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# IMPLEMENTATION PLAN FOR AREA 2, PHASE III PART TWO

## SOIL AND DISPOSAL FACILITY PROJECT

## FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
## FERNALD, OHIO


## DECEMBER 1999

## U.S. DEPARTMENT OF ENERGY
## FERNALD AREA OFFICE

20460-PL-0001
REVISION B
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# EXECUTIVE SUMMARY

This Implementation Plan describes the specific activities the U.S. Department of Energy (DOE) plans for soil remediation in Area 2, Phase III (A2PIII), Part Two, at the Fernald Environmental Management Project (FEMP). A2PIII is essentially the south-central portion of the FEMP site, approximately 75 acres west of the South Access Road and north of Willey Road. A2PIII is divided into Parts One and Two by the unnamed tributary to Paddys Run. A2PIII Part Two is approximately 5 acres in the northern peninsula portion of A2PIII.

This Implementation Plan describes the area-specific remedial design/remedial action process discussed in the Sitewide Excavation Plan (SEP; DOE 1998a) (i.e., predesign investigations, remedial design, remedial action, precertification, and restoration activities). Certification and restoration will be performed following remediation and will be addressed in detail in future documents.

Remedial action in A2PIII Part Two consists of a 2.5-foot excavation and disposition of impacted material from A2PIII Part Two. A Design Change Notice (DCN) to the Area 2, Phase I (A2PI) Southern Waste Unit (SWU) excavation drawings has been prepared, along with notes, and is included with this Implementation Plan as part of the Integrated Remedial Design Package (IRDP) for A2PIII Part Two. The technical specifications for the A2PI SWU excavation package are applicable because of the DCN.

The remedial action requirements described in the construction drawings and technical specifications were developed in accordance with the concepts described in this Implementation Plan, as guided by the On-Site Disposal Facility (OSDF) Waste Acceptance Criteria (WAC) Attainment Plan (DOE 1998b) and the SEP. As the integrating document for the IRDP, the Implementation Plan provides a comprehensive description of planned remediation activities. Remediation is scheduled for completion in Spring 2000.

Material to be excavated from A2PIII Part Two consists of soils with contaminant levels above final remediation levels (FRLs) for radium-226. Excavation and remediation of A2PIII Part Two is expected to generate approximately 5,200 cubic yards ($yd^3$) of impacted material, all of which is anticipated to be hauled to and disposed of in the OSDF. The excavation boundaries, both lateral and vertical, are controlled by the presence of radium-226 at concentrations above the FRL of 1.7 picoCuries per gram (pCi/g). The radiological controls for the excavation of the A2PIII Part Two footprint will be governed by the controls for total uranium.

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| | |
|---|---|
| A1PII | Area 1 Phase II |
| A2PI | Area 2 Phase I |
| A2PIII | Area 2 Phase III |
| ACA | Amended Consent Agreement |
| ACGIH | American Council of Governmental and Industrial Hygenists |
| ALARA | As Low As Reasonably Achievable |
| APM | Area Project Manager |
| ARAR | Applicable or Relevant and Appropriate Requirement |
| ASCOC | Area Specific Contaminant of Concern |
| BAT | best available technology |
| CDL | Certification Design Letter |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| CM | Construction Manager |
| COC | Contaminant of Concern |
| CRDL | Contract-required detection limit |
| CU | certification unit |
| dbA | administrative decibel level |
| DCN | Design Change Notification |
| DOE | US Department of Energy |
| dpm | disintegtations per minute |
| EPA | US Environmental Protection Agency |
| ESH&TRM | Environmental Safety and Health and Training Requirements Matrix |
| FAR | Federal Acquisition Requirement |
| FDF | Fluor Daniel Fernald |
| FEMP | Fernald Environmental Management Project |
| FRL | final remediation level |
| HPGe | high-purity germanium detector |
| HWMU | Hazardous Waste Management Unit |
| IEMP | Integrated Environmental Monitoring Plan |
| IIMS | Integrated Information Management System |
| IMHR | Impacted Material Haul Road |
| IMPP | Impacted Materials Placement Plan |
| IRDP | Integrated Remedial Design Package |
| mg/kg | milligrams per kilogram |

| | |
|---|---|
| NPDES | National Pollutant Discharge Elimination System |
| NRRP | Natural Resources Restoration Plan |
| NRT | Natural Resource Trustee |
| OEPA | State of Ohio Environmental Protection Agency |
| OSDF | On-Site Disposal Facility |
| OSHA | Occupational Safety and Health Administration |
| OU | Operable Unit |
| pCi/g | picoCuries per gram |
| PEP | Project Execution Plan |
| PID | photoionization detector |
| PPE | personal protective equipment |
| PSHSRM | Project-Specific Health & Safety Requirements Matrix |
| RCRA | Resource Conservation and Recovery Act |
| RD/RA | remedial design/remedial action |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RSS | Radiation Scanning System |
| RTRAK | Radiation Tracking System |
| RWP | radiological work permit |
| S&H | Safety and Health |
| SCEP | Soil Characterization and Excavation Project |
| SDFP | Soil and Disposal Facility Project |
| SEP | Sitewide Excavation Plan |
| STP | Sewage Treatment Plant |
| SWPPP | Storm Water Pollution Prevention Plan |
| SWU | Southern Waste Unit |
| TBC | To Be Considered Criteria |
| WAC | Waste Acceptance Criteria |
| WAO | Waste Acceptance Organization |
| WPRAP | Waste Pits Remedial Action Project |
| $yd^3$ | cubic yards |

# 1.0 INTRODUCTION =- 2682

This Implementation Plan describes the intended remediation activities in Area 2, Phase III (A2PIII) Part Two at the Fernald Environmental Management Project (FEMP). It details how the general remediation strategies set forth by the US Department of Energy (DOE) in the Sitewide Excavation Plan (SEP; DOE 1998a) will be applied to remediation of A2PIII Part Two.

The FEMP site has been divided into ten areas for remediation of soil and at- and below-grade structures and debris. As shown on Figure 1-1, the southwestern corner of the FEMP east of Paddys Run has been identified as Remediation Area 2. The remediation of this area has been separated into three phases (i.e., Phase I, Phase II and Phase III) to prioritize removal of material presenting the greatest risk to human health and the environment. A2PIII was further subdivided into subareas Part One and Part Two during precertification activities and development of the A2PIII Certification Design Letter (CDL).

This Implementation Plan addresses Part Two of A2PIII, which consists of approximately 5 acres in the northern portion of A2PIII. Part Two was not previously identified as an excavation area; the impacted material was identified during precertification activities. A2PIII Part One consists of the remaining approximate 70-acre portion of A2PIII. Certification efforts for A2PIII Part One are underway and discussed in the CDL for A2PIII Part One (DOE 1999a).

All A2PIII Part Two excavation activities will be performed in accordance with the A2PIII Part Two Integrated Remedial Design Package (IRDP). The IRDP consists of the following area- and project-specific documents:

- Implementation Plan (this document)
- Design Change Notice (DCN) and Existing Area 2, Phase I (A2PI) Southern Waste Unit (SWU) Excavation Technical Specifications.

The remedial action requirements described in the DCN and technical specifications were developed in accordance with the concepts described in this Implementation Plan, as guided by the SEP. As the integrating document for the IRDP, the Implementation Plan provides a comprehensive description of

planned remediation activities. This will facilitate regulatory agency review and define the scope of work necessary to procure remediation equipment, supplies, and services.

Remediation involves strategic planning, preparation of design packages and detailed remedial action planning. As presented in the Amended Consent Agreement (ACA; EPA 1991) between DOE, the U.S. Environmental Protection Agency (EPA) and the Ohio Environmental Protection Agency (OEPA), this remediation process includes preparation of remedial action work plans to cover construction activities and the establishment of an enforceable remedial action schedule. The goals of remedial design and remedial action, and the intent of the ACA, will be addressed through sitewide excavation planning, development of IRDPs, the On-Site Disposal Facility (OSDF) Impacted Materials Placement Plan (IMPP; DOE 1999b) and Waste Acceptance Criteria (WAC) Attainment Plan (DOE 1998b), coordination with other FEMP activities, and remediation/construction activities. This Implementation Plan, as part of the IRDP and in conjunction with the SEP and these documents, fulfills ACA requirements.

## 1.1 SCOPE AND GENERAL APPROACH OF THE IMPLEMENTATION PLAN

As shown on Figure 1-1 of the SEP, the area-specific remedial design/remedial action (RD/RA) process involves several steps, including:

- Predesign investigations
- Remedial design
- Remedial action
- Precertification and certification
- Final restoration
- Post remediation activities.

This Implementation Plan addresses predesign investigations, remedial design and remedial action. As stated in the SEP, a CDL will be prepared and submitted to the regulatory agencies following completion of the precertification process. This will provide a summary of the area-specific remediation completed, results of the precertification activities, and design of the certification sampling and analysis program. Following completion of certification activities and agency approval, restoration (Section 3.6) will be completed, guided by the final version of the Natural Resource Restoration Plan (NRRP; DOE 1998c).

Remedial action in A2PIII Part Two will be completed as a 2.5 foot excavation activity in a 1.3-acre area, with some site preparation work as necessary. Site preparation activities will consist primarily of establishing erosion and sediment controls.

The excavation involves removal and disposition of impacted material. Impacted material, for the purposes of this Implementation Plan, consists of material with contaminant levels above the A2PIII final remediation levels (FRLs) for the area-specific constituents of concern (ASCOCs) (Section 2.2). In addition, all sediment collected on erosion control measures prior to certification will be considered impacted. Impacted material that meets chemical, radiological, and physical WAC will be hauled to the OSDF for disposition (Section 3.3.3).

The extent of excavation (Section 2.4) is based on the contamination limits, which have been defined through the use of predesign investigations, real-time monitoring and physical sampling and analysis. These investigations are discussed in Section 2.1.

The excavation grades shown on the construction drawings represent the excavation footprint following the 2.5-foot excavation. The final excavation extent will be based on actual field conditions, radiological field survey measurements, and physical sampling results.

This Implementation Plan consists of the following sections:

- Section 1.0 - Introduction, which summarizes the purpose and scope of this Implementation Plan and describes programmatic strategies and requirements for implementation of this remedial action project.

- Section 2.0 - Predesign Investigations, which describes the ASCOCs for A2PIII Part Two, the surface conditions of the area, the nature and extent of contamination, and the anticipated excavation boundaries.

- Section 3.0 - Remedial Action Approach, which summarizes the approach that will be used to implement excavation (i.e., site preparation, soil excavation, excavation control monitoring, material handling and treatment, restoration, and institutional controls).

- Section 4.0 - Project-Specific Environmental Controls and Monitoring, which discusses environmental controls and associated monitoring which will be initiated as part of the remediation of A2PIII Part Two.

- Section 5.0 - Project-Specific Health and Safety, which summarizes project-specific health and safety requirements and procedures.

- Section 6.0 - Remedial Action Management Strategy, which discusses the strategy for managing remediation activities in A2PIII Part Two.

## 1.2 BACKGROUND AND DESCRIPTION OF THE REMEDIATION AREA

### 1.2.1 Description of Area

Part Two of A2PIII is a peninsula-shaped area located in the northern portion of the remediation area. The area itself covers approximately 5 acres, with the excavation footprint covering approximately 1.3 acres.

### 1.2.2 Excavation Priorities

In terms of the A2PIII Part Two remediation project, the excavation will consist of a 2.5-foot excavation activity. There are no hazardous waste management units (HWMU) or underground storage tanks within the boundaries of A2PIII Part Two. There are no areas identified within A2PIII Part Two with contamination levels above the OSDF WAC for the ASCOCs.

Special materials have not been identified, nor are expected, in the A2PIII Part Two excavation. However, in the event that special materials are encountered during the excavation, proper material handling will take place (Section 3.3.2) and a Special Material Transfer Area will be established if needed.

## 1.3 SUMMARY OF REGULATORY DRIVERS

Several regulatory criteria and legal obligations provide the basis for remediation activities within A2PIII Part Two. These include:

- Applicable or Relevant and Appropriate Requirements (ARARs) or To Be Considered Criteria (TBCs)

- Permits

- Natural Resources Trusteeship.

The pertinence of each of these to the remediation of A2PIII Part Two is discussed in the following paragraphs.

1.3.1 ARARs and TBCs

The ARARs and TBCs for the A2PIII Part Two remediation project are presented in the Design Criteria Package for A2PI, which is part of the A2PI Implementation Plan.

1.3.2 Permits

Storm water discharges from the A2PIII Part Two project area during remediation are covered under the existing National Pollution Discharge Elimination System (NPDES) permit (OEPA Permit Number 1IO00004*ED) through the implementation of the permit-required sitewide Storm Water Pollution Prevention Plan (SWPPP; RM-0039). Thus, no modifications to the permit are required as a result of the A2PIII Part Two remedial action. The A2PIII Part Two remediation activities are authorized by Nationwide Permit #38 (Cleanup of Hazardous and Toxic Waste) under 33 CFR Part 330.1(c).

1.3.3 Natural Resource Trusteeship

Two mechanisms drive protection of natural resources during remediation, the natural resource trusteeship process and the pertinent federal and state regulations. Both of these mechanisms have been incorporated into A2PIII Part Two remedial design.

Regulatory drivers for the management of natural resources and associated monitoring are grouped into three areas: threatened and endangered species protection, wetlands/floodplain protection, and the resolution of DOE's liability for injuries to natural resources.

Threatened and Endangered Species

Based upon 1993-1994 updated threatened and endangered species surveys at the FEMP, DOE does not expect to encounter any federal- or state-listed threatened or endangered species or critical habitat in A2PIII Part Two. Therefore, no additional threatened/endangered species surveys have been planned or conducted.

Wetlands/Floodplains

Jurisdictional wetlands and waters of the United States were delineated in the 1993 FEMP Wetland Delineation, officially approved by the U.S. Army Corps of Engineers on August 19, 1993. Based on a review of an overlay of the A2PIII Part Two boundary on the 1993 FEMP Jurisdictional Wetland Delineation (Figure 1-2), no jurisdictional wetlands or waters of the United States exist in the A2PIII Part Two remediation area.

Resolution of DOE's Liability for Injuries to Natural Resources

The Natural Resource Trustees (NRTs) are working to resolve liability that DOE faces for injuries to natural resources under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). In 1986, the State of Ohio filed a claim against the DOE for injuries to natural resources. The claim has been in stay while negotiations are proceeding toward resolution. The State of Ohio has designated OEPA as their trustee representative in matters involving natural resource injuries. The Fernald NRTs have jointly developed the NRRP and have tentatively agreed that DOE, through implementation of the plan, will resolve natural resource liability at the Fernald Site, including the 1986 State of Ohio claim.

### 1.3.4 Cultural Resource Management

All areas in A2PIII Part Two have been surveyed and consultation with the State Historic Preservation Office has been completed. Although not anticipated, any necessary cultural resource activities pertaining to A2PIII Part Two will be conducted in accordance with both a programmatic agreement (DOE 1997) and the inadvertent discovery of cultural resources provision of the National Historic Preservation Act.

In the event that cultural resources are discovered, project personnel will follow the procedures outlined in Appendix F.4.2 of the SEP, and FEMP procedure EP-0003, Unexpected Discovery of Cultural Resources. In such cases, the DOE will consult with the appropriate parties pursuant to 36 CFR Part 800 to determine a course of action to avoid and minimize, to the extent practical, any adverse impacts. If human remains, associated or unassociated funerary objects, sacred objects, or objects of cultural patrimony are discovered, the appropriate Native American tribe(s) will be consulted. During the consultation, DOE will cease activity in the immediate area and secure the

remains and/or objects in accordance with the Native American Graves Protection and Repatriation Act. Work stoppages in the immediate area would likely last at least 30 days.

## 1.4 COMPONENTS OF THE REMEDY

As described in the Operable Unit (OU) 5 Record of Decision (ROD; DOE 1996), the remedy selected to provide protection of human health and the environment involves excavation of all impacted materials, material processing (if necessary) to meet sizing and moisture criteria for the OSDF, disposal of all material that meets OSDF WAC, and off-site disposal of excavated material exceeding OSDF WAC. The components of the selected remedy, as presented in the OU5 ROD and as applicable to A2PIII Part Two, and the commitment to ensure these elements are met include the following:

- Establishment of OSDF WAC for the on-site disposal of OU5 materials. The OSDF WAC have been established and are discussed in detail in the IMPP and the WAC Attainment Plan.

- Excavation to the depth established and shown on the DCN. Excavation will be performed in such a way as to minimize dilution of impacted material and keep exposure to humans as low as reasonably achievable (ALARA). Excavation includes removal of all soil with contaminant levels above FRLs (see Section 3.3 for additional details).

- Transportation and on-site disposal of excavated material that meets the OSDF WAC. A discussion of transportation and disposition is presented in Section 3.3.3.

- Precertification and certification real-time scanning, sampling and analysis in the excavated areas to confirm material with ASCOC levels above FRLs has been removed. As discussed in Section 7.2 of the SEP, a CDL will detail the proposed certification activities. If results of the certification sampling and analysis indicate that above-FRL contamination remains, supplemental excavation and certification sampling and analysis will be performed. The certification program is discussed in Section 3.4 of the SEP.

- Restoration following excavation and certification sampling and analysis. Restoration will include permanent seeding. The extent of restoration will depend on the end use of the area and the appropriate habitat. Information regarding the restoration of A2PIII Part Two is included in Section 3.6. The final land use will be included in the final version of the NRRP.

- Institutional controls such as access restrictions at the A2PIII Part Two project. During remediation, access to the A2PIII Part Two area will be restricted through the use of barriers and warning/caution signs. Long-term institutional controls necessary to implement restoration goals under the site's selected remedy are presented in the NRRP.

- Maintenance of the remediated area after restoration. Periodic checks will be made to assure that restoration efforts have been effective and are in place, such as adequate seeding and vegetative coverage over the remediated area.

## 1.5 LESSONS LEARNED

A lessons learned program has been implemented to apply knowledge accumulated during successive remedial efforts conducted under the SEP. Integration of lessons learned from past remedial activities [i.e., Area 1, Phase II (A1PII) - Sewage Treatment Plant (STP)] is imperative to ensure future remedial activities meet all requirements and achieve the highest possible levels of quality at the project level.

