 0.00 | 0.17 | 105.26 | mg/kg | - |
| 122073 | 11194 | Uranium, Total | 481671.30 | 1348699.84 | 0.00 | 0.50 | 112.00 | MG/KG | - |
| SS-46-334 | CIS_SYSGEN_832 | Uranium, Total | 482236.49 | 1348632.05 | 0.00 | 0.16 | 118.14 | mg/kg | NV |
| 000651 | 1506 | Uranium, Total | 481658.14 | 1348809.32 | 1.50 | 2.00 | 121.00 | MG/KG | - |
| 005392 | ZONE 1-297 | Uranium, Total | 481765.40 | 1349161.97 | 1.00 | 1.50 | 144.91 | mg/kg | NV |
| SS-46-335 | CIS_SYSGEN_835 | Uranium, Total | 482238.38 | 1348563.07 | 0.00 | 0.16 | 161.32 | mg/kg | NV |
| 005502 | ZONE 1-304 | Uranium, Total | 481829.39 | 1348390.97 | 0.00 | 0.17 | 164.05 | mg/kg | - |
| SS-46-423 | CIS_SYSGEN_812 | Uranium, Total | 482168.68 | 1348368.10 | 0.00 | 0.17 | 164.62 | mg/kg | NV |
| 005391 | ZONE 1-297 | Uranium, Total | 481765.40 | 1349161.97 | 0.50 | 1.00 | 185.64 | mg/kg | NV |
| SS-46-336 | CIS_SYSGEN_837 | Uranium, Total | 482240.76 | 1348476.11 | 0.00 | 0.16 | 200.00 | mg/kg | NV |
| 050005 | 1338 | Uranium, Total | 481658.14 | 1348815.42 | 0.00 | 0.50 | 211.00 | MG/KG | NV |
| SS-46-338 | CIS_SYSGEN_839 | Uranium, Total | 482242.64 | 1348407.13 | 0.00 | 0.16 | 211.40 | mg/kg | NV |
| SS-46-332 | CIS_SYSGEN_831 | Uranium, Total | 482232.38 | 1348781.99 | 0.00 | 0.16 | 214.10 | mg/kg | NV |
| 050005 | 1338 | Uranium, Total | 481658.14 | 1348815.42 | 0.00 | 0.50 | 219.00 | MG/KG | J |
| 000649 | 1506 | Uranium, Total | 481658.14 | 1348809.32 | 0.50 | 1.00 | 228.00 | MG/KG | - |
| 005404 | ZONE 1-385 | Uranium, Total | 482241.61 | 1349086.57 | 0.50 | 1.00 | 387.65 | mg/kg | NV |
| 005389 | ZONE 1-321 | Uranium, Total | 481921.40 | 1349192.97 | 1.00 | 1.50 | 419.05 | mg/kg | NV |
| 000648 | 1506 | Uranium, Total | 481658.14 | 1348809.32 | 0.00 | 0.50 | 715.00 | MG/KG | - |
| 005403 | ZONE 1-385 | Uranium, Total | 482241.61 | 1349086.57 | 0.00 | 0.50 | 915.97 | mg/kg | - |
| 005390 | ZONE 1-297 | Uranium, Total | 481765.40 | 1349161.97 | 0.00 | 0.50 | 961.76 | mg/kg | - |
| 005405 | ZONE 1-385 | Uranium, Total | 482241.61 | 1349086.57 | 1.00 | 1.50 | 1023.20 | mg/kg | NV |
| 005294 | ZONE 1-273 | Uranium, Total | 481670.40 | 1348718.00 | 1.00 | 1.50 | 1050.00 | MG/KG | J |
| 005388 | ZONE 1-321 | Uranium, Total | 481921.40 | 1349192.97 | 0.50 | 1.00 | 1743.85 | mg/kg | NV |
| 005387 | ZONE 1-321 | Uranium, Total | 481921.40 | 1349192.97 | 0.00 | 0.50 | 2521.17 | mg/kg | J |



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**TABLE A-1**
**HISTORICAL WAC DATA FOR THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA**