### 1.5.1 A1PII Lessons Learned

During the excavation of the STP in A1PII, the practice of loading haul vehicles in a radiological buffer area outside of a contamination area was implemented to prevent hauling equipment from entering the contamination area. This reduced the level of equipment decontamination that would have been necessary for the vehicles to leave the area in order to transport the impacted material to the OSDF. The buffer area was established by a layer of geotextile placed on the ground that the haul vehicles parked on. Careful loading practices and visual observation by Fluor Daniel Fernald (FDF) and the contractor enabled the haul vehicles to be loaded and, after radiological scanning, moved to the OSDF. This practice will also be utilized during the A2PIII Part Two project.

### 1.5.2 Lessons Learned Summary

In addition to the above discussion, the lessons learned from the A2PI SWU project are also incorporated into the standard practices for soil excavation projects, including the use of continuous visual monitoring during excavation and the use of real-time instrumentation for excavation monitoring. The Implementation Plan for A2PI also presents a discussion of lessons learned from the site preparation phase of the SWU remediation, which have also been applied to subsequent work efforts.

Because of the general complexity and site-specific nature of soil remediation activities, soil remediation at the FEMP will continue to evolve based on lessons learned during successive remedial efforts. Lessons learned will continue to be applied to future work efforts to ensure the highest possible quality of work.

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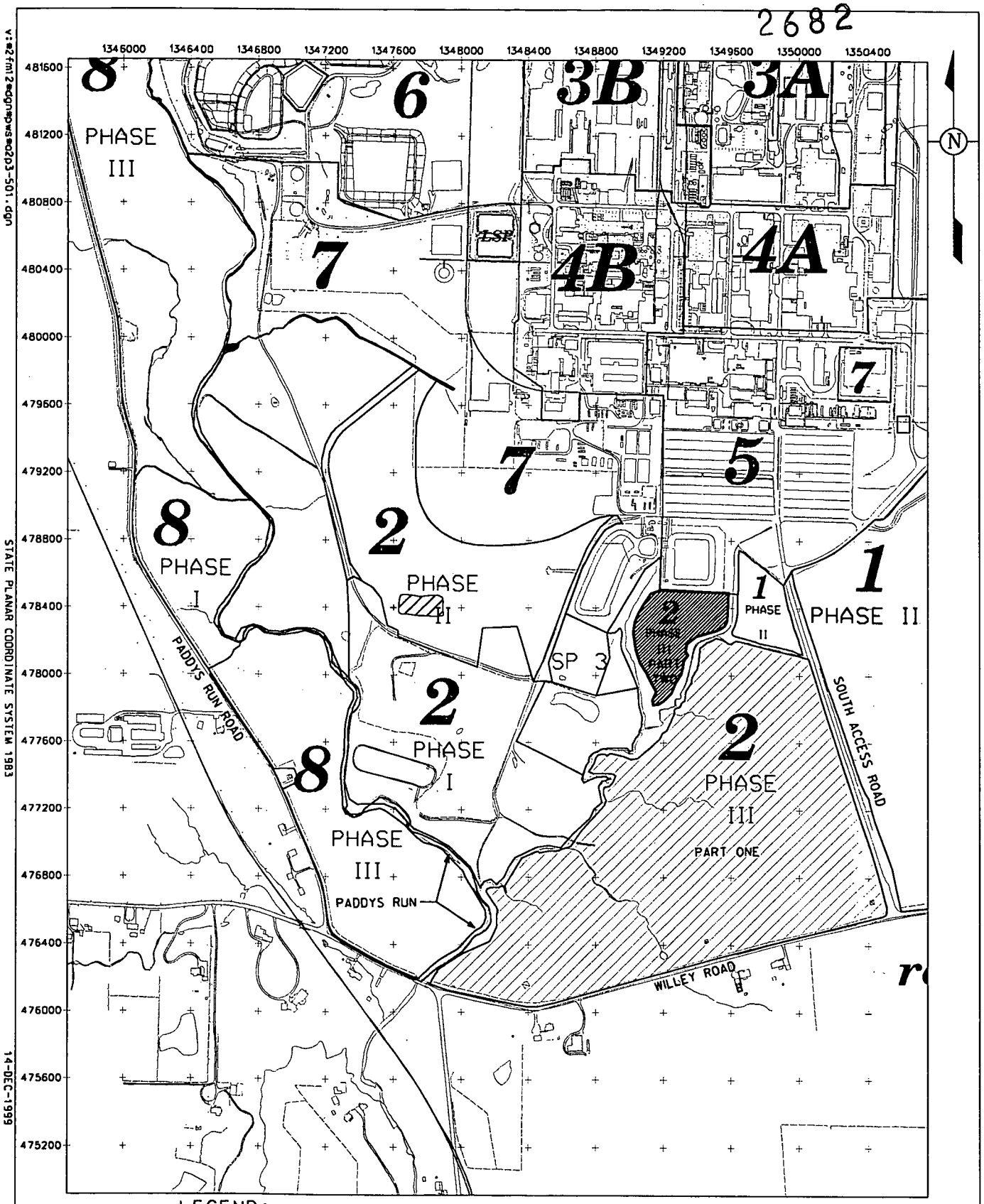


LEGEND:

AREA BOUNDARY

A2PIII PART ONE AREA (Except for tributaries)

A2PIII PART TWO AREA

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SCALE

800 400 0 800 FEET

FIGURE 1-1. A2PIII LOCATION MAP

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STATE PLANAR COORDINATE SYSTEM 1983

14-DEC-1999

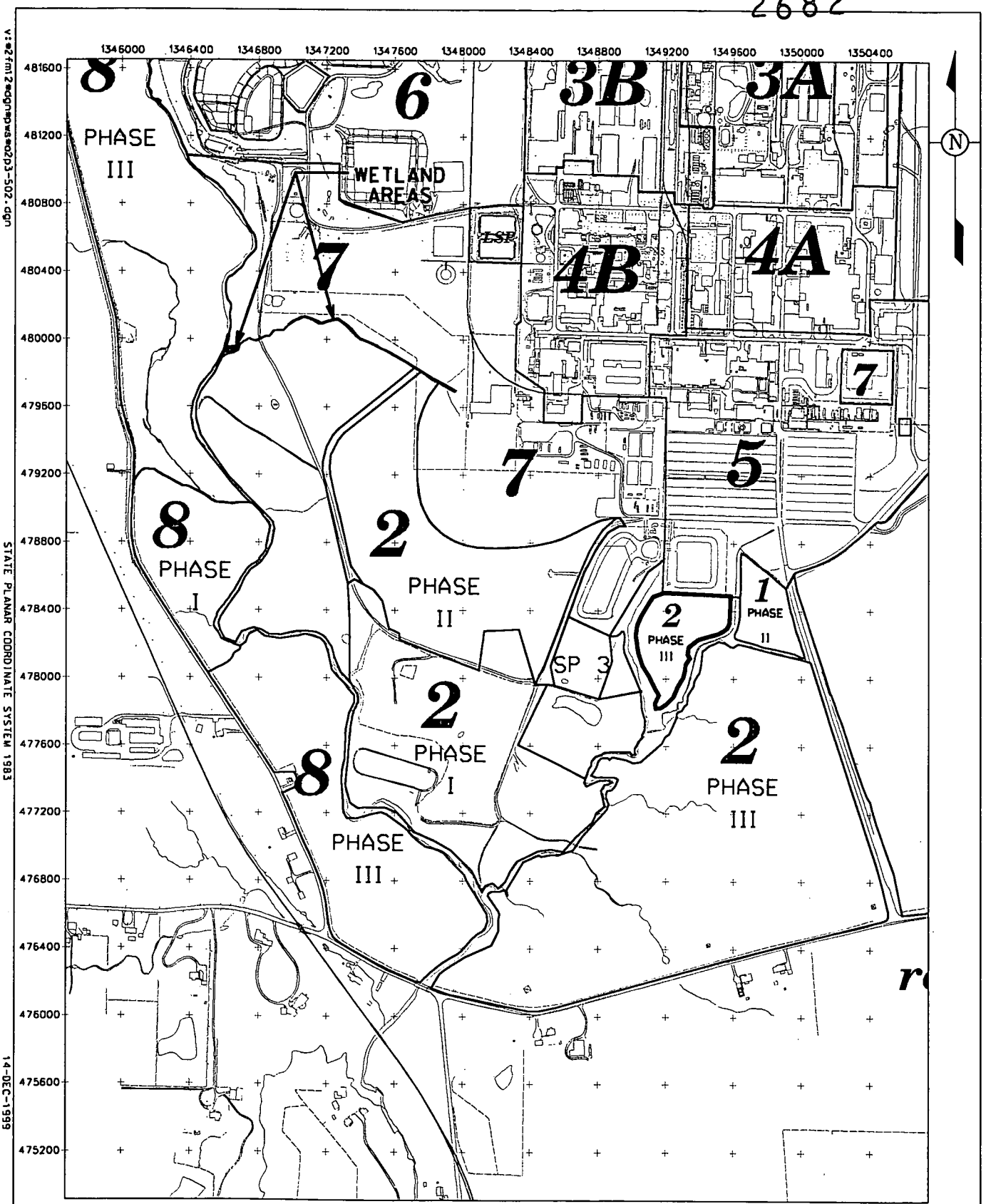


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FIGURE 1-2. WETLANDS IN AREA 2

# 2.0 PREDESIGN INVESTIGATIONS

This section summarizes the investigations in A2PIII Part Two that have been used in remedial design. These investigations include:

- The OU5 Remedial Investigation/Feasibility Study (RI/FS) activities
- Precertification sampling activities
- Additional sampling and analyses to delineate the extent of above-FRL contamination.

This information has been used to identify the ASCOCs for A2PIII Part Two, describe the surface and subsurface conditions expected, and present the anticipated excavation boundaries.

## 2.1 SUMMARY OF RI/FS AND PREDESIGN INVESTIGATIONS

Predesign investigations used to characterize A2PIII Part Two include studies conducted as part of the OU5 RI/FS study and additional sampling and measurements that have been completed pursuant to RI/FS activities.

The nature and extent of soil contamination at the FEMP site places considerable demands on the coordination of characterization and excavation activities carried out during the remediation process. In many remediation areas, data generated from RI activities are not comprehensive for the purpose of preparing detailed engineering designs and excavation drawings, and additional radiological surveys and sampling programs must be implemented to collect the needed data. Real-time, field-deployable instruments [the Radiation Tracking System (RTRAK), the Radiation Scanning System (RSS), and the high-purity germanium detector (HPGe)] can satisfy a major portion of these additional data needs, and their use is integrated with discrete sampling and subsequent laboratory analysis to maintain an efficient remediation process.

### 2.1.1 RI/FS Data Review

The nature and extent of radiological constituents within A2PIII Part Two are based on data collected during RI/FS field investigation activities. More detailed information regarding the extent and nature of contamination within the A2PIII Part Two area is available in Section 4.0 of the OU5 RI Report (DOE 1995a). The development and list of FRLs pertinent to OU5 are presented in the OU5 ROD.

Figure 2-4, A2PIII Part 2 Historical Sample Locations, shows all sample locations within A2PIII Part Two and within a 100-foot buffer area along the perimeter. All results from these borings are below FRLs for primary and secondary COCs, as presented in Appendix A.

### 2.1.2 Additional Sampling/Measurements

Two additional investigations have been conducted in A2PIII Part Two pursuant to the RI/FS phase:

- Precertification sampling
- Delineation of areas exceeding FRL.

The purpose of these investigations is discussed in the following paragraphs; the results of the investigations are presented in Appendix A of this Implementation Plan.

#### 2.1.2.1 Precertification Sampling

In March 1999, A2PIII precertification using real-time monitoring was completed. Based on the results, the area was separated into two parts, Part One and Part Two. Part One precertification data were presented in the CDL for A2PIII Part One and is not addressed under this IRDP. A2PIII Part Two precertification data indicated elevated levels of radium-226. The data were collected in two phases: an initial surface scan (Phase I) and confirmation/delineation (Phase II).

The real-time instrumentation (HPGe and RSS) was used to delineate the lateral extent of the above-FRL contamination. The results of these scans showing the above-FRL data are shown on Figures 2-1 and 2-2. Appendix A summarizes the data. As noted in these tables and figures, no confirmed monitoring data are above-FRL for total uranium or thorium-232. Nine HPGe Phase II measurements were greater than 3xFRL, five were greater than 2xFRL, and six were greater than 1xFRL for radium-226. Overlaying the HPGe measurements with the RSS data defines the lateral bounding of the radium-226 contamination, as depicted in Figure A-3. The scans show two distinct areas of contamination in addition to several outlying measurements above the radium-226 FRL.

#### 2.1.2.2 Physical Sampling for Above-FRLs

Based on the results of the precertification sampling effort, seven physical borings were collected during April 1999 in order to bound the contamination vertically. Initially, eleven samples from these borings were analyzed for radium-226, technetium-99, thorium-230, potassium-40, thorium-232, and

total uranium. In addition, thirteen archive samples were submitted in two phases for analysis of the primary radionuclides radium-226, radium-228, thorium-228, thorium-232 and total uranium. The locations of these borings were chosen based on spatial distribution and levels of contamination. Four borings were located along the perimeter and one within the interior of the larger of the above-FRL areas. One boring was located within the smaller of the two above-FRL areas, and one boring location was placed in the approximate center of the outlying above-FRL readings.

Sampling and analysis for radium-226 was conducted to confirm real-time monitoring data and determine the depth of contamination. Historic photos showed evidence of past soil disturbance in the radium-226 footprint. In addition, there was evidence of a potential construction road through the area from the STP; as a result, technetium-99 was added as an analyte for the initial eleven samples because of recent detections of above-WAC technetium-99 in locations within the former STP. These detections are presently being addressed in the STP excavation. Potassium-40 was also added as an analyte for the initial eleven samples since fertilizer might have been spread in the area. Thorium-230 is the parent of radium-226 and is not easily detected by the real-time instrumentation; thus, it was added to the initial list of analytes. Total uranium, radium-228, thorium-228, and thorium-232 were added for the archive samples because they are primary sitewide constituents of concern (COCs).

The borings were also lithologically described in 6-inch intervals to a depth of 5 feet from the surface. A comparison of soil types between the Xenia soil profile and the actual soil cores proved comparable at certain depths. Although a comparison of soil colors suggests that potential native soil displacement did occur, there are no obvious signs of fill material.

The borings were monitored with a beta-gamma and alpha frisker prior to archiving or submittal of the samples for analysis; there were no beta-gamma measurements noted above background. As a result, eleven sample intervals were selected for analysis based on the highest alpha frisker activity at depth for each boring and four additional varying alpha frisker activity ranges [non-detect, 7.5, 15, and 30 disintegrations per minute (dpm)]. The additional intervals were chosen in an attempt to establish a relationship between alpha frisker measurements and analytical data.

The data results from the initial eleven samples showed no evidence of the presence of technetium-99, thorium-230, or potassium-40. The total uranium and thorium-232 levels detected were below their

respective FRLs. In an effort to expedite the turnaround time for radium-226, analysis by alpha spectroscopy was also conducted for radium-226 in addition to gamma spectroscopy. Two of the samples showed above-FRL radium-226 concentrations at the surface (0-0.5 feet).

In an attempt to bound the surface contamination, seven archive samples (phase I archives) were submitted for primary radionuclides analysis. The phase I archive results were below FRL for radium-228, thorium-228, thorium-232, and total uranium. However, five of the seven 6-12 inch interval samples had above-FRL concentrations for radium-226. As a result, six more archive samples (phase II) were submitted for analysis to bound contamination at 2.5 feet. These phase II archive results were at or below FRL concentrations for radium-226, as well as the other primary radionuclides. Based on this bounding information, remediation is designed for an excavation depth of 2.5 feet.

## 2.2 IDENTIFICATION OF EXCAVATION ASCOCS

The selection process for retaining ASCOCs for a remediation area is driven by applying a set of decision criteria. A soil contaminant will be retained as an A2PIII Part Two ASCOC if the following are true:

- It is listed as a soil COC in the OU5 ROD
- It can be traced to site use, either through process knowledge or known release of the constituent to the environment
- Analytical results indicate the contaminant is present at a concentration above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated contract-required detection limits (CRDLs)
- Physical characteristics of the contaminant, such as half-life, indicate it is likely to persist in the soil between time of release and remediation
- The contaminant is one of the sitewide primary COCs.

The selected remedy for OU5 discusses the full suite of on-site COCs as well as their corresponding FRLs. Total uranium, radium-226, radium-228, thorium-228, and thorium-232 are sitewide primary COCs and will be retained as ASCOCs for this reason. However, only total uranium and radium-226 affect remedial design and excavation in A2PIII Part Two. No above-WAC levels of any of the ASCOCs were detected in A2PIII Part Two. Since no mechanism for secondary COC contamination of

A2PIII Part Two can be identified, only the sitewide primary COCs will be retained as ASCOCs. The ASCOC list for A2PIII Part Two and their respective FRL values can be found in Table 2-1.

Data received from precertification real-time monitoring was used to evaluate the type of field radiological controls necessary. Alpha contamination is associated with the presence of thorium or radium; beta-gamma contamination indicates the presence of uranium. If alpha contamination results are greater than the beta-gamma results by a ratio of more than two-to-one, then the material and excavation controls are dictated by the limits of the isotope of concern. In A2PIII Part Two, the field radiological survey data showed a ratio of less than two-to-one between the alpha and beta-gamma results, thus the material and excavation controls are based on uranium contamination. The excavation will be continuously monitored, and if this ratio would become greater than two-to-one during field activities, the appropriate changes in controls will be made at that time.

The excavation boundaries, both lateral and vertical, are controlled by the presence of radium-226 at concentrations above the FRL of 1.7 pCi/g. The radiological controls for the excavation of the A2PIII Part Two footprint will be governed by the controls for total uranium, based on the above discussion.

## 2.3 SUMMARY OF SURFACE AND SUBSURFACE CONDITIONS

Surface and subsurface conditions in A2PIII Part Two are described in the following paragraphs in terms of surface coverage and drainage patterns and at- and below-grade structures and debris.

### 2.3.1 Surface Coverage and Drainage Pattern

The A2PIII Part Two area covers approximately 5 acres and has steep outslopes to the west and southwest, being bounded on the west and southwest sides by unnamed tributaries that are generally uncontrolled before reaching Paddys Run. Besides these tributaries, existing drainage consists of sheet flow. The 1.3-acre area to be excavated is primarily flat, with sheet flow drainage to the south.

### 2.3.2 At- and Below-Grade Structures and Debris

There are no known at- or below-grade structures present in the A2PIII Part Two area. Below-grade debris is not anticipated; based on the borings from the area, the A2PIII Part Two area appears to be comprised of native soils and there are no known disposal activities in the area, although historic photographs indicate the area has been disturbed at various times.