| Sample ID | Location ID | Parameter | Northing | Easting | Top Depth | Bottom Depth | result | units | qualifier |
|---|---|---|---|---|---|---|---|---|---|
| 005293 | ZONE 1-273 | Uranium, Total | 481670.40 | 1348718.00 | 0.50 | 1.00 | 6140.00 | MG/KG | J |
| 005292 | ZONE 1-273 | Uranium, Total | 481670.40 | 1348718.00 | 0.00 | 0.50 | 12336.91 | PCI/G | NV |
| SP4-4-B1-L | SP4-4 | Vinyl chloride | 481827.00 | 1349353.00 | 1.50 | 1.90 | 10.00 | ug/kg | UJ |
| SP4-4-L | SP4-4 | Vinyl chloride | 481827.00 | 1349353.00 | 0.00 | 1.50 | 10.00 | ug/kg | UJ |
| SP4-4-TL | SP4-4 | Vinyl chloride | 481827.00 | 1349353.00 | 0.00 | 1.50 | 10.00 | mg/L | UJ |
| 061455 | P1P61 | Vinyl chloride | 481689.29 | 1348519.38 | 1.50 | 2.00 | 11.00 | ug/kg | U |
| 061470 | P1P62 | Vinyl chloride | 481691.39 | 1348444.48 | 1.50 | 2.00 | 11.00 | ug/kg | U |
| 099161 | P1P3 | Vinyl chloride | 481693.36 | 1349126.47 | 0.00 | 1.00 | 11.00 | ug/kg | U |
| 099162 | P1P3 | Vinyl chloride | 481693.36 | 1349126.47 | 2.00 | 3.00 | 11.00 | ug/kg | U |
| 121183 | 11196 | Vinyl chloride | 481876.64 | 1349329.08 | 1.00 | 1.50 | 11.00 | ug/kg | U |
| 122072 | 11194 | Vinyl chloride | 481671.30 | 1348699.84 | 0.00 | 0.50 | 11.00 | UG/KG | U |
| 122087 | 11194 | Vinyl chloride | 481671.30 | 1348699.84 | 4.50 | 5.00 | 11.00 | UG/KG | U |
| 121186 | 11196 | Vinyl chloride | 481876.64 | 1349329.08 | 2.50 | 3.00 | 12.00 | ug/kg | U |
| 122081 | 11194 | Vinyl chloride | 481671.30 | 1348699.84 | 2.50 | 3.00 | 12.00 | UG/KG | U |
| 099173 | P1P12 | Vinyl chloride | 481667.17 | 1348812.69 | 0.00 | 1.00 | 12.00 | UG/KG | U |
| 099176 | P1P12 | Vinyl chloride | 481667.17 | 1348812.69 | 2.00 | 3.00 | 12.00 | UG/KG | U |
| 111385 | 2947 | Vinyl chloride | 482149.42 | 1348437.72 | 0.00 | 0.00 | 12.00 | ug/kg | UJ |
| 119492 | 11078 | Vinyl chloride | 482173.00 | 1348372.56 | 0.00 | 10.00 | 12.00 | ug/kg | UJ |
| 061463 | P1P60 | Vinyl chloride | 481687.29 | 1348594.37 | 1.50 | 2.00 | 13.00 | ug/kg | U |
| 121179 | 11196 | Vinyl chloride | 481876.64 | 1349329.08 | 0.00 | 0.50 | 13.00 | ug/kg | U |
| 122076 | 11194 | Vinyl chloride | 481671.30 | 1348699.84 | 1.00 | 1.50 | 13.00 | UG/KG | U |
| 121192 | 11196 | Vinyl chloride | 481876.64 | 1349329.08 | 4.50 | 5.00 | 14.00 | ug/kg | U |

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TABLE A-2
HISTORICAL VALIDATED DATA FROM SOLID WASTE LANDFILL

| Location Id | Top Depth | ottom Dept | Parameter | Result | Units | Qualifier | |
|---|---|---|---|---|---|---|---|
| **11036** | **2.5** | **5** | **Uranium, Total** | **1730.73** | **mg/kg** | **-** | |
| 11036 | 17 | 19 | Uranium, Total | 3.56 | mg/kg | - | |
| 11037 | 5 | 7.5 | Uranium, Total | 3.57 | mg/kg | - | |
| 11037 | 17.5 | 20 | Uranium, Total | 4.68 | mg/kg | - | |
| 11037 | 20 | 22 | Uranium, Total | 9.00 | mg/kg | NV | |
| **1722** | **3** | **4.5** | **Uranium, Total** | **1260.42** | **mg/kg** | **-** | |
| 1722 | 11 | 12.5 | Uranium, Total | 19.58 | mg/kg | - | |
| 1722 | 12.5 | 14 | Uranium, Total | 143.11 | mg/kg | - | |
| **1722** | **1.5** | **3** | **Lead** | **147** | **mg/kg** | **-** | |
| 1722 | 6 | 7.5 | Lead, TCLP | 0.936 | ug/L | - | |
| 1722 | 11 | 12.5 | Lead, TCLP | 0.04 | ug/L | U | |
| 1722 | 14 | 16.5 | Lead | 10.1 | mg/kg | - | |
| 1984 | 2.5 | 5 | Uranium, Total | 5.19 | mg/kg | J | |
| 1984 | 12.5 | 15 | Uranium, Total | 3.72 | mg/kg | J | |
| 1985 | 0 | 2 | Uranium, Total | 113.00 | mg/kg | - | |
| 1985 | 2 | 4 | Uranium, Total | 59.16 | mg/kg | - | |
| 1985 | 15 | 17 | Uranium, Total | 4.56 | mg/kg | - | |
| **1986** | **2.5** | **5** | **Uranium, Total** | **1280.00** | **mg/kg** | **NV** | |
| 1986 | 5 | 7.5 | Uranium, Total | 146.00 | mg/kg | - | |
| 1986 | 10 | 12.5 | Uranium, Total | 18.30 | mg/kg | - | |
| 1986 | 12.5 | 15 | Uranium, Total | 2.49 | mg/kg | J | |
| 1988 | 2.5 | 5 | Uranium, Total | 113.17 | mg/kg | - | |
| 1988 | 17.5 | 20 | Uranium, Total | 2.88 | mg/kg | - | |

TABLE A-3
HISTORICAL WAC DATA FOR THE FIRE TRAINING FACILTY

| Sample ID | Location ID | Sample Depth | Northing | Easting | Parameter | Result | Units | Qualifier |
|---|---|---|---|---|---|---|---|---|
| 200105523 | 044703-014 | Surface | 482571.00 | 1349471.00 | 4-Nitroaniline | 53.00 | ug/kg | J |

# FIGURE A-1
## Real-Time Scanning Data in NW Former Production Area

Moisture Corrected Total Uranium
RSS2 batch #0179, 0180, 0181, 0182, & 0183
Coverage Plot, Field of View to scale
Measurement Dates: 4/3/2001 through

N

Values within circles are HPGE values in ppm Total Uranium

ppm Total Uranium
- -300.00 to 82.00
- 82.00 to 400.00
- 400.00 to 721.00
- 721.00 to 10000.00

RTIMP DWG Title: OMTAEx2-WAC-TU-1PT-MC
Project: 20310-PSP-0001
Name: RTIMP Misc. WAC scan
Prepared by: David Allen
File: OMTAEx2_WAC_TU_1PT_MC.srf
Date Prepared: 4/25/2001

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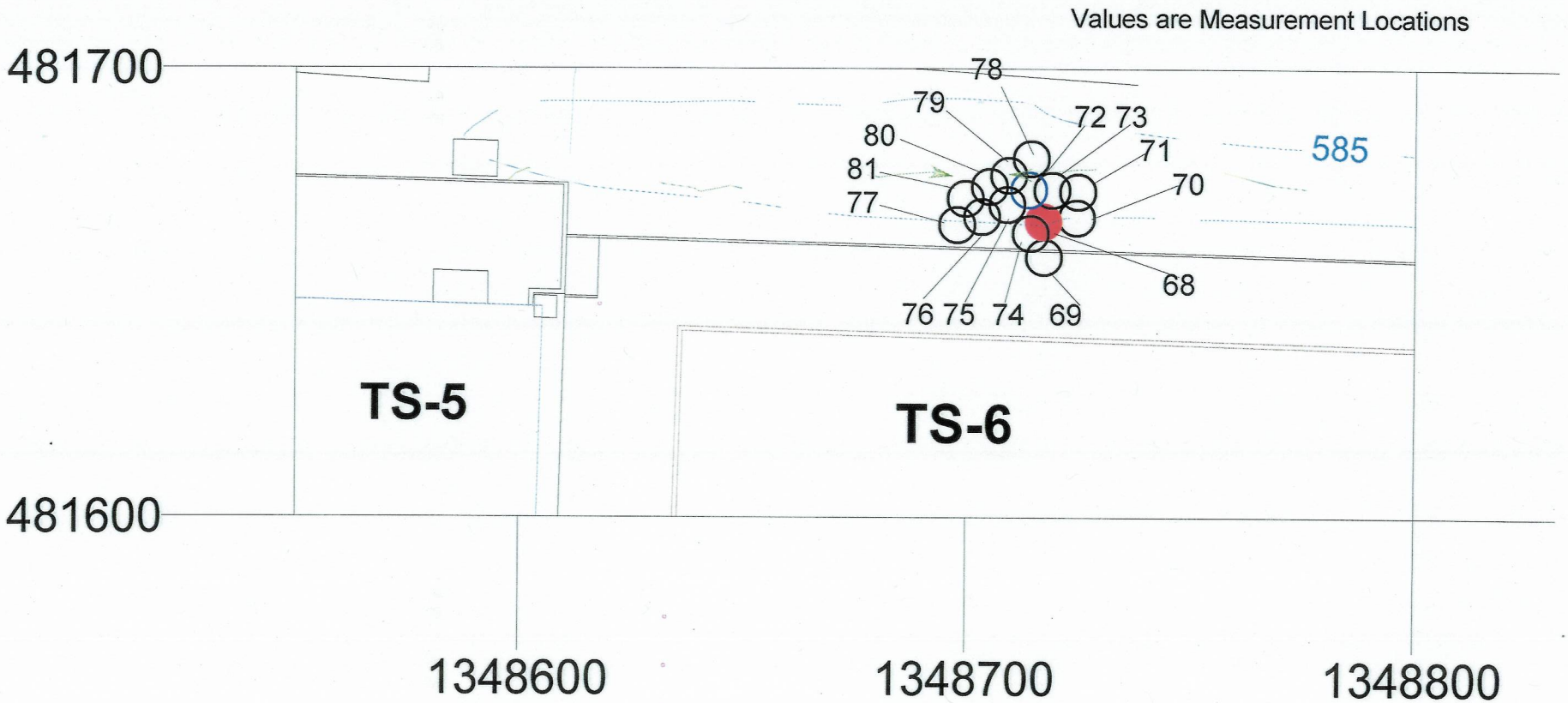
# Figure A-2

## HPGe Measurements at Above WAC Location Zone 1-273

Moisture Corrected Total Uranium
HPGE #31204, & 31265
Coverage Plot, Field of View to scale
Measurement Dates: 5/16/2001 and 5/17/2001




ppm Total Uranium
- 0.00 to 82.00
- 82.00 to 400.00
- 400.00 to 928.00
- 928.00 to 10000.00

RTIMP DWG Title: OMTAEx2-WAC-15CM-TU-1PT-MC
Project: 20310-PSP-0001
Name: RTIMP Misc. WAC scan
Prepared by: David Allen
File: OMTAEx2_WAC_15CM_TU_1PT_MC.srf
Date Prepared: 5/17/2001

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# APPENDIX B

# DATA QUALITY OBJECTIVES SL-048, REV. 5

3753

Control Number _____

# Fernald Environmental Management Project

## Data Quality Objectives

Title: Delineating the Extent of Constituents of Concern During Remediation Sampling