## 2.4 ANTICIPATED EXCAVATION BOUNDARIES

OU5 RI/FS data, predesign investigations (Section 2.1.2) and the radium-226 FRL (Section 2.2) were used to establish the extent of excavation of impacted material in A2PIII Part Two. Approximately 5,200 $yd^3$ of impacted material in A2PIII Part Two exceeds the radium-226 FRL and meets the chemical/radiological WAC for the OSDF, and all of this material will be dispositioned to the OSDF. The excavation footprint is approximately 1.3 acres within A2PIII Part Two, and extends to a depth of 2.5 feet. The excavation procedures to be used are discussed in Section 3.3.

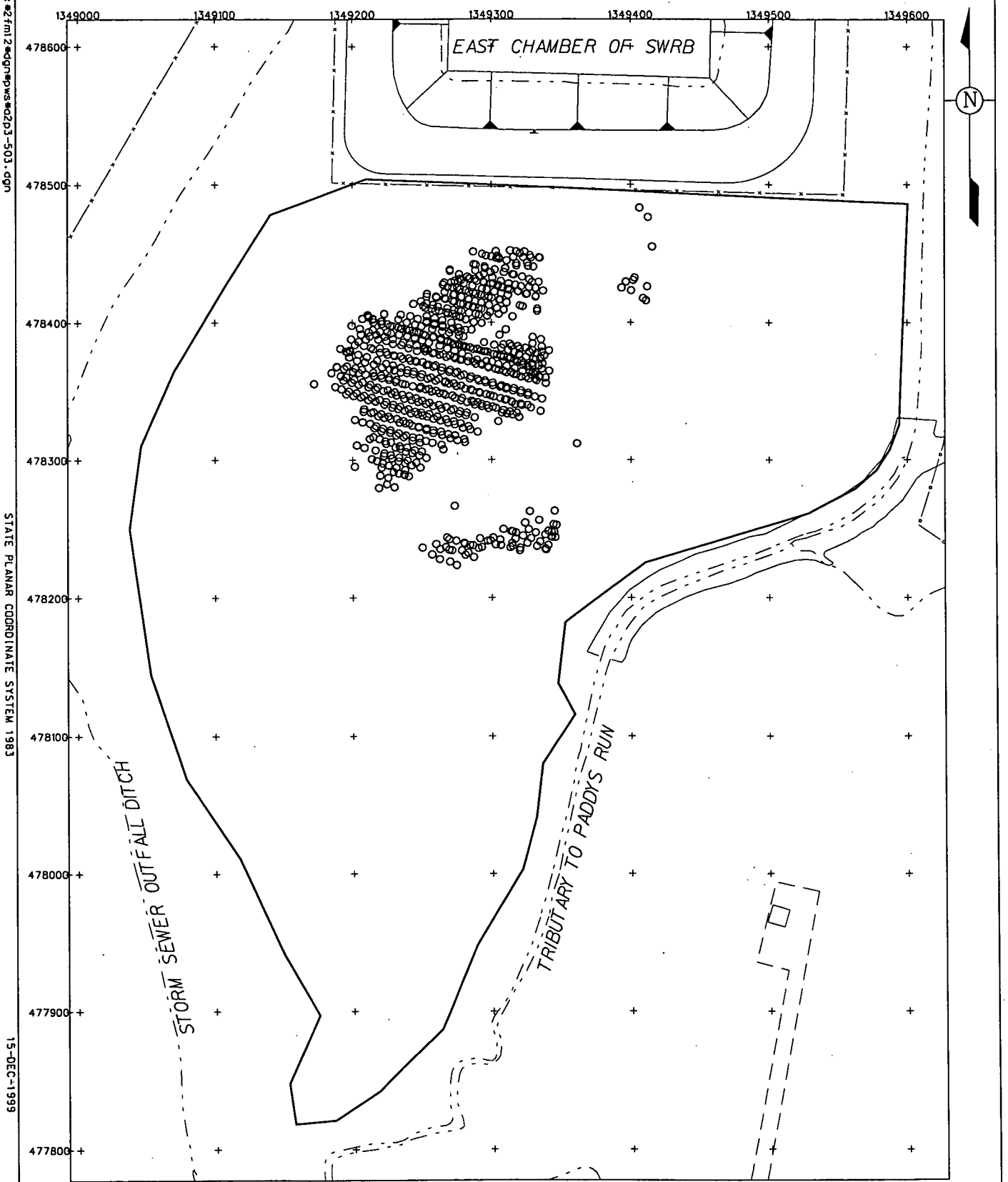
## TABLE 2-1
## ASCOC LIST FOR A2PIII PART TWO

-- 2682

| ASCOC | FRL |
|---|---|
| Total Uranium | 82 mg/kg |
| Radium-226 | 1.7 pCi/g |
| Radium-228 | 1.8 pCi/g |
| Thorium-228 | 1.7 pCi/g |
| Thorium-232 | 1.5 pCi/g |



000025

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STATE PLANAR COORDINATE SYSTEM 1983

15-DEC-1999

FIGURE 2-1. A2PII PART 2 RSS RADIUM DATA

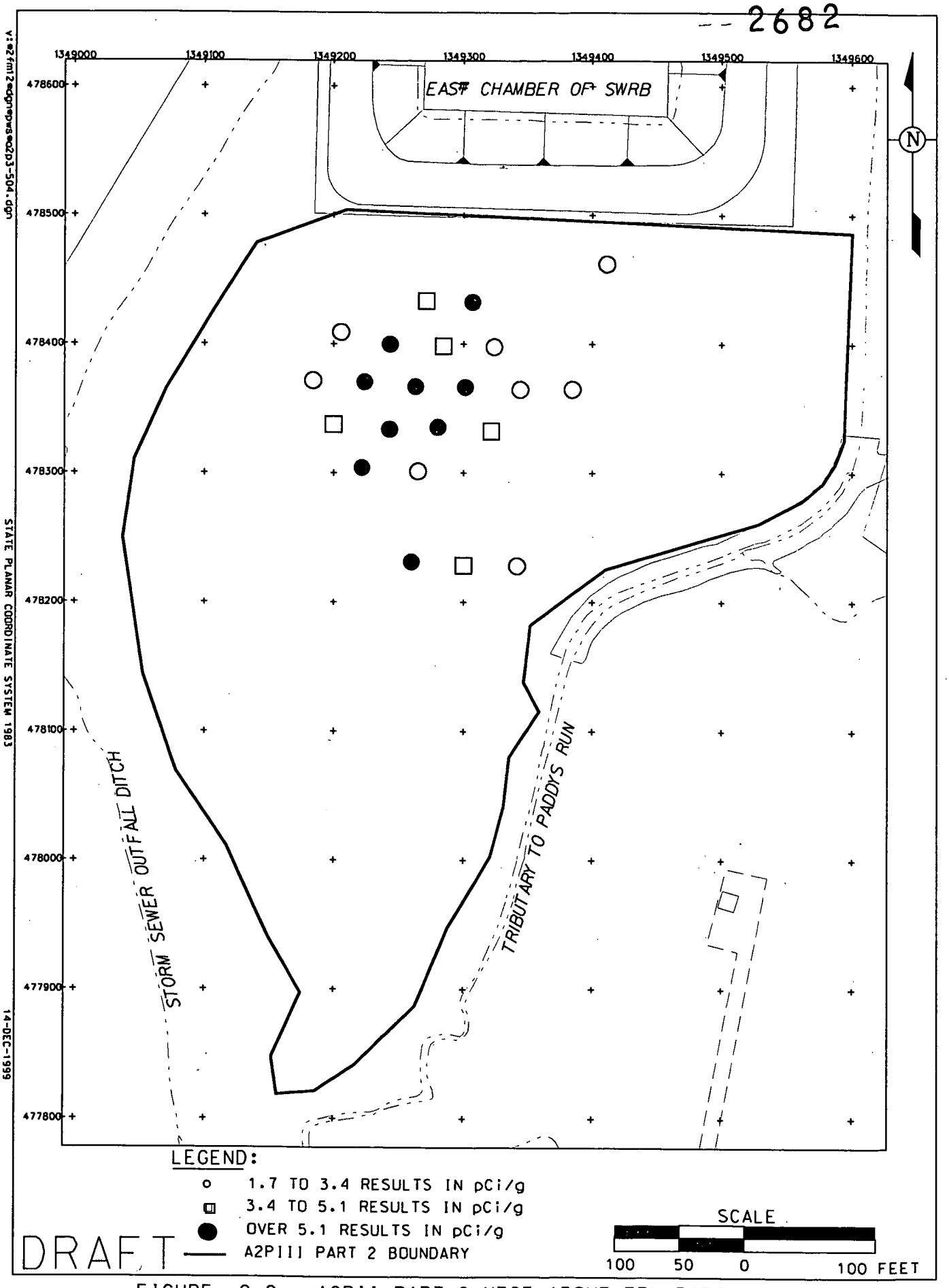



FIGURE 2-2. A2PII PART 2 HPGE ABOVE FRL RADIUM DATA

1348300 1348400 1348500 1348600 1348700 1348800 1348900 1349000 1349100 1349200 1349300 1349400 1349500 1349600 1349700 1349800 1349900 1350000 1350100 1350200 1350300 1350400

478900 478800 478700 478600 478500 478400 478300 478200 478100 478000 477900 477800 477700

N

## A2P3-RA-6

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/MS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 12.43 | 7.5 | | | | | | | | |
| 0.5-1 | | < | 4.7/4.2 | 1.1 | 1.1 | | 1.1 | | 19 | |
| 1-1.5 | | < | | | | | | | | |
| 1.5-2 | | 22.5 | | | | | | | | |
| 2-2.5 | | < | | | | | | | | |
| 2.5-3 | | 7.5 | 1.2/1.4 | 1.1 | 1.0 | | 1.1 | | 4.5 | |
| 3-3.5 | | 7.5 | | | | | | | | |
| 3.5-4 | | 22.5 | 1.2/0.92 | | | 1.6 | 0.88 | 1.0* | 3.8* | 22 |
| 4-4.5 | | < | | | | | | | | |
| 4.5-5 | | 7.5 | | | | | | | | |

## A2P3-RA-3

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/MS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 6.66 | 7.5 | | | | | | | | |
| 0.5-1 | | 7.5 | 7.1/7.3 | 1.1 | 1.0 | | | | 30 | |
| 1-1.5 | | 15 | | | | | | | | |
| 1.5-2 | | < | | | | | | | | |
| 2-2.5 | | 15 | | | | | | | | |
| 2.5-3 | | 15 | 1.3/1.4 | 1.1 | 1.1 | | | | 4.5 | |
| 3-3.5 | | 15 | | | | | | | | |
| 3.5-4 | | 30 | | | | | | | | |
| 4-4.5 | | 30 | 1.2/1.0 | | | 1.5 | 1.0 | 0.93* | 3.7* | 22 |
| 4.5-5 | | 7.5 | | | | | | | | |

## A2P3-RA-1

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/MS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 1.24 | 7.5 | | | | | | | | |
| 0.5-1 | | < | 0.97/1.1 | 0.97 | 0.94 | | 0.97 | | 0.97 | |
| 1-1.5 | | 7.5 | | | | | | | | |
| 1.5-2 | | < | | | | | | | | |
| 2-2.5 | | < | | | | | | | | |
| 2.5-3 | | < | 1.5/1.6 | 1.1 | 1.1 | | 1.1 | | 4.3 | |
| 3-3.5 | | 7.5 | | | | | | | | |
| 3.5-4 | | < | | | | | | | | |
| 4-4.5 | | < | | | | | | | | |
| 4.5-5 | | 30 | 1.2/1.0 | | | 1.4 | 0.97 | 0.92* | 3.8* | 24 |

## A2P3-RA-2

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/MS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 2.33 | < | 7.3/6.0 | 0.86 | | | | | | |
| 0.5-1 | | 22.5 | | | 0.82 | | 0.86 | | 21 | |
| 1-1.5 | | 30 | | | | | | | | |
| 1.5-2 | | 15 | | | | | | | | |
| 2-2.5 | | 30 | | | | | | | | |
| 2.5-3 | | 15 | 1.7/1.6 | 1.2 | 1.2 | | 1.2 | | 6.5 | |
| 3-3.5 | | 15 | | | | | | | | |
| 3.5-4 | | 22.5 | | | | | | | | |
| 4-4.5 | | 30 | | | | | | | | |
| 4.5-5 | | 30 | 1.0/1.0 | | | 1.3 | 0.88 | 0.97* | 5.4 | 20 |

## A2P3-RA-4

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/MS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 1.85 | < | | 1.0 | 1.0 | | | | | |
| 0.5-1 | | 7.5 | 1.2/1.2 | | | | 1.0 | | 6.6 | |
| 1-1.5 | | 22.5 | | | | | | | | |
| 1.5-2 | | 22.5 | 1.6/1.4 | | | 2.0 | 1.2 | 0.97* | 5.3 | 20 |
| 2-2.5 | | 7.5 | 1.7/1.5 | | | 2.0 | 1.2 | 0.90* | 3.9* | 19 |
| 2.5-3 | | 7.5 | 1.0/1.2 | 0.8 | 0.8 | | 0.8 | | 3.2 | |
| 3-3.5 | | < | | | | | | | | |
| 3.5-4 | | 7.5 | | | | | | | | |
| 4-4.5 | | 7.5 | | | | | | | | |
| 4.5-5 | | 7.5 | | | | | | | | |

## A2P3-RA-5

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/MS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 13.52 | 37.5 | 9.1/6.5 | | | 10.4 | 1.0 | 17 | 30 | 0.98* |
| 0.5-1 | | < | 1.8/1.5 | 1.2 | 1.2 | | 1.2 | | 5.5 | |
| 1-1.5 | | < | | | | | | | | |
| 1.5-2 | | < | | | | | | | | |
| 2-2.5 | | 15 | 1.7/1.6 | 1.3 | 1.3 | | | | 6.4 | |
| 2.5-3 | | NA | | | | | | | | |
| 3-3.5 | | 15 | | | | | | | | |
| 3.5-4 | | 7 | | | | | | | | |
| 4-4.5 | | 30 | 1.2/1.2 | | | 1.5 | 0.96 | 25 | 3.9* | 0.94* |
| 4.5-5 | | 15 | 1.2/0.95 | | | 1.7 | 0.96 | 23 | 3.9* | 0.97* |

## A2P3-RA-7

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/MS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 10.65 | 100 | 21/** | | | 22 | ** | 1.0* | 54 | ** |
| 0.5-1 | | 30 | 2.6/2.8 | 1.2 | 1.2 | | | 1.2 | 10 | |
| 1-1.5 | | 23 | | | | | | | | |
| 1.5-2 | | 15 | | | | | | | | |
| 2-2.5 | | < | 1.7/1.4 | | | 2.0 | 1.3 | 0.97* | 4.1* | 25 |
| 2.5-3 | | < | 1.1/1.4 | 1.1 | 1.0 | | 1.1 | | 4.7 | |
| 3-3.5 | | < | | | | | | | | |
| 3.5-4 | | < | | | | | | | | |
| 4-4.5 | | < | | | | | | | | |
| 4.5-5 | | < | | | | | | | | |

FINAL REMEDIATION LEVELS (FRL):

Ra-226 - 1.7 pCi/g
Tc-99 - 30.0 pCi/g
Th-230 - 280 pCi/g
K - 40 - Not Applicable
Th-232 - 1.5 pCi/g
TOTAL URANIUM - 82 ppm

NOTES: * MINIMUM DETECTABLE CONCENTRATION (MDC)
** INSUFFICIENT SAMPLE QUANTITY AVAILABLE FOR ANALYSIS
NA - NOT AVAILABLE
< - LESS THAN MINIMUM DETECTABLE COUNT RATE
A2PIII PART 2 BOUNDARY

a ALPHA SPEC / GAMMA SPEC METHOD

000028

SCALE
150 75 0 150 FEET

DRAFT

v:\a2fm12\dgn\map\nor\dpth\a2p3-015.dgn STATE PLANAR COORDINATE SYSTEM 1983 14-DEC-1999

FIGURE 2-3. A2PIII PART 2 SAMPLING DATA SUMMARY

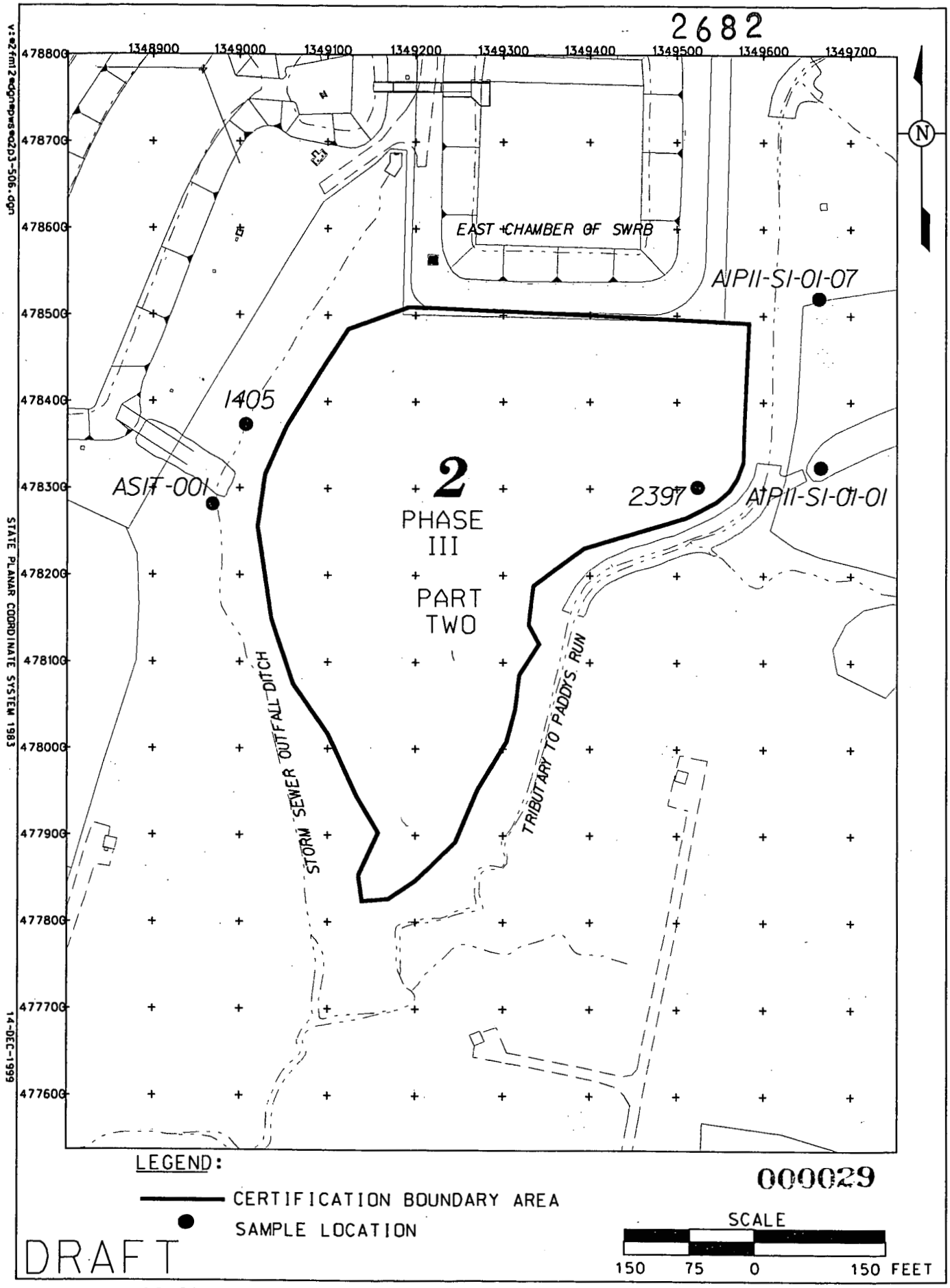



FIGURE 2-4. A2PIII PART 2 HISTORICAL SAMPLE LOCATIONS

# 3.0 REMEDIAL ACTION APPROACH

This section presents the approach that will be used to remediate A2PIII Part Two. The general approach is in accordance with "Excavation Approach A - Shallow Excavation of Impacted On-Property Area Outside the Former Production Area and other Waste Storage/Management Areas," described in Section 4.1 of the SEP. The performance requirements for implementing this approach are presented on the DCN to A2PI (SWUs) construction drawings and technical specifications for excavation activities, included as part of this IRDP. The drawings and specifications will become part of the A2PI Contract Documents, which will govern remediation activities performed by the present construction contractor. The contractor will detail specific methods and procedures to perform the work in a modification to the existing Safe Work Plan, which will be reviewed and approved by FDF before applicable remedial activities are implemented.