Number: SL-048

Revision: 5

Effective Date: February 26, 1999

Contact Name: Eric Kroger

Approval: (signature on file) Date: 2/25/99
James E. Chambers
DQO Coordinator

Approval: (signature on file) Date: 2/26/99
J.D. Chiou
SCEP Project Director

| Rev. # | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Effective Date: | 9/19/97 | 10/3/97 | 4/15/98 | 6/17/98 | 7/14/98 | 2/26/99 | |

# DATA QUALITY OBJECTIVES
## Delineating the Extent of Constituents of Concern During Remediation Sampling

**Members of Data Quality Objectives (DQO) Scoping Team**
The members of the DQO team include a project lead, a project engineer, a field lead, a statistician, a lead chemist, a sampling supervisor, and a data management lead.

**Conceptual Model of the Site**
Media is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The extent of specific media contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available data for media collected during the Remedial Investigation (RI) effort and other FEMP environmental characterization studies. Maps outlining contaminated media boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis data with isoconcentration maps of the other constituents of concern (COCs), as presented in the Operable Unit 5 RI report, and further modified by spatial analysis of maps reflecting the most current media characterization data. A sequential remediation plan has been presented that subdivides the FEMP into seven construction areas. During the course of remediation, areas of specific media may require additional characterization so remediation can be carried out as thoroughly and efficiently as possible. As a result, additional sampling may be necessary to accurately delineate a volume of specific media as exceeding a target level, such as the FRL or the Waste Attainment Criterion (WAC). Each individual Project-Specific Plan (PSP) will identify and describe the particular media to be sampled. This DQO covers all physical sampling activities associated with Pre-design Investigations, precertification sampling, WAC attainment sampling or regulatory monitoring that is required during site remediation.

## 1.0 Statement of Problem

If the extent (depth and/or area) of the media COC contamination is unknown, then it must be defined with respect to the appropriate target level (FRL, WAC, or other specified media concentration).

## 2.0 Identify the Decision

Delineate the horizontal and/or vertical extent of media COC contamination in an area with respect to the appropriate target level.

## 3.0 Inputs That Affect the Decision

Informational Inputs - Historical data, process history knowledge, the modeled extent of COC contamination, and the origins of contamination will be required to

establish a sampling plan to delineate the extent of COC contamination. The desired precision of the delineation must be weighed against the cost of collecting and analyzing additional samples in order to determine the optimal sampling density. The project-specific plan will identify the optimal sampling density.

Action Levels - COCs must be delineated with respect to a specific action level, such as FRLs and On-Site Disposal Facility (OSDF) WAC concentrations. Specific media FRLs are established in the OU2 and OU5 RODs, and the WAC concentrations are published in the OU5 ROD. Media COCs may also require delineation with respect to other action levels that act as remediation drivers, such as Benchmark Toxicity Values (BTVs).

## 4.0 The Boundaries of the Situation

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the remediation schedule. Time frames must allow for the scheduling of sampling and analytical activities, the collection of samples, analysis of samples and the processing of analytical data when received.

Scale of Decision Making - The decision made based upon the data collected in this investigation will be the extent of COC contamination at or above the appropriate action level. This delineation will result in media contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The parameters of interest are the COCs that have been determined to require additional delineation before remediation design can be finalized with the optimal degree of accuracy.

## 5.0 Decision Rule

If existing data provide an unacceptable level of uncertainty in the COC delineation model, then additional sampling will take place to decrease the model uncertainty. When deciding what additional data is needed, the costs of additional sampling and analysis must be weighed against the benefit of reduced uncertainty in the delineation model, which will eventually be used for assigning excavation, or for other purposes.

## 6.0 Limits on Decision Errors

In order to be useful, data must be collected with sufficient areal and depth coverage, and at sufficient density to ensure an accurate delineation of COC concentrations. Analytical sensitivity and reproducibility must be sufficient to differentiate the COC concentrations below their respective target levels.

Types of Decision Errors and Consequences

Decision Error 1 - This decision error occurs when the decision maker determines that the extent of media contaminated with COCs above action levels is not as extensive as it actually is. This error can result in a remediation design that fails to incorporate media contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the remediation schedule. Also, this could result in media contaminated above action levels remaining after remediation is considered complete, posing a potential threat to human health and the environment.

Decision Error 2 - This decision error occurs when the decision maker determines that the extent of media contaminated above COC action levels is more extensive than it actually is. This error could result in more excavation than necessary, and this excess volume of materials being transferred to the OSDF, or an off-site disposal facility if contamination levels exceed the OSDF WAC.

True State of Nature for the Decision Errors - The true state of nature for Decision Error 1 is that the maximum extent of contamination above the FRL is more extensive than was determined. The true state of nature for Decision Error 2 is that the maximum extent of contamination above the FRL is not as extensive as was determined. Decision Error 1 is the more severe error.

## 7.0 Optimizing Design for Useable Data

### 7.1 Sample Collection

A sampling and analytical testing program will delineate the extent of COC contamination in a given area with respect to the action level of interest. Existing data, process knowledge, modeled concentration data, and the origins of contamination will be considered when determining the lateral and vertical extent of sample collection. The cost of collecting and analyzing additional samples will be weighed against the benefit of reduced uncertainty in the delineation model. This will determine the sampling density. Individual PSPs will identify the locations and depths to be sampled, the sampling density necessary to obtain the desired accuracy of the delineation, and if samples will be analyzed by the on-site or off-site laboratory. The PSP will also identify the sampling increments to be selectively analyzed for concentrations of the COC(s) of interest, along with field work requirements. Analytical requirements will be listed in the PSP. The chosen analytical methodologies are able to achieve a detection limit capable of resolving the COC action level. Sampling of groundwater monitoring wells may require different purge requirements than those stated in the SCQ (i.e., dry well definitions or small purge volumes). In order to accommodate sampling of wells that go dry prior to completing the purge of the necessary well volume, attempts to sample the

monitoring wells will be made 24 hours after purging the well dry. If, after the 24 hour period, the well does not yield the required volume, the analytes will be collected in the order stated in the applicable PSP until the well goes dry. Any remaining analytes will not be collected. In some instances, after the 24 hour wait the well may not yield any water. For these cases, the well will be considered dry and will not be sampled.

7.2 COC Delineation

The media COC delineation will use all data collected under the PSP, and if deemed appropriate by the Project Lead, may also include existing data obtained from physical samples, and if applicable, information obtained through real-time screening. The delineation may be accomplished through modeling (e.g. kriging) of the COC concentration data with a confidence limit specific to project needs that will reduce the potential for Decision Error 1. A very conservative approach to delineation may also be utilized where the boundaries of the contaminated media are extended to the first known vertical and horizontal sample locations that reveal concentrations below the desired action level.

7.3 QC Considerations

Laboratory work will follow the requirements specified in the SCQ. If analysis is to be carried out by an off-site laboratory, it will be a Fluor Daniel Fernald approved full service laboratory. Laboratory quality control measures include a media prep blank, a laboratory control sample (LCS), matrix duplicates and matrix spike. Typical Field QC samples are not required for ASL B analysis. However the PSPs may specify appropriate field QC samples for the media type with respect to the ASL in accordance with the SCQ, such as field blanks, trip blanks, and container blanks. All field QC samples will be analyzed at the associated field sample ASL. Data will be validated per project requirements, which must meet the requirements specified in the SCQ. Project-specific validation requirements will be listed in the PSP.

Per the Sitewide Excavation Plan, the following ASL and data validation requirements apply to all **soil and soil field QC samples** collected in association with this DQO:

- If samples are analyzed for Pre-design Investigations and/or Precertification, 100% of the data will be analyzed per ASL B requirements. For each laboratory used for a project, 90% of the data will require only a Certificate of Analysis, the other 10% will require the Certificate of Analysis and all associated QA/QC results, and will be validated to ASL B. Per Appendix H of the SEP, the minimum detection level (MDL) for these analyses will be established at approximately 10% of the action level (the action level for precertification is the

FRL; the action level for pre-design investigations can be several different action levels, including the FRL, the WAC, RCRA levels, ALARA levels, etc.). If this MDL is different from the SCQ-specified MDL, the ASL will default to ASL E, though other analytical requirements will remain as specified for ASL B.

- If samples are analyzed for WAC Attainment and/or RCRA Characteristic Areas Delineation, 100% of the data will be analyzed and reported to ASL B with 10% validated. The ASL B package will include a Certificate of Analysis along with all associated QA/QC results. Total uranium analyses using a higher detection limit than is required for ASL B (10 mg/kg) may be appropriate for WAC attainment purposes since the WAC limit for total uranium is 1,030 mg/kg. In this case, an ASL E designation will apply to the analysis and reporting to be performed under the following conditions:

  - all of the ASL B laboratory QA/QC methods and reporting criteria will apply with the exception of the total uranium detection limit

  - the detection limit will be ≤10% of the WAC limit (e.g., ≤103 mg/kg for total uranium).

- If delineation data are also to be used for certification, the data must meet the data quality objectives specified in the Certification DQO (SL-043).

- Validation will include field validation of field packages for ASL B or ASL D data.

All data will undergo an evaluation by the Project Team, including a comparison for consistency with historical data. Deviations from QC considerations resulting from evaluating inputs to the decision from Section 3, must be justified in the PSP such that the objectives of the decision rule in Section 5 are met.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances will be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Data Management

Upon receipt from the laboratory, all results will be entered into the SED as qualified data using standard data entry protocol. The required ASL B, D or E data will undergo analytical validation by the FEMP validation team, as required (see Section 7.3). The Project Manager will be responsible to determine data usability as it pertains to supporting the DQO decision of determining delineation of media

COC's.

7.6 Applicable Procedures

Sample collection will be described in the PSP with a listing of applicable procedures. Typical related plans and procedures are the following:

- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ).
- SMPL-01, *Solids Sampling*
- SMPL-02, *Liquids and Sludge Sampling*
- SMPL-21, *Collection of Field Quality Control Samples*
- EQT-06, *Geoprobe® Model 5400 Operation and Maintenance*
- EQT-23, *Operation of High Purity Germanium Detectors*
- EQT-30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System*

**Data Quality Objectives**
**Delineating the Extent of Constituents of Concern During Remediation Sampling**

1A. Task/Description: Delineating the extent of contamination above the FRLs

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☒ RA ☐ $R_vA$ ☐ OTHER ☐

1.C. DQO No.: SL-048, Rev. 5 DQO Reference No.:_____

---

2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☒ Sediment ☒ Soil ☒

Waste ☒ Wastewater ☐ Surface water ☐ Other (specify) _____

---

3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization
A ☐ B ☒ C ☐ D ☒ E ☒

Risk Assessment
A ☐ B ☐ C ☐ D ☐ E ☐

Evaluation of Alternatives
A ☐ B ☐ C ☐ D ☐ E ☐

Engineering Design
A ☐ B ☒ C ☐ D ☒ E ☒

Monitoring during remediation
A ☒ B ☒ C ☐ D ☒ E ☒

Other
A ☐ B ☐ C ☐ D ☐ E ☐

---

4.A. Drivers: Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and the OU2 and/or OU5 Record of Decision (ROD).