## 3.1 SITE PREPARATION

Site preparation activities will prepare the site for excavation. These activities will be performed by the construction contractor and will include the following:

- Establishing site boundaries and access controls
- Surveying and site layout
- Establishing the support area
- Clearing
- Installation of erosion and sediment controls.

### 3.1.1 Establishing Site Boundaries and Access Controls

Initial preparation of the A2PIII Part Two area will include establishing the defined construction area in the field and posting appropriate signs at the boundaries. The A2PIII Part Two construction area will be defined by signs and construction fencing or rope, which will also define the radiological control boundary for the site. Vehicle and pedestrian access to the excavation footprint will be established by the contractor and approved by FDF.

### 3.1.2 Surveying and Site Layout

Project site survey control points (including baselines and temporary benchmarks) will be established in the field as necessary.

3.1.3 Establishing the Support Area

A support area will be established outside the proposed excavation area, to include a temporary radiological control point facility, parking, laydown area, and other contractor facilities. The radiological control point facility will contain radiological personnel monitoring equipment. During the remediation, all personnel will enter and exit the work area through this facility.

3.1.4 Clearing

Generally, all areas to be disturbed during A2PIII Part Two remediation will be cleared of vegetation prior to the start of excavation. There are two large trees within the excavation footprint, as shown on the construction drawings. The area surrounding these two trees will be excavated to a depth of 6 inches in order to protect the trees. The extent of this 6-inch stripping is shown on the sketch attached to the DCN.

3.1.5 Surface Water Management and Erosion/Sediment Control

Remediation activities will be performed to control runoff and sedimentation from disturbed areas. Surface water and runoff will be controlled through grading the excavation area for positive drainage in the southern direction of A2PIII Part Two. This will direct the drainage to the unnamed tributary to Paddys Run (and ultimately to Paddys Run), as is the current configuration. During the excavation, a 6- to 12-inch high berm will be constructed as an outlet control measure in order to decrease the amount of sediment leaving the excavation footprint. Coir matting will be installed along the outlet of the excavation to provide additional erosion control. Silt fence will be installed along the downgradient side of the excavation to minimize the amount of sediment entering Paddys Run. These controls are further shown in the DCN and technical specifications.

Crusting agents and/or seeding may be used to stabilize an area that will be left exposed for 45 days or longer, in accordance with the technical specifications. It is not anticipated that such stabilization will be necessary; however, provisions will be in place in the event they are needed.

3.2 AT- AND BELOW-GRADE STRUCTURE DEMOLITION

As stated in Section 2.3.2, there are no at- or below-grade structures present in the A2PIII Part Two area; therefore, demolition issues are not relevant.

## 3.3 SOIL EXCAVATION AND SEGREGATION

Excavation activities will begin after site preparation, including:

- Excavating impacted material within A2PIII Part Two
- Loading, hauling, and unloading impacted material that meets OSDF WAC.

As discussed in Section 1.1, impacted material, as used in this Implementation Plan, consists of all material with above-FRL contaminant levels. In addition, sediment collected in erosion control devices during excavation will be considered impacted, thus requiring removal prior to job completion. Sediment collected prior to certification will be monitored and dispositioned appropriately (either spread in area or to the OSDF). Non-impacted material consists of natural soil exhibiting below-FRL contaminant levels.

The limit of the design excavation depth was developed through the predesign investigations discussed in Section 2.1. Precertification of A2PIII Part Two identified the presence of above-FRL radium-226, which was confirmed through physical sampling. No above-WAC material was identified during the precertification scan or analysis of the physical samples. Analysis of the physical samples resulted in the excavation design depth of 2.5 feet. Real-time data that exceeded the radium-226 FRL was used to bound the lateral extent of contamination, ensuring that the excavation footprint encompassed all points showing contamination above the FRL (Figure 3-1, A2PIII Part 2 Extent of Excavation). The footprint for the excavation is shown on the DCN and is the minimum excavation depth that will be achieved. Excavation control monitoring (Section 3.3.4), precertification sampling (Section 3.5), and certification sampling and analysis (Section 3.4 of the SEP) will determine the final excavation depth, which may exceed the design depth.

If special material (Section 3.3.2 ) or unexpected cultural resources (Section 1.3.4) are encountered, the contractor will be directed to either excavate in another location at a safe distance from the non-excavation activities associated with these conditions or stop work until the appropriate actions can be made to allow excavation to restart.

### 3.3.1 General Excavation Approach

During excavation, the A2PIII Part Two area will be classified as a radiologically "contaminated" area. Excavation activities include the removal of above-FRL, below-WAC material to a depth of 2.5 feet

within the defined footprint. The contractor will be responsible for transporting and placing the soil into the OSDF as a Category 1 material.

The combination of small excavation depth, visual monitoring, and radiological survey monitoring will ensure that any special materials and above-WAC, gamma-emitting contamination are identified during excavation. Visual monitoring by FDF and contractor personnel will take place during the excavation to identify any special materials (Section 3.3.4). Although not anticipated, special materials will be handled in accordance with Section 3.3.2 if identified.

Upon completion of the excavation and completion of final grading, the entire area will be precertified (Section 3.5) to assure that the excavation depth is adequate to attain FRLs. As necessary, additional material will be excavated until the radiological surveying indicates that FRLs have been attained. The area will then be ready for certification (Section 3.4 of the SEP).

3.3.2 Excavation of Special Materials

As discussed in Section 1.2, the A2PIII Part Two area is believed to contain native soils; therefore, the presence of special materials is not anticipated. However, as a contingency, the following discussion outlines how special materials will be handled if encountered.

As described in the SEP, and used in this document, special materials include:

- Friable presumed asbestos containing materials
- Medical/infectious waste
- Lead acid batteries
- Pressurized containers
- Piping/pumps
- Tires
- Nonpressurized containers (drums)
- Uranium metal
- Non-soil residues (process-related)
- Miscellaneous debris
- Transformers/electrical equipment
- Acid brick.

If these materials are encountered, excavation will stop for the radiological level to be determined by FDF personnel for occupational health and safety considerations. Special material that cannot be handled by the contractor due to health and safety concerns will be handled completely by FDF.

Under normal circumstances, these special materials will be identified, excavated, handled, and documented in accordance with the guidelines provided in Appendix F of the SEP and the requirements of the technical specifications. If necessary, the contractor will prepare procedures for special material handling and include these as part of the Safe Work Plan. Special materials will be placed in a safe configuration (i.e., container, plastic, etc.), as required, and temporarily staged in a Special Materials Transfer Area (to be located by the contractor and approved by FDF) for later disposition by FDF, or hauled to SP-7 for off-site disposal.

The FDF Waste Acceptance Organization (WAO) will provide a field representative to observe all excavation activities. This representative's primary function will be to assist with the identification and handling of special materials, as well as documentation of the disposition of impacted material.

### 3.3.3 Transportation and Disposition of Impacted Material

Impacted material excavated from the A2PIII Part Two area will be hauled to the OSDF for disposition, as shown on the construction drawings. The haul vehicles will leave the project area, turn left and go to the south construction road towards the SWUs, where they will access the Impacted Material Haul Road (IMHR), unload the material at the OSDF, and return to the SWUs by the same route after going through the OSDF equipment wash. To minimize the amount of material tracked onto the IMHR, the SWU equipment wash facility will be used for vehicles entering the IMHR, and at the OSDF for equipment leaving the OSDF. Measures will also be implemented to control the generation of dust during the hauling of material (Section 4.2.2).

### 3.3.4 Excavation Control Monitoring

During remediation activities in A2PIII Part Two, excavation- and disposition-focused monitoring will occur in regard to the materials with contaminant levels below the OSDF WAC and special materials (if necessary).

Since RI/FS data indicate there are no organic COCs in A2PIII Part Two that affect design or excavation (Section 2.1.1) or that exceed the OSDF WAC, only organic monitoring associated with health and safety requirements will be performed.

FDF Health and Safety Representatives and Radiological Technicians, or their designees, will be in the field to monitor for occupational exposure to the workers. These professionals will use the tools that are available to them to monitor the excavation work area as necessary and appropriate, including photo-ionization detectors (PIDs) and radiological friskers. The information obtained by these personnel will be used to make decisions regarding personal protective equipment (PPE) and other worker related issues. This information will also be available to Waste Management and WAO personnel and will be used to determine if additional monitoring and/or sampling is necessary to characterize the material for disposal purposes.

All excavations will be subject to continuous visual observation by both the contractor and FDF personnel. Visual observation will be conducted for change in soil media and the presence of special materials. If special materials are identified, they will be excavated and handled according to guidelines provided in Section 3.3.2 and the contractor's Safe Work Plan. A change in the appearance of the soil/material being excavated may indicate other unexpected conditions, and the contractor will coordinate with FDF's construction manager and WAO field personnel to determine the required action, if any. As necessary, the contractor will stop work or proceed in another area until the issue is resolved.

Following completion of excavation to the limits shown on the construction drawings, a real-time scan will be performed to ensure that the remaining soil is below the radium-226 FRL. If precertification criteria are not met, additional excavation will take place to remove the identified contamination. Excavation will cease when the floor of the excavation is shown to meet the precertification protocol for gamma-discernable radionuclides. The excavated surface will then be certified, as described in the CDL (Section 7.2 of the SEP), which will be developed and approved subsequent to excavation.

### 3.3.5 Miscellaneous Excavation Requirements

Appropriate measures will be implemented to control the generation of dust. These measures include temporary seeding or application of a crusting agent in areas to be left idle for more than 45 days and the use of water, dust suppressants, crusting agents, and other measures to control dust during actual excavation activities (Section 4.2.2).

All interim and final movements of impacted material will be documented as required by the construction drawings and technical specifications. These data will be incorporated into the Integrated Information Management System (IIMS).

## 3.4 MATERIAL HANDLING AND TREATMENT

Excavation in A2PIII Part Two will consist of soil. Excavation of this material will be in accordance with the requirements contained in the project-specific technical specifications and shown on the DCN. Specific construction methods and procedures to achieve these requirements will be detailed in the contractor's Safe Work Plan.

### 3.4.1 General Requirements and Objectives

The technical specifications provide general requirements for the removal and handling of excavated material. Flow charts in Appendix F of the SEP provide general guidelines for the excavation and handling of special materials if encountered. Because the excavated impacted material will be placed in the OSDF, the OSDF IMPP will be included as part of the contract requirements.

During excavation, unexpected conditions may be encountered that are not addressed through the excavation specifications and guidelines. The combination of specifications and the contractor's Safe Work Plan establishes procedures to be implemented in such cases, including moving excavation activities to another area to allow evaluation of the unexpected condition. This approach will minimize and/or prevent work stoppages/slowdowns and keep the excavation process moving forward.

### 3.4.2 WAC Attainment

A key component of the OSDF WAC attainment program is the IIMS tracking system, which maintains traceability of excavated impacted material to RI/FS, predesign, precertification, and supplementary WAC data.

The following actions will be performed to demonstrate compliance with OSDF WAC:

- Assign OSDF-bound materials to material profiles
- Implement IIMS tracking requirements
- Segregate impacted materials according to OSDF IMPP Categories 1 through 5

- Reduce size, fill void spaces, package (if required), and otherwise comply with physical OSDF WAC requirements
- Visually inspect the material to verify it meets physical OSDF WAC requirements
- Visually inspect the material to verify it does not include prohibited items
- Perform IIMS WAC attainment query in conjunction with manifest preparation, to verify material meets OSDF chemical/radiological WAC
- For OSDF Category 5 non-soil residues:
  - Complete a supplementary sampling program to assess type and level of contamination
  - Implement required actions.

Based on the precertification scan and physical sampling, no above-WAC material has been identified. Material that does not meet the OSDF physical WAC will be re-sized as necessary and hauled to the OSDF for disposal. The area is not known to have been used for disposal activities; therefore, this segregation and processing should not be necessary. Material that does not meet the chemical/radiological WAC for the OSDF will be taken to SP-7 for future off-site disposal.

## 3.5 PRECERTIFICATION AND CERTIFICATION

After excavation, the A2PIII Part Two area will be precertified and certified. Section 6.10 presents the schedule for these activities. The overall A2PIII Part Two certification boundary and the general A2PIII Part Two area are shown on Figure 3-2.

Precertification will be performed with real-time instruments as excavation is completed to verify the area is ready for certification. Real-time instruments (RTRAK, RSS and/or HPGe) will measure primary radiological COC concentrations in the surface soil. The equipment will be selected and used based on actual field conditions as described in the User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (User's Manual; DOE 1998d). The results will be used to identify the following:

- "Hot Spot" areas (as defined in the SEP)
- Residual contamination patterns.

Based on precertification, supplemental excavation will be performed, if necessary, in any areas where surface soil contaminant concentrations exceed hot spot criteria. Additional precertification will be performed in areas where supplemental excavation is performed. Precertification and supplemental excavation will continue until precertification demonstrates that the area is ready for certification; results will be used to finalize the certification units (CUs) and prepare the CDL for A2PIII Part Two. Certification will be performed in accordance with the CDL, as described in the SEP, to verify that residual soil constituents are below FRLs. Based on certification data, supplemental excavation may again be performed in areas where residual constituents fail certification criteria. Additional certification will be performed in areas where supplemental excavation is performed. Iterations of certification sampling and analysis and supplemental excavation will continue until certification results indicate that the soil surface conditions satisfy certification and hot spot criteria.

## 3.6 RESTORATION

Following removal of impacted material from A2PIII Part Two and certification of FRL attainment (Section 3.4 of the SEP), A2PIII Part Two will be seeded and vegetation will be established by FDF. A2PIII Part Two may undergo future restoration in accordance with a separate natural resources restoration design package, which would be developed and submitted under a separate contract. This design will take into account final land use selected for the area. The overall plan and schedule depends upon federal funding and regulatory approval.

## 3.7 INSTITUTIONAL CONTROLS

Institutional controls, such as fencing and posting of signs, are a key component of the remediation for A2PIII Part Two. Commitments to ensure the intent of the selected remedy is met are discussed in Section 1.4.

Access restriction to remediated areas is necessary to prevent cross-contamination during and following remediation. Access to certified areas will be granted in accordance with FEMP site procedures. Institutional controls to restrict access to the remediated A2PIII Part Two area include installing fencing around the area and posting the appropriate caution and warning signs. A construction fence will define the limit of work boundary, and a radiological fence will define the control boundary for the A2PIII Part Two excavation site.

The access restrictions will remain in place until the area is released after restoration. Following the completion of remediation, during the final restoration phase, the institutional controls will be dictated by the NRRP.