4.B. Objective: Delineate the extent of media contaminated with a COC (or COCs) with respect to the action level(s) of interest.

---

5. Site Information (Description):

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | pH | X * | 2. | Uranium | X * | 3. | BTX ☐ |
| | Temperature | X * | | Full Radiological | X * | | TPH ☐ |
| | Specific Conductance | X * | | Metals | X * | | Oil/Grease ☐ |
| | Dissolved Oxygen | X * | | Cyanide | ☐ | | |
| | Technetium-99 | X * | | Silica | ☐ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4. | Cations | ☐ | 5. | VOA | X * | 6. Other (specify) |
| | Anions | ☐ | | BNA | X * | |
| | TOC | ☐ | | Pesticides | X * | |
| | TCLP | X * | | PCB | X * | |
| | CEC | ☐ | | COD | ☐ | |

*If constituent is identified for delineation in the individual PSP.

6.B. Equipment Selection and SCQ Reference:

| | Equipment Selection | Refer to SCQ Section |
|---|---|---|
| ASL A | | SCQ Section: |
| ASL B | X | SCQ Section: App. G Tables G-1&G-3 |
| ASL C | | SCQ Section: |
| ASL D | X | SCQ Section: App. G Tables G-1&G-3 |
| ASL E | X ( See sect. 7.3, pg. 6) | SCQ Section: App. G Tables G-1&G-3 |

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased X Composite ☐ Environmental X Grab X Grid X

Intrusive X Non-Intrusive ☐ Phased ☐ Source ☐

DQO Number: SL-048, Rev. 5

7.B. Sample Work Plan Reference: This DQO is being written prior to the PSPs.

Background samples: OU5 RI

7.C. Sample Collection Reference:

Sample Collection Reference: SMPL-01, SMPL-02, EQT-06

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8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

| | | | |
|---|---|---|---|
| Trip Blanks | X * | Container Blanks | X ++ |
| Field Blanks | X + | Duplicate Samples | X *** |
| Equipment Rinsate Samples | X *** | Split Samples | X ** |
| Preservative Blanks | ☐ | Performance Evaluation Samples | ☐ |
| Other (specify) | | | |

* For volatile organics only
** Split samples will be collected where required by EPA or OEPA.
*** If specified in PSP.
\+ Collected at the discretion of the Project Manager (if warranted by field conditions)
\+ + One per Area and Phase Area per container type (i.e. stainless steel core liner/plastic core liner/Geoprobe tube).

8.B. Laboratory Quality Control Samples:

| | | | |
|---|---|---|---|
| Method Blank | X | Matrix Duplicate/Replicate | X |
| Matrix Spike | X | Surrogate Spikes | ☐ |
| Tracer Spike | ☐ | | |

Other (specify) Per SCQ

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

# APPENDIX C

# SOIL SAMPLE LOCATIONS

# TABLE C-1
## SOIL SAMPLE LOCATIONS IN THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA

| Boring ID | Sample ID | Northing | Easting | Estimated Boring Depth | Sample Depths at Boring Location (feet) | TAL |
|---|---|---|---|---|---|---|
| A6-1 | A6-1-1-R | 482031.17 | 1348375.64 | 3.5 | 0.0-0.5 | A |
| | A6-1-7-R | | | | 3.0-3.5 | |
| A6-2 | A6-2-1-R | 482081.97 | 1348590.39 | 3.5 | 0.0-0.5 | A |
| | A6-2-7-R | | | | 3.0-3.5 | |
| A6-3 | A6-3-1-R | 482187.38 | 1348824.46 | 3.5 | 0.0-0.5 | A |
| | A6-3-7-R | | | | 3.0-3.5 | |
| A6-4 | A6-4-1-R | 482156.66 | 1348889.35 | 3.5 | 0.0-0.5 | A |
| | A6-4-7-R | | | | 3.0-3.5 | |
| A6-5 | A6-5-1-R | 482185.28 | 1348933.31 | 3.5 | 0.0-0.5 | A |
| | A6-5-7-R | | | | 3.0-3.5 | |
| A6-6 | A6-6-1-R | 482117.57 | 1349002.38 | 3.5 | 0.0-0.5 | A |
| | A6-6-7-R | | | | 3.0-3.5 | |
| A6-7 | A6-7-1-R | 482182.49 | 1349058.90 | 3.5 | 0.0-0.5 | A |
| | A6-7-7-R | | | | 3.0-3.5 | |
| A6-8 | A6-8-1-R | 482136.42 | 1349202.45 | 3.5 | 0.0-0.5 | A |
| | A6-8-7-R | | | | 3.0-3.5 | |
| A6-9 | A6-9-1-R | 482212.51 | 1349309.20 | 3.5 | 0.0-0.5 | A |
| | A6-9-7-R | | | | 3.0-3.5 | |
| A6-10 | A6-10-1-R | 481940.95 | 1349122.21 | 3.5 | 0.0-0.5 | A |
| | A6-10-7-R | | | | 3.0-3.5 | |
| A6-11 | A6-11-1-R | 481904.65 | 1349018.25 | 3.5 | 0.0-0.5 | A |
| | A6-11-7-R | | | | 3.0-3.5 | |
| A6-12 | A6-12-1-R | 481825.41 | 1348662.24 | 3.5 | 0.0-0.5 | A |
| | A6-12-7-R | | | | 3.0-3.5 | |
| A6-13 | A6-13-1-R | 482116.08 | 1349113.89 | 3.5 | 0.0-0.5 | A |
| | A6-13-7-R | | | | 3.0-3.5 | |
| A6-14 | A6-14-1-R | 481921.40 | 1349192.97 | 3.5 | 0.0-0.5 | A |
| | A6-14-7-R | | | | 3.0-3.5 | |
| A6-15 | A6-15-1-R | 482045.12 | 1348869.09 | 3.5 | 0.0-0.5 | A |
| | A6-15-7-R | | | | 3.0-3.5 | |
| A6-16 | A6-16-1-R | 481948.97 | 1348912.59 | 3.5 | 0.0-0.5 | A |
| | A6-16-7-R | | | | 3.0-3.5 | |
| A6-17 | A6-17-1-R | 481882.11 | 1348919.70 | 3.5 | 0.0-0.5 | A |
| | A6-17-7-R | | | | 3.0-3.5 | |
| A6-18 | A6-18-1-R | 481670.40 | 1348718.00 | 5 | 0.0-0.5 | A |
| | A6-18-3-R | | | | 1.0-1.5 | |
| | A6-18-6-R | | | | 2.5-3.0 | |
| | A6-18-10-R | | | | 4.5-5.0 | |
| A6-19 | A6-19-1-R | 481673.87 | 1348714.62 | 5 | 0.0-0.5 | A |
| | A6-19-3-R | | | | 1.0-1.5 | |
| | A6-19-6-R | | | | 2.5-3.0 | |
| | A6-19-10-R | | | | 4.5-5.0 | |
| A6-20 | A6-20-1-R | 481673.87 | 1349721.61 | 5 | 0.0-0.5 | A |
| | A6-20-3-R | | | | 1.0-1.5 | |
| | A6-20-6-R | | | | 2.5-3.0 | |
| | A6-20-10-R | | | | 4.5-5.0 | |

**TABLE C-1**
**SOIL SAMPLE LOCATIONS IN THE NORTHWEST CORNER OF THE FORMER PRODUCTION AREA**

| | | | | | | |
|---|---|---|---|---|---|---|
| A6-21 | A6-21-1-R | 481666.86 | 1348714.46 | 5 | 0.0-0.5 | A |
| | A6-21-3-R | | | | 1.0-1.5 | |
| | A6-21-6-R | | | | 2.5-3.0 | |
| | A6-21-10-R | | | | 4.5-5.0 | |
| A6-22 | A6-22-1-R | 481666.88 | 1348721.70 | 5 | 0.0-0.5 | A |
| | A6-22-3-R | | | | 1.0-1.5 | |
| | A6-22-6-R | | | | 2.5-3.0 | |
| | A6-22-10-R | | | | 4.5-5.0 | |

**TABLE C-2**
**SOLID WASTE LANDFILL BORING SAMPLE LOCATIONS**

| Boring Location | Sample ID | Northing | Easting | Estimated Boring Depth | Sample Depths at Boring Location (feet) | TAL |
|---|---|---|---|---|---|---|
| SWL-1 | SWL-1-2-R | 482170.73 | 1348195.45 | 8 | 0.5-1.0 | B |
| | SWL-1-4-R | | | | 1.5-2.0 | |
| | SWL-1-6-R | | | | 2.5-3 | |
| | SWL-1-8-R | | | | 3.5-4 | |
| | SWL-1-10-R | | | | 4.5-5 | |
| | SWL-1-12-R | | | | 5.5-6 | |
| | SWL-1-14-R | | | | 6.5-7 | |
| | SWL-1-16-R | | | | 7.5-8 | |
| SWL-2 | SWL-1-2-R | 482170.73 | 1348253.89 | 8 | 0.5-1.0 | B |
| | SWL-1-4-R | | | | 1.5-2.0 | |
| | SWL-1-6-R | | | | 2.5-3 | |
| | SWL-1-8-R | | | | 3.5-4 | |
| | SWL-1-10-R | | | | 4.5-5 | |
| | SWL-1-16-R | | | | 7.5-8 | |
| SWL-3 | SWL-3-2-R | 482147.55 | 1348303.14 | 8 | 0.5-1.0 | B |
| | SWL-3-4-R | | | | 1.5-2.0 | |
| | SWL-3-6-R | | | | 2.5-3 | |
| | SWL-3-8-R | | | | 3.5-4 | |
| | SWL-3-10-R | | | | 4.5-5 | |
| | SWL-3-16-R | | | | 7.5-8 | |
| SWL-4 | SWL-4-10-R | 482119.87 | 1348255.64 | 8 | 0.5-1.0 | B |
| | SWL-4-12-R | | | | 1.5-2.0 | |
| | SWL-4-14-R | | | | 2.5-3 | |
| | SWL-4-16-R | | | | 3.5-4 | |
| SWL-5 | SWL-5-2-R | 482125.55 | 1348195.45 | 8 | 0.5-1.0 | B |
| | SWL-5-4-R | | | | 1.5-2.0 | |
| | SWL-5-12-R | | | | 5.5-6 | |
| | SWL-5-14-R | | | | 6.5-7 | |
| | SWL-5-16-R | | | | 7.5-8 | |
| SWL-6 | SWL-6-12-R | 482140.58 | 1348234.2 | 8 | 5.5-6 | B |
| | SWL-6-14-R | | | | 6.5-7 | |
| | SWL-6-16-R | | | | 7.5-8 | |
| SWL-7 | SWL-7-6-TM | 482144.2 | 1348268.42 | 8 | 1.5-3 | D |
| | SWL-7-8-TM | | | | 3.5-4 | D |
| | SWL-7-10-R | | | | 4.5-5 | B |
| | SWL-7-12-R | | | | 5.5-6 | |
| | SWL-7-14-R | | | | 6.5-7 | |
| | SWL-7-16-R | | | | 7.5-8 | |