1348300 1348400 1348500 1348600 1348700 1348800 1348900 1349000 1349100 1349200 1349300 1349400 1349500 1349600 1349700 1349800 1349900 1350000 1350100 1350200 1350300 1350400

478900 478800 478700 478600 478500 478400 478300 478200 478100 478000 477900 477800 477700

N

## A2P3-RA-6

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/WS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 12.43 | 7.5 | | | | | | | | |
| 0.5-1 | | < | 4.7/4.2 | 1.1 | 1.1 | | 1.1 | | 19 | |
| 1-1.5 | | < | | | | | | | | |
| 1.5-2 | | 22.5 | | | | | | | | |
| 2-2.5 | | < | | | | | | | | |
| 2.5-3 | | 7.5 | 1.2/1.4 | 1.1 | 1.0 | | 1.1 | | 4.5 | |
| 3-3.5 | | 7.5 | | | | | | | | |
| 3.5-4 | | 22.5 | 1.2/0.92 | | | 1.6 | 0.88 | 1.0* | 3.8* | 22 |
| 4-4.5 | | < | | | | | | | | |
| 4.5-5 | | 7.5 | | | | | | | | |

## A2P3-RA-3

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/WS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 6.66 | 7.5 | | | | | | | | |
| 0.5-1 | | 7.5 | 7.1/7.3 | 1.1 | 1.0 | | | | 30 | |
| 1-1.5 | | 15 | | | | | | | | |
| 1.5-2 | | < | | | | | | | | |
| 2-2.5 | | 15 | | | | | | | | |
| 2.5-3 | | 15 | 1.3/1.4 | 1.1 | 1.1 | | | | 4.5 | |
| 3-3.5 | | 15 | | | | | | | | |
| 3.5-4 | | 30 | | | | | | | | |
| 4-4.5 | | 30 | 1.2/1.0 | | | 1.5 | 1.0 | 0.93* | 3.7* | 22 |
| 4.5-5 | | 7.5 | | | | | | | | |

## A2P3-RA-1

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/WS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 1.24 | 7.5 | | | | | | | | |
| 0.5-1 | | < | 0.97/1.1 | 0.97 | 0.94 | | 0.97 | | 0.97 | |
| 1-1.5 | | 7.5 | | | | | | | | |
| 1.5-2 | | < | | | | | | | | |
| 2-2.5 | | < | | | | | | | | |
| 2.5-3 | | < | 1.5/1.6 | 1.1 | 1.1 | | 1.1 | | 4.3 | |
| 3-3.5 | | 7.5 | | | | | | | | |
| 3.5-4 | | < | | | | | | | | |
| 4-4.5 | | < | | | | | | | | |
| 4.5-5 | | 30 | 1.2/1.0 | | | 1.4 | 0.97 | 0.92* | 3.8* | 24 |

## A2P3-RA-2

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/WS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 2.33 | < | 7.3/6.0 | 0.86 | | | | | | |
| 0.5-1 | | 22.5 | | | 0.82 | | 0.86 | | 21 | |
| 1-1.5 | | 30 | | | | | | | | |
| 1.5-2 | | 15 | | | | | | | | |
| 2-2.5 | | 30 | | | | | | | | |
| 2.5-3 | | 15 | 1.7/1.6 | 1.2 | 1.2 | | 1.2 | | 6.5 | |
| 3-3.5 | | 15 | | | | | | | | |
| 3.5-4 | | 22.5 | | | | | | | | |
| 4-4.5 | | 30 | | | | | | | | |
| 4.5-5 | | 30 | 1.0/1.0 | | | 1.3 | 0.88 | 0.97* | 5.4 | 20 |

## A2P3-RA-4

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/WS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 1.85 | < | | 1.0 | 1.0 | | | | | |
| 0.5-1 | | 7.5 | 1.2/1.2 | | | | 1.0 | | 6.6 | |
| 1-1.5 | | 22.5 | | | | | | | | |
| 1.5-2 | | 22.5 | 1.6/1.4 | | | 2.0 | 1.2 | 0.97* | 5.3 | 20 |
| 2-2.5 | | 7.5 | 1.7/1.5 | | | 2.0 | 1.2 | 0.90* | 3.9* | 19 |
| 2.5-3 | | 7.5 | 1.0/1.2 | 0.8 | 0.8 | | 0.8 | | 3.2 | |
| 3-3.5 | | < | | | | | | | | |
| 3.5-4 | | 7.5 | | | | | | | | |
| 4-4.5 | | 7.5 | | | | | | | | |
| 4.5-5 | | 7.5 | | | | | | | | |

## A2P3-RA-5

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/WS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 13.52 | 37.5 | 9.1/6.5 | | | 10.4 | 1.0 | 17 | 30 | 0.98* |
| 0.5-1 | | < | 1.8/1.5 | 1.2 | 1.2 | | 1.2 | | 5.5 | |
| 1-1.5 | | < | | | | | | | | |
| 1.5-2 | | < | | | | | | | | |
| 2-2.5 | | 15 | 1.7/1.6 | 1.3 | 1.3 | | | | 6.4 | |
| 2.5-3 | | NA | | | | | | | | |
| 3-3.5 | | 15 | | | | | | | | |
| 3.5-4 | | 7 | | | | | | | | |
| 4-4.5 | | 30 | 1.2/1.2 | | | 1.5 | 0.96 | 25 | 3.9* | 0.94* |
| 4.5-5 | | 15 | 1.2/0.95 | | | 1.7 | 0.96 | 23 | 3.9* | 0.97* |

## A2P3-RA-7

| DEPTH (ft) | HPGe Ra-226pCi/g | Alpha Frisk (dpm) | Ra-226 pCi/g | Ra-228 pCi/g | Th-228 pCi/g | Th-230 (pCi/g) | TH-232 pCi/g | Tc-99 (pCi/g) | TOTAL URANIUM ppm (ICP/WS) | K-40 pCi/g |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-0.5 | 10.65 | 100 | 21/** | | | 22 | ** | 1.0* | 54 | ** |
| 0.5-1 | | 30 | 2.6/2.8 | 1.2 | 1.2 | | | 1.2 | 10 | |
| 1-1.5 | | 23 | | | | | | | | |
| 1.5-2 | | 15 | | | | | | | | |
| 2-2.5 | | < | 1.7/1.4 | | | 2.0 | 1.3 | 0.97* | 4.1* | 25 |
| 2.5-3 | | < | 1.1/1.4 | 1.1 | 1.0 | | 1.1 | | 4.7 | |
| 3-3.5 | | < | | | | | | | | |
| 3.5-4 | | < | | | | | | | | |
| 4-4.5 | | < | | | | | | | | |
| 4.5-5 | | < | | | | | | | | |

FINAL REMEDIATION LEVELS (FRL):
Ra-226 - 1.7 pCi/g
Tc-99 - 30.0 pCi/g
Th-230 - 280 pCi/g
K - 40 - Not Applicable
Th-232 - 1.5 pCi/g
TOTAL URANIUM - 82 ppm

NOTES:
* MINIMUM DETECTABLE CONCENTRATION (MDC)
** INSUFFICIENT SAMPLE QUANTITY AVAILABLE FOR ANALYSIS
NA - NOT AVAILABLE
< - LESS THAN MINIMUM DETECTABLE COUNT RATE
EXCAVATION BOUNDARY
A2PIII PART 2 BOUNDARY
RSS Ra-226 RESULT > 1.69 pCi/g

LEGEND:
○ 1.7 TO 3.4 RESULTS IN pCi/g
□ 3.4 TO 5.1 RESULTS IN pCi/g
● OVER 5.1 RESULTS IN pCi/g

a ALPHA SPEC / GAMMA SPEC METHOD

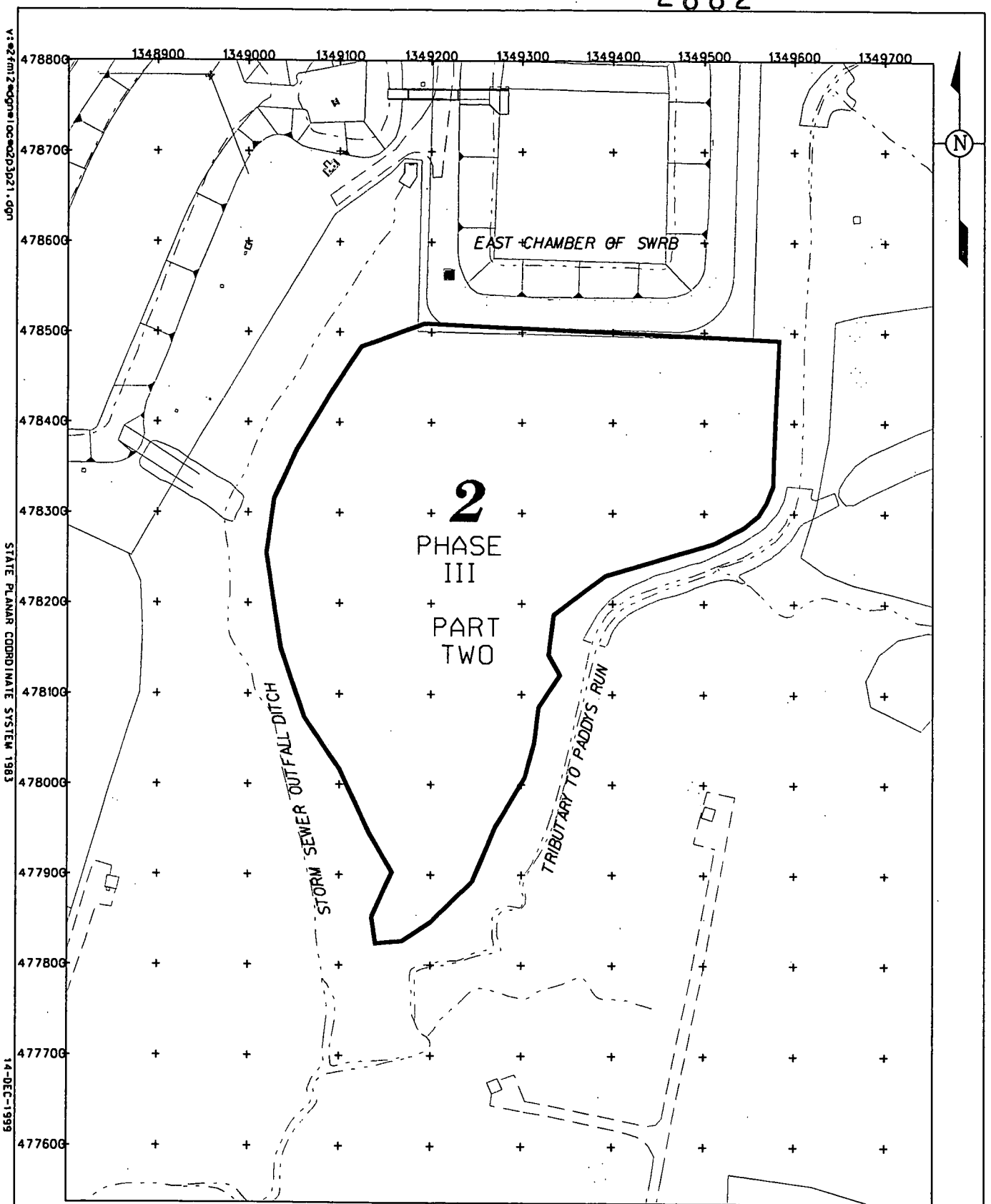
SCALE
150 75 0 150 FEET

000040

DRAFT

y:\e2fm12\dgn\pws\a2p3-505.dgn STATE PLANAR COORDINATE SYSTEM 1983 14-DEC-1999

FIGURE 3-1. A2PIII PART 2 EXTENT OF EXCAVATION




LEGEND:

CERTIFICATION BOUNDARY AREA

000041

SCALE

150 75 0 150 FEET

DRAFT

FIGURE 3-2. A2PIII PART 2 CERTIFICATION BOUNDARY

# 4.0 PROJECT-SPECIFIC ENVIRONMENTAL CONTROLS AND MONITORING

This section defines the project-specific environmental controls and monitoring that will be performed as part of A2PIII Part Two remediation, how the resulting information will be used by the project organization, and how it will be integrated with sitewide monitoring and reporting requirements. Control mechanisms and monitoring/inspection requirements are provided to address impacts on natural resources as well as environmental impacts through the air, surface water and groundwater pathways.

The Integrated Environmental Monitoring Plan (IEMP; DOE 1999c) provides a summary reporting link and a cumulative feedback function for the project-specific monitoring conducted by the individual remediation projects. This link will assist with interpretation of project-specific results from a sitewide perspective. It should be noted, however, that routine "process-adjustment" decisions, which will be made by project management in response to project-specific operating conditions and process-control objectives, will not be reported as part of the IEMP reporting cycles. Rather, these types of routine decisions will be maintained as part of the project organization's daily operations log and are considered to be a normal course of day-to-day practice to achieve project-specific operating objectives. Figure 5-1 of the SEP summarizes the FEMP sitewide and project-specific environmental monitoring and control mechanisms.

## 4.1 NATURAL RESOURCE IMPACTS

Impacts to natural resources include those associated with threatened and endangered species, cultural resources, and wetlands/floodplains. The following paragraphs describe the control mechanisms and monitoring that will be implemented in A2PIII Part Two.

### 4.1.1 Control Mechanisms

The SEP establishes a four component strategic control mechanism for natural resource impacts. The first component is to identify the unavoidable potential natural resource impacts that are anticipated due to A2PIII Part Two remediation activities to be initiated under the SEP.

The second component, avoidance of impacts to FEMP natural resources as practicable, has been controlled through planning and design. Sensitive natural resource areas have been delineated at the FEMP. These "Priority Natural Resource Areas" are illustrated in the Natural Resource Impact Monitoring Plan (briefly discussed below) and Figure 5-2 of the SEP. No Priority Natural Resource Areas are located within A2PIII Part Two. All access points, laydown areas, etc., for the A2PIII Part

Two soil remediation project are outside Priority Natural Resource Areas. Potential impacts to other FEMP natural resources will be minimized through the incorporation of appropriate environmental control mechanisms as well. These are addressed in the subsequent, media-specific discussions.

The third component, monitoring to document the actual extent of impacts, is addressed in Section 4.1.2.

The fourth component, natural resource restoration, is briefly described in Section 3.6, and is the subject of the NRRP.

### 4.1.2 Monitoring

Monitoring of natural resource impacts associated with A2PIII Part Two and other sitewide remedial activities will be conducted under the Natural Resources Impact Monitoring Plan (part of the IEMP). Descriptions of the objectives, regulatory drivers, monitoring, data evaluation, and reporting requirements for the program are provided therein. Sitewide monitoring of natural resource impacts will continue under the IEMP during A2PIII Part Two soil remediation activities. Monitoring under that program will verify and document the actual extent of natural resource impacts anticipated by and identified in the RODs and will identify any unanticipated impacts to wetlands and floodplains associated with Paddys Run and its tributaries and threatened and endangered species habitat. The natural resource monitoring data collected from the FEMP will be updated in the NRRP as it is relevant to restoration.

## 4.2 AIR PATHWAY

This subsection presents the air pathway control and monitoring requirements for noise, fugitive emissions (visible dust), airborne radiological particulates and radon, and direct radiation during A2PIII Part Two soil remediation activities. Air pathway monitoring activities, to the maximum extent possible, will make use of both the existing FEMP occupational air monitoring program and the sitewide environmental monitoring program (described in Section 6.0 of the IEMP). Using existing monitoring programs will help ensure that project-specific data are of comparable quality and are beneficial in evaluating and reporting project-specific air pathway releases under the various regulatory drivers associated with these monitoring programs.

Administrative and engineering control techniques, in accordance with RM-0047, Fugitive Dust Control Requirements, developed from the FEMP fugitive dust control "best available technology" (BAT) determination, will be implemented during A2PIII Part Two soil remediation activities, including excavation, hauling, and placement of soils to mitigate potential emissions of fugitive dust and airborne radiological particulates.

4.2.1 Noise

4.2.1.1 Control Mechanisms

Noise control and abatement during the remediation of A2PIII Part Two will include noise control devices (mufflers) on equipment and machinery, proper maintenance of equipment and machinery, and also may include rescheduling time periods in which heavy equipment is used in the field. Currently, no remediation activities are anticipated after sunset.

To ensure that Occupational Safety and Health Administration (OSHA) and American Conference of Governmental and Industrial Hygienists (ACGIH) noise limits are met, an administrative action level below these limits has been specified in the health and safety documents (see Section 5.0). This administrative action level will be used to assess the need for hearing protection for field personnel in the areas of remediation activities, the need for maintenance of equipment and machinery, and the need for additional noise control and abatement.

4.2.1.2 Monitoring

Noise monitoring will be conducted to implement the A2PIII Part Two project-specific health and safety requirements. Noise measurements will be made in the field by FDF health and safety personnel, using health and safety protocols for noise monitoring, to determine whether administrative action levels are exceeded; the need for hearing protection; the need for maintenance of equipment and machinery; the need for additional noise control or abatement; and compliance with OSHA and ACGIH occupational noise limits.

Components of noise monitoring will include establishing remediation area-specific background levels prior to the start of excavation activities, and occasional monitoring during implementation of remedial activities. If the environmental noise level falls within 5 dBA of the administrative action level

(85 dBA, as specified in the health and safety requirements), health and safety personnel will contact the project field manager to begin appropriate corrective actions.

Field managers will be responsible for documenting noise monitoring as well as for initiating noise abatement measures.

### 4.2.2 Fugitive Emissions

#### 4.2.2.1 Control Mechanisms

Water, commercially available dust suppression agents, or other appropriate methods and work practices will be used proactively to reasonably minimize dust generation from A2PIII Part Two soil remediation activities, including soil excavation, handling, hauling, and placement. In general, the opportunity for dust generation will be minimized using work practices, including maintaining the IMHR relatively free of impacted material, and covering the beds of haul equipment. Beyond that, water or other dust suppression agents will be applied in sufficient quantities to minimize dust generation, but limited so that they do not result in migration of the agent beyond work area boundaries, ponding, or disruption of other portions of work.

For excavation activities, dust control will be by progressive increments focused on making the material less dusty. The base mechanism is anticipated to be reliance on inherent moisture in the soil. If visible dust emissions occur during excavation, a water mist will be applied for dust control.

For soil handling, loading, hauling, and placement activities, dust control will be focused on making the material to be transported unlikely to become airborne. The base mechanism should rely on inherent moisture in the soil, coupled with a 20-mile-per-hour speed limit during hauling. In addition, the beds of all haul equipment will be covered when transporting material. If visible dust emissions occur during handling, hauling, or placement, one or a combination of the following dust control methods may be used:

- Change configuration of material (e.g., place less in the trucks)
- Apply water mist
- Reduce equipment speed.

Equipment wash facilities will be used at the point where equipment enters the IMHR from the SWUs or the OSDF. Clods, clumps, or visible deposits of soil or other materials that could readily become visible fugitive emissions from paved or unpaved roadways/parking areas will be promptly removed. Appropriate dust control mechanisms will be applied to reasonably minimize the generation of visible dust that may result from the removal process.

The type or amount of dust suppression equipment in operation will not preclude stopping work if there is visible dust or excessive visible dust. Visible dust indicates the need to increase the level of dust control effort. Increasing levels of visible dust indicate a need to increase the level of dust control effort, including possible alteration, slowdown, or temporary suspension of the work activities generating the visible dust. The work activity(ies) generating the visible dust will be temporarily suspended if the visible dust exceeds the site-specific limit or Ohio standard (see RM-0047, Fugitive Dust Control Requirements). Dust controls will be increased and/or work practices will be modified to bring the fugitive emissions to a level below the limit/standard during dust-generating activities.

The contractor will abide by the approved Dust Control Plan, as part of the Safe Work Plan, which specifies:

- A narrative description of how the contractor will implement the Dust Control Plan, monitor for visible dust, progressively implement increased dust control or alter work activities when required, and maintain records of dust control activities
- A listing of methods to be used to suppress dust, and the associated frequency that routine dust suppression is to take place
- By method, the materials to be used to suppress dust (e.g., water, dust suppression agents, etc.)
- By method, the specific types and quantities of equipment to be used to suppress dust.

A description of the notification process, including designation of personnel, that the contractor intends for Soil and Disposal Facility Project (SDFP) personnel [formerly Soils Characterization and Excavation Project (SCEP)] to utilize during non-work periods to notify the contractor of a dust alert.

FDF approval of the Dust Control Plan is a prerequisite to authorization of earthmoving activities.