TABLE C-3
FTF SOIL SAMPLE LOCATION

| Boring ID | Sample ID | Northing | Easting | Estimated Boring Depth | Sample Depths at Boring Location (feet) | TAL |
|---|---|---|---|---|---|---|
| FTF-1 | FTF-1-1-RM | 482571.00 | 1349471.00 | 0.5 | 0.0-0.5 | F |
| | FTF-1-1-SL | | | | | E |

# APPENDIX D

# TARGET ANALYTE LISTS

# APPENDIX D
# TARGET ANALYTE LISTS

## TAL A
## 20600-PSP-0001-A

| Analyte | Method | ASL Level | WAC Limit | Required Detection Limit |
|---|---|---|---|---|
| Total Uranium | ICP/MS | B | 1030 ppm | 10 ppm |
| Technetium-99 | GPC | B | 29.1 pCi/g | 2 pCi/g |

GPC – gas proportional counter
ICP/MS – inductively coupled plasma/mass spectroscopy

## TAL B
## TAL 20600-PSP-0001-B

| Analyte | Method | ASL Level | WAC Limit | Required Detection Limit |
|---|---|---|---|---|
| Total Uranium | ICP/MS | B | 1030 ppm | 10 ppm |

## TAL C
## TAL 20600-PSP-0001-C

| Analyte | Method | ASL Level | WAC Limit | Required Detection Limit |
|---|---|---|---|---|
| Bromodichloromethane | Gas Chromatography Mass Spectroscopy | B | .903 ppm | 0.5 ppm |
| 1,1-Dichloroethene | Gas Chromatography Mass Spectroscopy | B | 11.4 ppm | 1 ppm |
| 1,2-Dichloroethene | Gas Chromatography Mass Spectroscopy | B | 11.4 ppm | 1 ppm |
| Trichloroethene | Gas Chromatography Mass Spectroscopy | B | 128 ppm | 1 ppm |
| Tetrachloroethene | Gas Chromatography Mass Spectroscopy | B | 128 ppm | 1 ppm |

## TAL D
## TAL 20600-PSP-0001-D

| Analyte | Method | ASL Level | RCRA Limit | Required Detection Limit |
|---|---|---|---|---|
| TCLP Lead | ICP-AES | B | 5.0 mg/L | 100 µg/L |

ICP-AES – inductively coupled plasma/atomic emission spectroscopy

## TAL E
## TAL 20600-PSP-0001-E

| Analyte | Method | ASL Level | WAC Limit | Required Detection Limit |
|---|---|---|---|---|
| 4-nitroaniline | Gas Chromatography Mass Spectroscopy | B | .044 ppm | .830 ppm* |
| Carbazole | Gas Chromatography Mass Spectroscopy | B | 7270 ppm | 100 ppm |
| Chloroethane | Gas Chromatography Mass Spectroscopy | B | 392,000 ppm | 100 ppm |

* See Section 4.2

## TAL F
## TAL 20600-PSP-0001-F

| Analyte | Method | ASL Level | WAC Limit | Required Detection Limit |
|---|---|---|---|---|
| Boron | ICP-AES | B | 1040 ppm | 10 ppm |
| Neptunium-237 | GPC | B | 3,120,000,000 pCi/g | 1000 pCi/g |
| Technetium-99 | GPC | B | 29.1 pCi/g | 1 pCi/g |

## TAL G (Trip Blank)
## TAL 20600-PSP-0001-G

| Analyte | Method | ASL Level | Required Detection Limit |
|---|---|---|---|
| Bromodichloromethane | Gas Chromatography Mass Spectroscopy | B | 10 ppb |
| 1,1-Dichloroethene | Gas Chromatography Mass Spectroscopy | B | 10 ppb |
| 1,2-Dichloroethene | Gas Chromatography Mass Spectroscopy | B | 10 ppb |
| Trichloroethene | Gas Chromatography Mass Spectroscopy | B | 10 ppb |
| Tetrachloroethene | Gas Chromatography Mass Spectroscopy | B | 10 ppb |
| Chloroethane | Gas Chromatography Mass Spectroscopy | B | 10 ppb |