4.2.2.2 Monitoring

Project personnel will tour the remediation area at the start of the day and periodically during the day. Real-time observation of visible dust, in accordance with the criteria described in RM-0047, Fugitive Dust Control Requirements, will be used to assess fugitive dust emissions and progressively implement corrective measures.

Additionally, visual monitoring will be conducted in accordance with 40 CFR Part 60, Appendix A, Method 22, Visual Determination of Fugitive Emissions from Material Sources and Smoke Emission from Flares. Visual determination of opacity will be conducted on "project field activities" and "material handling/vehicle traffic on storage piles" (identified in the table in RM-0047, Fugitive Dust Control Requirements). That determination will be in accordance with 40 CFR Part 60, Appendix A, Method 9, Visual Determination of Opacity of Emissions from Stationary Sources (or an approved alternative method).

FDF managers will be responsible for documenting visible emission monitoring in the field as well as for initiating fugitive dust abatement measures. Records for each work day (as described in the approved Dust Control Plan) will be maintained for the A2PIII Part Two soil remediation project.

4.2.3 Airborne Radiological Particulates

4.2.3.1 Control Mechanisms

All airborne radiological particulate emissions associated with A2PIII Part Two soil remediation activities are anticipated to be from fugitive emissions. Control mechanisms for fugitive emissions are presented in the preceding subsection. No airborne radiological particulate control mechanisms beyond those provided by fugitive emission control are anticipated to be required for environmental or public safety concerns as a result of A2PIII Part Two soil remediation activities.

4.2.3.2 Monitoring

All airborne radiological particulate emissions associated with A2PIII Part Two soil remediation activities will be monitored via the sitewide airborne radiological particulate monitoring program presented in Section 6.0 of the IEMP. The monitoring network encompasses all the current and expected diffuse and point sources at the FEMP site. The data collected under the sitewide airborne radiological particulate monitoring program will be used to assess the collective effect of concurrent

remediation activities at the FEMP site under various regulatory drivers described in Section 6.0 of the IEMP.

No supplement or modification to the sitewide airborne radiological particulate monitoring program is anticipated to be required as a result of A2PIII Part Two soil remediation activities. Airborne radiological particulate monitoring stations will be established for the A2PIII Part Two project under the existing sitewide program. If necessary, relocation of the air monitoring stations will be coordinated with project personnel to ensure the integrity of the sitewide monitoring network is maintained.

4.2.4 Radon

4.2.4.1 Control Mechanisms

Emission of radon from soil being remediated under the A2PIII Part Two soil remediation project is not anticipated to be an environmental or public safety concern. Hence, no project-specific radon control mechanisms are anticipated to be required as a result of A2PIII Part Two soil remediation activities.

4.2.4.2 Monitoring

Any potential radon emissions associated with A2PIII Part Two soil remediation activities will be monitored via the sitewide radon monitoring program presented in Section 6.0 of the IEMP. No supplement or modification to that sitewide radon monitoring program is anticipated to be required as a result of A2PIII Part Two soil remediation activities.

4.2.5 Direct Radiation

4.2.5.1 Control Mechanisms

No project-specific direct radiation control mechanisms beyond that provided by fugitive emissions control are anticipated to be required for environmental or public safety concerns as a result of A2PIII Part Two soil remediation activities.

4.2.5.2 Monitoring

Environmental radiation levels associated with A2PIII Part Two soil remediation activities will be monitored via the sitewide environmental direct radiation monitoring program presented in Section 6.0

of the IEMP. No supplement or modification to the sitewide environmental direct radiation monitoring program is anticipated to be required as a result of A2PIII Part Two soil remediation activities.

## 4.3 SURFACE WATER PATHWAY

### 4.3.1 Control Mechanisms

As a condition of its NPDES Permit (OEPA Permit No. 1IO00004*ED), the FEMP was required to develop and implement a SWPPP. The SWPPP identifies potential sources of pollution associated with construction and industrial activities that may affect storm water quality at the FEMP and describes the practices that will be employed to reduce pollutants within these types of discharges. The SWPPP also contains provisions on the inspection programs which ensure that discharges of storm water associated with construction and industrial activities comply with the requirements of the FEMP NPDES Permit and the SWPPP.

A2PIII Part Two is located outside the "storm water runoff controlled" Former Production Area drainage basin. Currently, the A2PIII Part Two area drains to NPDES-permitted Storm Water Outfall *003. Outside the FEMP's Former Production Area drainage basin, storm water from construction activity is regulated as an industrial activity (if a certain magnitude of earth-moving activities is involved). A2PIII Part Two soil remediation activities to be initiated under the SEP are a subset of construction activities. In accordance with both the SWPPP (under the FEMP's NPDES permit) and the SEP, erosion and sediment controls will be installed where appropriate to protect downgradient areas. These controls will be designed and installed to manage surface water runon and runoff, minimize erosion, and control sedimentation in on-site surface waters.

The management of surface water for A2PIII Part Two will be performed by installation of sediment and erosion control measures (Section 3.1.5). This includes, but is not limited to, installing silt fencing and grading the area for positive drainage to prevent runoff from contaminated and potentially contaminated areas from migrating downgradient of A2PIII Part Two.

The sediment/erosion control systems for A2PIII Part Two will remain in place until remediation of the area has been completed. They will be dismantled or reconfigured during restoration of A2PIII Part Two.

4.3.2 Inspection

Construction activity inspections mandated by the SWPPP will be conducted in the A2PIII Part Two remediation area. Under the FEMP's construction activity inspection program, weekly inspections will be conducted within all construction areas at the site and after any rain event totaling 0.5 inch or greater within a 24-hour period. Construction activity inspections are documented and maintained as part of the SWPPP files at the facility.

Industrial activity inspections might also be conducted in the A2PIII Part Two remediation area. Industrial activity inspections are documented and maintained as part of the NPDES and SWPPP files at the facility.

Inspections conducted in the A2PIII Part Two area will ensure that:

- Erosion and sedimentation control measures are in place and are well maintained
- Work practices and housekeeping activities are conducted in a manner that reduces the potential discharge of pollutants in association with storm water discharges from disturbed areas
- Corrective actions related to the establishment and/or maintenance of erosion and sedimentation control structures are documented and tracked to resolution
- Excessive erosion and/or situation to off-property waterways is not occurring as a result of construction activities initiated under the A2PIII Part Two soil remediation activities.

The SEP discusses potential project-specific storm water monitoring programs for soil remediation areas located outside the formerly storm water runoff-controlled Production Area drainage basin. The objectives of such a program would be to monitor performance of erosion and sedimentation control structures (e.g., sediment traps and basins) against their anticipated design efficiencies, and to determine whether the runoff presents an unacceptable impact to surface water quality or presents an unacceptable cross-media impact to the Great Miami Aquifer.

Because the objectives of the SEP-contemplated storm water monitoring program are met through other existing means no project-specific storm water monitoring program will be implemented for the A2PI soil remediation project.

## 4.4 GROUNDWATER PATHWAY

### 4.4.1 Control Mechanisms

The Great Miami Aquifer is an extensive aquifer located, in part, beneath the entire FEMP (including the A2PIII Part Two area). Additional information on the Great Miami Aquifer in the A2PIII Part Two area is provided in the OU2 RI (DOE 1995b) and in the OU5 RI.

The depth of the Great Miami Aquifer beneath the A2PIII Part Two area is approximately 15 to 20 feet below the surface. This depth, in conjunction with the clay layer above the Great Miami Aquifer, indicates that no impact to groundwater is anticipated as a result of the A2PIII Part Two remediation activities.

### 4.4.2 Monitoring

The sitewide management strategy for monitoring groundwater during remedial activities is described in detail in Section 3.0 of the IEMP. Descriptions of the objectives, regulatory drivers, monitoring, data evaluation, and reporting requirements for the program are provided therein. Sitewide monitoring of groundwater will continue under the IEMP during A2PIII Part Two soil remediation activities.

## 5.0 PROJECT-SPECIFIC HEALTH AND SAFETY

All DOE and FDF employees, visitors, vendors, and contractors are required to abide by the provisions of FDF-prepared applicable Environmental, Safety and Health and Training Requirements Matrices (ESH&TRMs), FDF Work Permits, and the FDF-approved Safe Work Plan prepared by the contractor. Managers and supervisors are responsible for ensuring that all health and safety requirements are met. All personnel have stop-work authority for imminent safety hazards resulting from noncompliance with the applicable health and safety practices.

All contractor activities conducted in support of this project are governed by the safety requirements specified in the remediation contract, which addresses environmental, occupational, industrial, and construction health and safety. In addition to the contract requirements, Project-Specific Health and Safety Requirements Matrices (PSHSRMs), and permits, the contractors will comply with all federal, state, and local requirements (e.g., OSHA, ACGIH). Health and safety requirements and procedures for this Implementation Plan are governed by the A2PIII Part Two ESH&TRM, FDF Work Permits, and the overall strategy discussed in Section 6.0 of the SEP.

A project-specific occupational monitoring strategy will be developed by the FDF Safety and Health (S&H) department for the A2PIII Part Two project. The contractor will incorporate their occupational exposure monitoring requirements into Section 3 of their FDF-approved Safe Work Plan. These strategies will address the COCs for the A2PIII Part Two project area and will comply with all federal, state, and local requirements (e.g., OSHA, ACGIH).

In accordance with SH-0001, Developing Project-Specific Health and Safety Requirements, an ESH&TRM will be developed for A2PIII Part Two construction, excavation, and impacted material placement activities. The applicable ESH&TRM will be provided to the contractor, with information related to the possible hazards and the safety requirements to execute each task. The contractor can develop the specific Safe Work Plan using this information. The ESH&TRM may be revised as tasks and/or associated hazards and mitigators are identified, added, or deleted. The detailed Safe Work Plan will be maintained at the project site, with controlled copies in the project document control files. A controlled copy of the ESH&TRM will be maintained in the project document control files.

FDF will provide all radiological occupational monitoring for the contractor. FDF radiological control technicians will provide the necessary support for A2PIII Part Two activities. The contractual radiological control requirements for the performance of A2PIII Part Two work will be documented in FDF job-specific Radiological Work Permits (RWPs). Personnel performing work that requires an RWP will be briefed on the specific hazards and requirements for the task prior to commencing work. FDF radiological control personnel will evaluate the data obtained from the monitoring to determine the effectiveness of the radiological controls and relay this information to the contractor.

# 6.0 REMEDIAL ACTION MANAGEMENT STRATEGY

This section describes the strategy for managing the remediation of A2PIII Part Two, specifically the organizational structure, configuration management, remedial action approach, remedial action management, contingency management, integration of project activities with other FEMP activities, and the remediation schedule.

## 6.1 ORGANIZATION AND RESPONSIBILITIES

The governing document for CERCLA response actions at the FEMP is the ACA between DOE and EPA. As such, ultimate project management responsibility lies with those two entities. The DOE is the lead agency responsible for CERCLA activities at the FEMP. The DOE Fernald Area Office (DOE-FEMP) is the ultimate authority for ensuring the A2PIII Part Two remedial action is performed in a manner that meets all project goals, standards, specifications, and requirements of the A2PIII Part Two IRDP. The OEPA has been granted regulatory authority over certain Resource Conservation and Recovery Act (RCRA) activities.

Within each agency, various organizations and offices have been delegated specific program responsibilities. The DOE-FEMP OU5 Team Leader will provide the overall DOE programmatic direction for A2PIII Part Two. The DOE-FEMP will conduct field oversight through technical leads responsible for construction, excavation/remediation, engineering, quality assurance and control, health and safety, and other pertinent aspects of the project.

The FDF SDFP will provide the overall project management and technical guidance to the A2PIII Part Two Project Team. The Project Team will provide all of the necessary technical, regulatory, and administrative input required for the project. As the project moves through design to construction, the project organization will change to maximize efficiency. The basic project organization will stay the same throughout the project; however, the overall manager will change to best meet the needs of the project. During predesign investigation, design, precertification and certification, the project will be managed by the Area Project Manager (APM). During procurement and construction, the project will be managed by the Construction Manager (CM). This organizational structure will provide clear lines of responsibility during the project and provide project leadership with the necessary experience at various phases of the project (i.e., the CM will lead the project during construction phases). The

The CM will also coordinate the remedial action of the A2PIII Part Two contractor with other FEMP contractors. This coordination will be addressed in the actual contract documents.

## 6.5 CONTINGENCY MANAGEMENT

Conditions which are unexpected and not addressed through established excavation guidelines or the remedial design will be dealt with according to contingency management protocols and plans set forth in Appendix F of the SEP. These contingencies are categorized as follows:

- Unearthing of materials that require special handling;
- Encountering contamination or soil conditions which may pose a risk to human health or the environment if standard excavation practices are used, or which are significantly different than expected, or which may affect other operations;
- Discovering unexpected cultural or historic resources.

Requirements for managing special materials encountered during remediation of A2PIII Part Two will be presented in the project design documents and detailed in the contractor's Safe Work Plan (Section 3.3.2). SDFP/WAO will provide assistance to Construction for field decisions related to management and disposition of special materials if necessary and, if applicable, will arrange for movement of materials to the appropriate FEMP storage and handling areas for characterization, treatment evaluation, and final disposition arrangements.

Although not expected, excavation of A2PIII Part Two could progress to a point where continued work would cause the remedial action to differ from the design, such as:

- Discovering unexpected types or quantities of contamination;
- Encountering soil types or excavation depths that are not within design parameters;
- Discovering impacted materials beyond the design limits.

In accordance with the SEP, the FEMP design change process will be used to effect design changes in cases where conditions and design changes do not differ significantly from those already acknowledged and approved for the project. If conditions are significantly different from the approved design, construction activities will stop until an acceptable plan is developed and approved.

# REFERENCES

U.S. Department of Energy, 1995a, "Remedial Investigation Report for Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1995b, "Remedial Investigation Report for Operable Unit 2," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1996, "Record of Decision for Remedial Actions at Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1997, "Programmatic Agreement among the U.S. Department of Energy, Fernald Office, the Advisory Council on Historic Preservation, and the Ohio Historic Preservation Office Regarding Archaeological Investigations at the Fernald Environmental Management Project," Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1998a, "Sitewide Excavation Plan," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1998b, "Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1998c, "Natural Resource Restoration Plan," Draft Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1998d, "User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (User's Manual)," Revision 1, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1999a, "Certification Design Letter for Area 2, Phase III Part One," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1999b, "Impacted Materials Placement Plan," Revision 1, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1999c, "Integrated Environmental Monitoring Program," Revision 1, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, OH.

U.S. Environmental Protection Agency, 1991, Consent Agreement as Amended under CERCLA Sections 120 and 106(a), in the matter of U.S. Department of Energy, Feed Materials Production Center, Fernald, Ohio, U.S. EPA Region V.

# APPENDIX A

# A2PIII PART TWO DATA

**TABLE A-3**
**PHYSICAL SAMPLE LOCATION COORDINATES**

| Location ID | Northing | Easting |
|---|---|---|
| A2P3-RA-1 | 478435.0 | 1349228.2 |
| A2P3-RA-2 | 478462.2 | 1349408.1 |
| A2P3-RA-3 | 478432.4 | 1349307.0 |
| A2P3-RA-4 | 478364.7 | 1349340.9 |
| A2P3-RA-5 | 478304.2 | 1349221.6 |
| A2P3-RA-6 | 478367.0 | 1349262.9 |
| A2P3-RA-7 | 478231.2 | 1349259.8 |

# APPENDIX A

# A2PIII PART TWO DATA

## LIST OF TABLES



## LIST OF FIGURES

**TABLE A-1**
**A2PIII PART TWO HISTORICAL DATA**

| Parameter | Sample ID | Location ID | Top Depth | Bottom Depth | Northing | Easting | Result | Qualifier | Units |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 1,1,2,2-Tetrachloroethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 1,1,2-Trichloroethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 1,1-Dichloroethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 1,1-Dichloroethene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 1,2,4-Trichlorobenzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 1,2-Dichlorobenzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 1,2-Dichloroethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 1,2-Dichloroethene (Total) | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 1,2-Dichloropropane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 1,3-Dichlorobenzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 1,4-Dichlorobenzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 2,4,5-Trichlorophenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1100 | U | ug/kg |
| 2,4,6-Trichlorophenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 2,4-Dichlorophenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 2,4-Dimethylphenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 2,4-Dinitrophenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1100 | UJ | ug/kg |
| 2,4-Dinitrotoluene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 2,6-Dinitrotoluene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 2-Butanone | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 2-Chloronaphthalene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 2-Chlorophenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 2-Hexanone | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 2-Methylnaphthalene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | UJ | ug/kg |
| 2-Nitroaniline | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1100 | U | ug/kg |
| 2-Nitrophenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 3,3'-Dichlorobenzidine | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 3-Nitroaniline | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1100 | U | ug/kg |
| 4,6-Dinitro-2-methylphenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1100 | U | ug/kg |
| 4-Bromophenyl phenyl ether | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |

## TABLE A-1
## A2PIII PART TWO HISTORICAL DATA

| Parameter | Sample ID | Location ID | Top Depth | Bottom Depth | Northing | Easting | Result | Qualifier | Units |
|---|---|---|---|---|---|---|---|---|---|
| 4-Chloro-3-methylphenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 4-Chlorophenylphenyl ether | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| 4-Methyl-2-pentanone | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| 4-Nitroaniline | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1100 | U | ug/kg |
| 4-Nitrophenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1100 | UJ | ug/kg |
| Acenaphthene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Acenaphthylene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Acetone | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Aluminum | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 3890 | - | mg/kg |
| Anthracene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Antimony | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 3.7 | U | mg/kg |
| Arsenic | A1PII-S1-01-01M | A1PII-S1-01-01 | | | 478323 | 1349668 | 4.4 | NV | mg/kg |
| Arsenic | A1PII-S1-01-01M-D | A1PII-S1-01-01 | | | 478323 | 1349668 | 3.7 | NV | mg/kg |
| Arsenic | A1PII-S1-01-07M | A1PII-S1-01-07 | | | 478518 | 1349666 | 3.6 | NV | mg/kg |
| Arsenic | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 5.5 | J | mg/kg |
| Barium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 38.1 | - | mg/kg |
| Benzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Benzo(a)anthracene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Benzo(a)pyrene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Benzo(b)fluoranthene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 76 | J | ug/kg |
| Benzo(g,h,i)perylene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Benzo(k)fluoranthene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 96 | J | ug/kg |
| Beryllium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1.3 | UJ | mg/kg |
| bis(2-Chloroethoxy)methane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| bis(2-Chloroethyl)ether | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| bis(2-Chloroisopropyl) ether | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| bis(2-Ethylhexyl)phthalate | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Bromodichloromethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Bromoform | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Bromomethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |

**TABLE A-1**
**A2PIII PART TWO HISTORICAL DATA**

| Parameter | Sample ID | Location ID | Top Depth | Bottom Depth | Northing | Easting | Result | Qualifier | Units |
|---|---|---|---|---|---|---|---|---|---|
| Butyl benzyl phthalate | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Cadmium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1.3 | R | mg/kg |
| Calcium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 56000 | - | mg/kg |
| Carbazole | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Carbon disulfide | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Carbon Tetrachloride | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Cesium-137 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 0.2 | UJ | pci/g |
| Cesium-137 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.2 | UJ | pCi/g |
| Chlorobenzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Chloroethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Chloroform | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Chloromethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Chromium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 6.8 | J | mg/kg |
| Chrysene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| cis-1,3-Dichloropropene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Cobalt | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 4.7 | - | mg/kg |
| Copper | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 8.1 | - | mg/kg |
| Cyanide | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.33 | U | mg/kg |
| Dibenzo(a,h)anthracene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Dibenzofuran | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Dibromochloromethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Diethyl phthalate | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 2200 | U | ug/kg |
| Dimethyl phthalate | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Di-n-butyl phthalate | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Di-n-octyl phthalate | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Ethylbenzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Fluoranthene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 110 | J | ug/kg |
| Fluorene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Grain Size Diameter, 0.075 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 11.6 | NV | % FINER |
| Grain Size Diameter, 0.106 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 12.9 | NV | % FINER |

**TABLE A-1**
**A2PIII PART TWO HISTORICAL DATA**

| Parameter | Sample ID | Location ID | Top Depth | Bottom Depth | Northing | Easting | Result | Qualifier | Units |
|---|---|---|---|---|---|---|---|---|---|
| Grain Size Diameter, 0.25 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 20.7 | NV | % FINER |
| Grain Size Diameter, 0.425 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 36.7 | NV | % FINER |
| Grain Size Diameter, 0.85 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 69.2 | NV | % FINER |
| Grain Size Diameter, 19 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 100 | NV | % FINER |
| Grain Size Diameter, 2 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 92.7 | NV | % FINER |
| Grain Size Diameter, 37.5 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 100 | NV | % FINER |
| Grain Size Diameter, 4.75 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 98.7 | NV | % FINER |
| Grain Size Diameter, 75 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 100 | NV | % FINER |
| Grain Size Diameter, 9.5 mm | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 100 | NV | % FINER |
| Gross Alpha | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1.3 | NV | pCi/L |
| Gross Beta | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1 | NV | pCi/L |
| Hexachlorobenzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Hexachlorobutadiene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Hexachlorocyclopentadiene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Hexachloroethane | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Indeno(1,2,3-cd)pyrene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Iron | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 8780 | - | mg/kg |
| Isophorone | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Lead | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 10.5 | - | mg/kg |
| Magnesium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13900 | - | mg/kg |
| Manganese | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 450 | - | mg/kg |
| Mercury | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.07 | UJ | mg/kg |
| Methylene chloride | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Molybdenum | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 4.5 | UJ | mg/kg |
| Naphthalene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Neptunium-237 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 0.6 | U | pci/g |
| Neptunium-237 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.6 | U | pCi/g |
| Nickel | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 9 | - | mg/kg |
| Nitrobenzene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| N-Nitroso-di-n-propylamine | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |

**TABLE A-1**
**A2PIII PART TWO HISTORICAL DATA**

| Parameter | Sample ID | Location ID | Top Depth | Bottom Depth | Northing | Easting | Result | Qualifier | Units |
|---|---|---|---|---|---|---|---|---|---|
| N-Nitrosodiphenylamine | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| o-Methylphenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| p-Chloroaniline | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Pentachlorophenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1100 | U | ug/kg |
| Phenanthrene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 62 | J | ug/kg |
| Phenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Plutonium-238 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 0.6 | U | pci/g |
| Plutonium-238 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.6 | U | pCi/g |
| Plutonium-239/240 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 0.6 | U | pci/g |
| Plutonium-239/240 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.6 | U | pCi/g |
| p-Methylphenol | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 440 | U | ug/kg |
| Potassium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 885 | U | mg/kg |
| Pyrene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 74 | J | ug/kg |
| Radium-226 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 1.22 | J | pci/g |
| Radium-226 | A1PII-S1-01-01R | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.958 | - | pci/g |
| Radium-226 | A1PII-S1-01-01R-D | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.925 | - | pci/g |
| Radium-226 | A1PII-S1-01-07R | A1PII-S1-01-07 | | | 478518 | 1349666 | 0.988 | - | pci/g |
| Radium-226 | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.7 | UJ | pCi/L |
| Radium-226 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.6 | J | pCi/g |
| Radium-228 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 1.08 | J | pci/g |
| Radium-228 | A1PII-S1-01-01R | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.844 | - | pci/g |
| Radium-228 | A1PII-S1-01-01R-D | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.813 | - | pci/g |
| Radium-228 | A1PII-S1-01-07R | A1PII-S1-01-07 | | | 478518 | 1349666 | 0.861 | - | pci/g |
| Radium-228 | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1.7 | UJ | pCi/L |
| Radium-228 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.5 | UJ | pCi/g |
| Ruthenium-106 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 1 | UJ | pci/g |
| Ruthenium-106 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1 | UJ | pCi/g |
| Selenium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1.3 | R | mg/kg |
| Silicon | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 831 | - | mg/kg |
| Silver | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.26 | U | mg/kg |

**TABLE A-1**
**A2PIII PART TWO HISTORICAL DATA**

| Parameter | Sample ID | Location ID | Top Depth | Bottom Depth | Northing | Easting | Result | Qualifier | Units |
|---|---|---|---|---|---|---|---|---|---|
| Sodium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 111 | - | mg/kg |
| Strontium-90 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 0.5 | U | pci/g |
| Strontium-90 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.5 | U | pCi/g |
| Styrene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Technetium-99 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 1 | U | pci/g |
| Technetium-99 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.9 | U | pCi/g |
| Tetrachloroethene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Thallium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.26 | UJ | mg/kg |
| Thorium, Total | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 5.13 | J | mg/kg |
| Thorium, Total | 32960 | 2397 | | | 478300.02 | 1349526.06 | 18 | UNV | mg/kg |
| Thorium, Total | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 7.296124 | NV | pCi/g |
| Thorium-228 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 0.989 | J | pci/g |
| Thorium-228 | A1PII-S1-01-01R | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.839 | - | pci/g |
| Thorium-228 | A1PII-S1-01-01R-D | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.785 | - | pci/g |
| Thorium-228 | A1PII-S1-01-07R | A1PII-S1-01-07 | | | 478518 | 1349666 | 0.873 | - | pci/g |
| Thorium-228 | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.2 | UJ | pCi/L |
| Thorium-228 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.6 | UJ | pCi/g |
| Thorium-230 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 1.21 | J | pci/g |
| Thorium-230 | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.3 | UJ | pCi/L |
| Thorium-230 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 2.5 | J | pCi/g |
| Thorium-232 | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 0.6 | UJ | pci/g |
| Thorium-232 | A1PII-S1-01-01R | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.844 | - | pci/g |
| Thorium-232 | A1PII-S1-01-01R-D | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.813 | - | pci/g |
| Thorium-232 | A1PII-S1-01-07R | A1PII-S1-01-07 | | | 478518 | 1349666 | 0.861 | - | pci/g |
| Thorium-232 | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.1 | UJ | pCi/L |
| Thorium-232 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.8 | J | pCi/g |
| Toluene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| trans-1,3-Dichloropropene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Trichloroethene | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Uranium, Total | 98062 | 1405 | 0 | 0.5 | 478371.168 | 1349009.012 | 8.2 | - | mg/kg |

**TABLE A-1**
**A2PIII PART TWO HISTORICAL DATA**

| Parameter | Sample ID | Location ID | Top Depth | Bottom Depth | Northing | Easting | Result | Qualifier | Units |
|---|---|---|---|---|---|---|---|---|---|
| Uranium, Total | 98064 | 1405 | 1.5 | 2 | 478371.168 | 1349009.012 | 9.9 | - | mg/kg |
| Uranium, Total | 98066 | 1405 | 3 | 3.5 | 478371.168 | 1349009.012 | 3.9 | - | mg/kg |
| Uranium, Total | 98089 | 1405 | 17.5 | 18 | 478371.168 | 1349009.012 | 2.6 | - | mg/kg |
| Uranium, Total | 98100 | 1405 | 24.5 | 25 | 478371.168 | 1349009.012 | 4.3 | - | mg/kg |
| Uranium, Total | 98115 | 1405 | 33.5 | 34 | 478371.168 | 1349009.012 | 2.7 | - | mg/kg |
| Uranium, Total | 32935 | 2397 | 0 | 1.5 | 478300.024 | 1349526.061 | 9.5 | J | mg/kg |
| Uranium, Total | 32960 | 2397 | | | 478300.02 | 1349526.06 | 11 | UNV | mg/kg |
| Uranium, Total | A1PII-S1-01-01R | A1PII-S1-01-01 | | | 478323 | 1349668 | 2.06 | UJ | mg/kg |
| Uranium, Total | A1PII-S1-01-01R-D | A1PII-S1-01-01 | | | 478323 | 1349668 | 0.039 | UJ | mg/kg |
| Uranium, Total | A1PII-S1-01-07R | A1PII-S1-01-07 | | | 478518 | 1349666 | 1.45 | UJ | mg/kg |
| Uranium, Total | 120092 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 11 | NV | mg/kg |
| Uranium, Total | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.1 | U | ug/L |
| Uranium, Total | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 4 | J | mg/kg |
| Uranium-234 | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.1 | UJ | pCi/L |
| Uranium-234 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1.3 | NV | pCi/g |
| Uranium-235/236 | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.1 | UJ | pCi/L |
| Uranium-235/236 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.6 | U | pCi/g |
| Uranium-238 | 120102 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 0.1 | UJ | pCi/L |
| Uranium-238 | 9041 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 1.4 | NV | pCi/g |
| Vanadium | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 14.7 | - | mg/kg |
| Vinyl Acetate | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Vinyl chloride | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Xylenes, Total | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 13 | U | ug/kg |
| Zinc | 120090-1 | ASIT-001 | 0 | 0.5 | 478279.367 | 1348971.213 | 17.2 | R | mg/kg |

**TABLE A-2**
**HPGe RESULTS FOR TOTAL URANIUM, THORIUM-232, AND RADIUM-226**

| Location | Northing | Easting | Detector Height | Total Uranium (ppm) | Thorium-232 (pCi/g) | Radium-226 (pCi/g) |
|---|---|---|---|---|---|---|
| A2P3-P1-T-145-G | 477710.08 | 1349112.66 | 100cm | 12.80 | 0.46 | 0.75 |
| A2P3-P1-T-146-G | 477748.83 | 1349132.03 | 100cm | 14.50 | 0.67 | 0.75 |
| A2P3-P1-T-147-G | 477719.56 | 1349150.02 | 100cm | 9.98 | 0.45 | 0.71 |
| A2P3-P1-T-148-G | 477772.48 | 1349146.01 | 100cm | 14.00 | 0.61 | 0.81 |
| A2P3-P1-T-149-G | 477817.74 | 1349145.07 | 100cm | 13.10 | 0.62 | 0.84 |
| A2P3-P1-T-150-G* | 477795.64 | 1349122.72 | 100cm | 13.80 | 0.73 | 0.84 |
| A2P3-P1-T-151-G | 477847.91 | 1349226.31 | 100cm | 11.30 | 0.72 | 0.97 |
| A2P3-P1-T-152-G | 477886.51 | 1349280.66 | 100cm | 13.50 | 0.66 | 0.78 |
| A2P3-P1-T-153-G* | 477942 | 1349293.01 | 100cm | 16.00 | 0.69 | 0.83 |
| A2P3-P1-T-154-G | 477972.19 | 1349309.37 | 100cm | 18.20 | 0.83 | 0.90 |
| A2P3-P1-T-155-G | 478016.6 | 1349323.45 | 100cm | 16.80 | 0.74 | 0.88 |
| A2P3-P1-T-156-G | 478058.52 | 1349330.42 | 100cm | 11.80 | 0.69 | 0.75 |
| A2P3-P1-T-157-G | 478094.65 | 1349338.54 | 100cm | 20.10 | 0.73 | 0.83 |
| A2P3-P1-T-158-G | 478139.92 | 1349342.97 | 100cm | 12.60 | 0.68 | 0.76 |
| A2P3-P1-T-159-G | 478171.48 | 1349340.58 | 100cm | 0.06 | 0.62 | 0.56 |
| A2P3-P1-T-160-G | 478263.36 | 1349476.31 | 100cm | 0.04 | 0.61 | 0.67 |
| A2P3-P1-T-161-G* | 478467.49 | 1349158.81 | 100cm | 26.00 | 0.69 | 0.75 |
| A2P3-P1-T-162-G | 478433.87 | 1349127.55 | 100cm | 25.80 | 0.70 | 0.71 |
| A2P3-P1-T-163-G | 478400.08 | 1349104.01 | 100cm | 19.60 | 0.83 | 0.73 |
| A2P3-P1-T-164-G | 478429.51 | 1349097.08 | 100cm | 24.40 | 0.79 | 0.75 |
| A2P3-P1-T-165-G | 478469.56 | 1349124.67 | 100cm | 32.60 | 0.72 | 1.38 |
| A2P3-P1-T-166-G | 478380.84 | 1349060.94 | 100cm | 12.00 | 0.60 | 0.59 |
| A2P3-P1-T-167-G | 478348.9 | 1349041.5 | 100cm | 14.10 | 0.77 | 0.77 |
| A2P3-P1-T-168-G | 478009.37 | 1349068.16 | 100cm | 10.80 | 0.67 | 0.68 |
| A2P3-P1-T-169-G | 477973.54 | 1349076.3 | 100cm | 14.70 | 0.62 | 0.67 |
| A2P3-P1-T-169-G-D | 477973.54 | 1349076.3 | 100cm | 12.90 | 0.62 | 0.71 |
| A2P3-P1-T-170-G | 477932.68 | 1349090.51 | 100cm | 12.50 | 0.55 | 0.60 |
| A2P3-P1-T-170-G-D | 477932.68 | 1349090.51 | 100cm | 14.10 | 0.59 | 0.63 |
| A2P3-P1-T-171-G | 477889.29 | 1349102.43 | 100cm | 12.70 | 0.46 | 0.55 |
| A2P3-P1-T-171-G-D | 477889.29 | 1349102.43 | 100cm | 10.90 | 0.48 | 0.56 |
| A2P3-P1-T-172-G | 477844.96 | 1349110.03 | 100cm | 9.55 | 0.39 | 0.66 |
| A2P3-P1-23D-1-G | 478458.32 | 1349525.68 | 100cm | 9.25 | 0.78 | 0.98 |
| A2P3-P1-23D-2-G | 478456.65 | 1349561.76 | 100cm | 15.60 | 0.79 | 1.12 |
| A2P3-P1-23D-3-G | 478423.31 | 1349544.02 | 100cm | 6.82 | 0.83 | 1.32 |
| A2P3-P1-23D-3-G-D | 478423.31 | 1349544.02 | 100cm | 8.22 | 0.81 | 1.32 |
| A2P3-P1-23D-4-G | 478391.11 | 1349560.74 | 100cm | 0.06 | 0.76 | 1.02 |
| A2P3-P1-23D-5-G | 478320.46 | 1349558.86 | 100cm | 10.30 | 0.76 | 0.89 |
| A2P3-P1-23D-6-G | 478362.11 | 1349575.45 | 100cm | 10.90 | 0.63 | 0.76 |
| A2P3-P1-23D-7-G | 478423.76 | 1349577.35 | 100cm | 11.70 | 0.72 | 0.83 |
| A2P3-P1-24A-1-G | 478459.64 | 1349485.55 | 100cm | 8.04 | 0.80 | 1.05 |
| A2P3-P1-24A-2-G | 478435.08 | 1349502.46 | 100cm | 7.53 | 0.79 | 1.15 |
| A2P3-P1-24A-3-G | 478398.96 | 1349522.69 | 100cm | 8.65 | 0.88 | 1.10 |
| A2P3-P1-24A-4-G | 478354.64 | 1349539.2 | 100cm | 8.14 | 0.74 | 0.95 |
| A2P3-P1-24A-5-G | 478288.87 | 1349536.77 | 100cm | <MDC | 0.62 | 0.85 |

**TABLE A-2**
**HPGe RESULTS FOR TOTAL URANIUM, THORIUM-232, AND RADIUM-226**

| Location | Northing | Easting | Detector Height | Total Uranium (ppm) | Thorium-232 (pCi/g) | Radium-226 (pCi/g) |
|---|---|---|---|---|---|---|
| A2P3-P1-24A-6-G | 478321.69 | 1349517.47 | 100cm | 13.10 | 0.82 | 1.09 |
| A2P3-P1-24A-7-G | 478356.04 | 1349499.23 | 100cm | 10.80 | 0.77 | 1.06 |
| A2P3-P1-24A-8-G | 478391.89 | 1349480.58 | 100cm | 0.04 | 0.82 | 1.00 |
| A2P3-P1-24A-9-G | 478425.82 | 1349465.62 | 100cm | 10.00 | 0.80 | 1.28 |
| A2P3-P1-24A-10-G | 478426.35 | 1349425.52 | 100cm | 7.29 | 0.82 | 1.16 |
| A2P3-P1-24A-11-G | 478392.87 | 1349441.47 | 100cm | 11.40 | 0.86 | 1.08 |
| A2P3-P1-24A-12-G | 478358.52 | 1349462.45 | 100cm | 0.06 | 0.73 | 0.88 |
| A2P3-P1-24A-13-G | 478324.34 | 1349478.59 | 100cm | 8.53 | 0.71 | 0.91 |
| A2P3-P1-24A-14-G | 478292.3 | 1349459.46 | 100cm | 17.00 | 0.62 | 0.74 |
| A2P3-P1-24A-15-G | 478326.58 | 1349438.75 | 100cm | 0.08 | 0.73 | 1.01 |
| A2P3-P1-24A-16-G | 478362.16 | 1349421.43 | 100cm | 10.80 | 0.77 | 1.03 |
| A2P3-P1-24A-17-G | 478396.25 | 1349401.38 | 100cm | 14.00 | 0.81 | 1.15 |
| A2P3-P1-24A-18-G | 478430.74 | 1349383.21 | 100cm | 13.80 | 0.79 | 1.39 |
| A2P3-P1-24A-18-GD | 478430.74 | 1349383.21 | 100cm | 11.80 | 0.81 | 1.29 |
| A2P3-P1-24A-19-G | 478430.58 | 1349345.94 | 100cm | 13.70 | 0.66 | 1.34 |
| A2P3-P1-24A-20-G | 478397.98 | 1349362.13 | 100cm | 17.20 | 0.83 | 1.35 |
| A2P3-P1-24A-21-G | 478364.87 | 1349381.49 | 100cm | 19.60 | 0.77 | 1.69 |
| A2P3-P1-24A-22-G | 478327.1 | 1349405.54 | 100cm | 13.90 | 0.67 | 0.95 |
| A2P3-P1-24A-23-G | 478294.51 | 1349418.85 | 100cm | 12.60 | 0.73 | 0.98 |
| A2P3-P1-24A-24-G | 478259.2 | 1349440.85 | 100cm | 0.06 | 0.76 | 1.00 |
| A2P3-P1-24A-25-G | 478260.61 | 1349481.08 | 100cm | 0.04 | 0.71 | 1.03 |
| A2P3-P1-24A-26-G* | 478295.57 | 1349377.87 | 100cm | 14.60 | 0.73 | 1.01 |
| A2P3-P1-24A-27-G | 478330.47 | 1349359.51 | 100cm | 13.60 | 0.72 | 1.03 |
| A2P3-P1-24A-28-G | 478364.71 | 1349340.92 | 100cm | 20.30 | 0.69 | 1.85 |
| A2P3-P1-24A-29G* | 478226.74 | 1349376.27 | 100cm | 7.64 | 0.68 | 0.91 |
| A2P3-P1-24A-29G-D | 478226.74 | 1349376.27 | 100cm | 10.90 | 0.69 | 1.01 |
| A2P3-P1-24B-1-G | 478226.92 | 1349418.36 | 100cm | 0.06 | 0.67 | 0.87 |
| A2P3-P1-24B-2-G | 478194.67 | 1349370.38 | 100cm | 6.12 | 0.67 | 0.74 |
| A2P3-P1-24C-1-G | 478165.85 | 1349176.94 | 100cm | 13.40 | 0.67 | 1.02 |
| A2P3-P1-24C-2-G | 478165.63 | 1349216.55 | 100cm | 15.70 | 0.69 | 1.06 |
| A2P3-P1-24C-4-G | 478132.06 | 1349272.29 | 100cm | 16.50 | 0.64 | 0.97 |
| A2P3-P1-24C-5-G | 478165.02 | 1349255.28 | 100cm | 14.40 | 0.64 | 0.85 |
| A2P3-P1-24C-6-G | 478164.35 | 1349293.59 | 100cm | 12.90 | 0.73 | 1.02 |
| A2P3-P1-24C-7-G | 478130.06 | 1349310.87 | 100cm | 15.40 | 0.69 | 0.97 |
| A2P3-P1-24C-8-G | 478200.54 | 1349315.43 | 100cm | 14.40 | 0.72 | 0.99 |
| A2P3-P1-24D-1-G | 478397.67 | 1349320.7 | 100cm | 23.10 | 0.70 | 2.41 |
| A2P3-P1-24D-2-G | 478398.49 | 1349284.67 | 100cm | 32.40 | 0.69 | 3.91 |
| A2P3-P1-24D-3-G | 478366.39 | 1349301.38 | 100cm | 48.20 | 0.75 | 13.15 |
| A2P3-P1-24D-4-G | 478332.53 | 1349321.5 | 100cm | 23.30 | 0.64 | 3.66 |
| A2P3-P1-24D-4-G-D | 478332.53 | 1349321.5 | 100cm | 25.80 | 0.64 | 3.81 |
| A2P3-P1-24D-5-G* | 478297.95 | 1349338.94 | 100cm | 16.60 | 0.72 | 1.03 |
| A2P3-P1-24D-6-G | 478262.41 | 1349355.97 | 100cm | 11.70 | 0.69 | 1.16 |
| A2P3-P1-24D-7-G* | 478228.16 | 1349338.62 | 100cm | 13.30 | 0.75 | 1.69 |
| A2P3-P1-24D-7-G-D | 478228.16 | 1349338.62 | 100cm | 13.70 | 0.79 | 1.68 |

**TABLE A-2**
**HPGe RESULTS FOR TOTAL URANIUM, THORIUM-232, AND RADIUM-226**

| Location | Northing | Easting | Detector Height | Total Uranium (ppm) | Thorium-232 (pCi/g) | Radium-226 (pCi/g) |
|---|---|---|---|---|---|---|
| A2P3-P1-24D-8-G | 478265.15 | 1349317.25 | 100cm | 13.80 | 0.65 | 1.66 |
| A2P3-P1-24D-9-G | 478299.57 | 1349299.97 | 100cm | 13.10 | 0.66 | 0.90 |
| A2P3-P1-24D-10-G | 478335.52 | 1349280.3 | 100cm | 37.60 | 0.73 | 8.96 |
| A2P3-P1-24D-11-G | 478367.03 | 1349262.87 | 100cm | 39.50 | 0.59 | 12.43 |
| A2P3-P1-24D-12-G | 478399.82 | 1349243.47 | 100cm | 41.20 | 0.61 | 10.34 |
| A2P3-P1-24D-13-G | 478370.61 | 1349223.66 | 100cm | 45.70 | 0.65 | 9.90 |
| A2P3-P1-24D-14-G | 478333.89 | 1349243.13 | 100cm | 34.90 | 0.70 | 8.70 |
| A2P3-P1-24D-15-G | 478301.43 | 1349261.62 | 100cm | 20.60 | 0.68 | 2.64 |
| A2P3-P1-24D-16-G | 478266.86 | 1349279.65 | 100cm | 15.20 | 0.69 | 1.11 |
| A2P3-P1-24D-17-G* | 478228.46 | 1349300.02 | 100cm | 20.90 | 0.63 | 4.21 |
| A2P3-P1-24D-18-G | 478197.51 | 1349277.7 | 100cm | 16.80 | 0.72 | 1.18 |
| A2P3-P1-24D-19-G* | 478231.24 | 1349259.79 | 100cm | 43.00 | 0.67 | 10.65 |
| A2P3-P1-24D-20-G | 478268.78 | 1349240.82 | 100cm | 17.10 | 0.72 | 1.35 |
| A2P3-P1-24D-21-G | 478304.16 | 1349221.55 | 100cm | 39.30 | 0.74 | 13.52 |
| A2P3-P1-24D-22-G | 478337.79 | 1349199.66 | 100cm | 26.30 | 0.75 | 3.87 |
| A2P3-P1-24D-23-G | 478371.47 | 1349180.91 | 100cm | 23.10 | 0.62 | 2.20 |
| A2P3-P1-24D-24-G | 478372.17 | 1349141.11 | 100cm | 11.10 | 0.71 | 0.90 |
| A2P3-P1-24D-25-G | 478338.86 | 1349157.32 | 100cm | 16.90 | 0.75 | 1.17 |
| A2P3-P1-24D-26-G | 478305.55 | 1349181.24 | 100cm | 16.10 | 0.71 | 1.09 |
| A2P3-P1-24D-27-G | 478272.18 | 1349199.07 | 100cm | 19.40 | 0.71 | 1.19 |
| A2P3-P1-24D-28-G | 478234.26 | 1349219.09 | 100cm | 18.40 | 0.72 | 1.24 |
| A2P3-P1-24D-29-G | 478201.13 | 1349238.13 | 100cm | 22.00 | 0.69 | 1.09 |
| A2P3-P1-24D-30-G | 478203.19 | 1349199.8 | 100cm | 14.20 | 0.69 | 1.17 |
| A2P3-P1-24D-31-G | 478239.3 | 1349180.61 | 100cm | 14.90 | 0.64 | 1.19 |
| A2P3-P1-24D-32-G | 478273.27 | 1349160.76 | 100cm | 13.50 | 0.58 | 0.91 |
| A2P3-P1-24D-33-G | 478308.95 | 1349139.16 | 100cm | 16.60 | 0.60 | 0.86 |
| A2P3-P1-25A-1-G | 478341.44 | 1349116.56 | 100cm | 11.30 | 0.68 | 0.85 |
| A2P3-P1-25A-2-G | 478310.66 | 1349099.59 | 100cm | 9.17 | 0.66 | 0.93 |
| A2P3-P1-25A-3-G | 478274.88 | 1349122 | 100cm | 17.00 | 0.64 | 0.95 |
| A2P3-P1-25A-4-G | 478240.83 | 1349142.23 | 100cm | 15.60 | 0.66 | 1.06 |
| A2P3-P1-25A-5-G | 478204.06 | 1349160.9 | 100cm | 13.40 | 0.67 | 1.26 |
| A2P3-P1-25A-6-G | 478167.49 | 1349137.75 | 100cm | 12.90 | 0.69 | 1.11 |
| A2P3-P1-25A-7-G | 478205.39 | 1349121 | 100cm | 15.40 | 0.66 | 1.08 |
| A2P3-P1-25A-8-G | 478242.6 | 1349102.92 | 100cm | 19.40 | 0.56 | 0.84 |
| A2P3-P1-25A-9-G | 478206.21 | 1349083.63 | 100cm | 10.80 | 0.65 | 0.95 |
| A2P3-P1-25A-10-G | 478168.09 | 1349098.04 | 100cm | 14.70 | 0.69 | 0.99 |
| A2P3-P1-25A-11-G | 478245.02 | 1349072.3 | 100cm | 10.1 | 0.613 | 0.672 |
| A2P3-P1-25A-12-G | 478274.12 | 1349081.1 | 100cm | 8.6 | 0.674 | 0.721 |
| A2P3-P1-25B-1-G | 478094.72 | 1349134.69 | 100cm | 14.90 | 0.66 | 0.87 |
| A2P3-P1-25B-2-G | 478066.4 | 1349114.94 | 100cm | 16.50 | 0.67 | 1.00 |
| A2P3-P1-25B-3-G | 478067.26 | 1349150.64 | 100cm | 19.60 | 0.64 | 0.87 |
| A2P3-P1-25B-4-G | 478031.58 | 1349127.46 | 100cm | 16.00 | 0.70 | 0.87 |
| A2P3-P1-25B-5-G | 478034.72 | 1349094.25 | 100cm | 14.70 | 0.67 | 0.98 |
| A2P3-P1-25B-6-G | 478062.65 | 1349071.95 | 100cm | 14.10 | 0.65 | 0.90 |

**TABLE A-2**
**HPGe RESULTS FOR TOTAL URANIUM, THORIUM-232, AND RADIUM-226**

| Location | Northing | Easting | Detector Height | Total Uranium (ppm) | Thorium-232 (pCi/g) | Radium-226 (pCi/g) |
|---|---|---|---|---|---|---|
| A2P3-P1-25B-7-G | 477997.49 | 1349107.59 | 100cm | 14.40 | 0.73 | 1.01 |
| A2P3-P1-25B-8-G | 477970.59 | 1349094.19 | 100cm | 12.80 | 0.63 | 0.89 |
| A2P3-P1-25B-8-GD | 477970.59 | 1349094.19 | 100cm | 11.60 | 0.60 | 0.88 |
| A2P3-P1-25B-9-G | 477966.04 | 1349126.94 | 100cm | 9.97 | 0.71 | 0.94 |
| A2P3-P1-25B-10-G | 478092.48 | 1349056.9 | 100cm | 14.30 | 0.68 | 0.85 |
| A2P3-P1-25B-10-G- | 478092.48 | 1349056.9 | 100cm | 10.30 | 0.66 | 0.92 |
| A2P3-P1-25B-11-G | 478094.63 | 1349094.38 | 100cm | 11.80 | 0.70 | 0.92 |
| A2P3-P1-25B-11-G- | 478094.63 | 1349094.38 | 100cm | 13.60 | 0.72 | 0.93 |
| A2P3-P1-25B-12-G | 478128.97 | 1349078.46 | 100cm | 9.91 | 0.58 | 0.84 |
| A2P3-P1-27B-1-G | 478460.56 | 1349447.21 | 100cm | 8.88 | 0.81 | 1.27 |
| A2P3-P1-27B-1-G-D | 478460.56 | 1349447.21 | 100cm | 11.90 | 0.83 | 1.13 |
| A2P3-P1-27B-2-G | 478462.18 | 1349408.06 | 100cm | 16.80 | 0.82 | 2.33 |
| A2P3-P1-27B-3-G | 478465.17 | 1349365.25 | 100cm | 19.50 | 0.87 | 1.15 |
| A2P3-P1-27B-4-G | 478436.11 | 1349329.42 | 100cm | 17.00 | 0.71 | 1.01 |
| A2P3-P1-27C-1-G | 478432.39 | 1349306.98 | 100cm | 26.80 | 0.55 | 6.66 |
| A2P3-P1-27C-2-G | 478433.68 | 1349271.33 | 100cm | 33.30 | 0.63 | 4.31 |
| A2P3-P1-27C-3-G | 478409.16 | 1349202.23 | 100cm | 22.00 | 0.63 | 2.91 |
| A2P3-P1-27C-4-G | 478404.99 | 1349162.12 | 100cm | 18.70 | 0.74 | 0.97 |
| A2P3-P1-27C-5-G | 478436.48 | 1349187.06 | 100cm | 20.70 | 0.64 | 0.84 |
| A2P3-P1-27C-6-G | 478435.02 | 1349228.18 | 100cm | 17.70 | 0.77 | 1.24 |
| A2P3-P1-27C-7-G | 478469.88 | 1349208.3 | 100cm | 11.60 | 0.76 | 0.95 |
| A2P3-P1-27C-8-G* | 478466.17 | 1349250.14 | 100cm | 14.40 | 0.69 | 1.02 |
| A2P3-P1-27C-9-G | 478463.64 | 1349288.21 | 100cm | 13.20 | 0.66 | 1.10 |
| | | | **Maximum Res** | 48.2 | 0.881 | 13.52 |

* Measurement taken twice in error; highest result is reported

**TABLE A-3**
**PHYSICAL SAMPLE LOCATION COORDINATES**

| Location ID | Northing | Easting |
|---|---|---|
| A2P3-RA-1 | 478435.0 | 1349228.2 |
| A2P3-RA-2 | 478462.2 | 1349408.1 |
| A2P3-RA-3 | 478432.4 | 1349307.0 |
| A2P3-RA-4 | 478364.7 | 1349340.9 |
| A2P3-RA-5 | 478304.2 | 1349221.6 |
| A2P3-RA-6 | 478367.0 | 1349262.9 |
| A2P3-RA-7 | 478231.2 | 1349259.8 |

## TABLE A-4
## PHYSICAL SAMPLE ANALYSIS AND FIELD FRISKER RESULTS

| Location ID | Depth (ft) | Alpha Frisk (dpm) | Ra-226 Alpha/Gamma Spec (pCi/g) | Ra-228 (pCi/g) | Th-228 (pCi/g) | Th-230 (pCi/g) | Th-232 (pCi/g) | Total Uranium (ppm) | Tc-99 (pCi/g) | Potassium-40 (pCi/g) |
|---|---|---|---|---|---|---|---|---|---|---|
| A2P3-RA-1 | 0.5-1 | 0 | 0.97/1.1 NV | 0.97 NV | 0.94 NV | * | 0.97 NV | 9.7 NV | * | * |
| A2P3-RA-1 | 2.5-3 | 0 | 1.5/1.6 NV | 1.1 NV | 1.1 NV | * | 1.1 NV | 4.3 NV | * | * |
| A2P3-RA-1 | 4.5-5 | 30 | 1.2/1.03 - | | | 1.45 - | 0.97 - | 3.79 UJ | 0.92 U | 23.8 - |
| A2P3-RA-2 | 0.5-1 | 22.5 | 7.3/6.0 NV | 0.86 NV | 0.82 NV | * | 0.86 NV | 21.0 NV | * | * |
| A2P3-RA-2 | 2.5-3 | 15 | 1.7/1.6 NV | 1.2 NV | 1.2 NV | * | 1.2 NV | 6.5 NV | * | * |
| A2P3-RA-2 | 4.5-5 | 30 | 1.04/1.05 - | | | 1.28 - | 0.88 - | 5.44 J | 0.97 U | 20.18 - |
| A2P3-RA-3 | 0.5-1 | 7.5 | 7.1/7.3 NV | 1.1 NV | 1.0 NV | * | 1.1 NV | 30 NV | * | * |
| A2P3-RA-3 | 2.5-3 | 15 | 1.3/1.4 NV | 1.1 NV | 1.1 NV | * | 1.1 NV | 4.5 NV | * | * |
| A2P3-RA-3 | 4-4.5 | 30 | 1.20/1.09 - | | | 1.53 - | 1.0 - | 3.68 UJ | 0.93 U | 22.32 - |
| A2P3-RA-4 | 0.5-1 | 7.5 | 1.2/1.2 NV | 1.0 NV | 1.0 NV | * | 1.0 NV | 6.6 NV | * | * |
| A2P3-RA-4 | 1.5-2 | 22.5 | 1.59/1.37 - | | | 2.02 - | 1.25 - | 5.33 J | 0.97 U | 19.64 - |
| A2P3-RA-4 | 2-2.5 | 7.5 | 1.74/1.47 - | | | 2.03 - | 1.16 - | 3.89 UJ | 0.90 U | 19.23 - |
| A2P3-RA-4 | 2.5-3 | 7.5 | 1.0/1.2 NV | 0.8 NV | 0.8 NV | * | 0.8 NV | 3.2 UNV | * | * |
| A2P3-RA-5 | 0-0.5 | 37.5 | 9.07/6.52 - | | | 10.41 - | 1.01 - | 29.51 - | 0.98 U | 16.74 - |
| A2P3-RA-5 | 0.5-1 | 0 | 1.8/1.5 NV | 1.2 NV | 1.2 NV | * | 1.2 NV | 5.5 NV | * | * |
| A2P3-RA-5 | 2-2.5 | 15 | 1.7/1.6 NV | 1.3 NV | 1.3 NV | * | 1.3 NV | 6.4 NV | * | * |
| A2P3-RA-5 | 4-4.5 | 30 | 1.25/1.19 - | | | 1.55 - | 0.96 - | 3.92 UJ | 0.94 U | 25.15 - |
| A2P3-RA-5 | 4.5-5 | 15 | 1.16/0.95 - | | | 1.67 - | 0.96 - | 3.91 UJ | 0.98 U | 23.04 - |
| A2P3-RA-6 | 0.5-1 | 0 | 4.7/4.2 NV | 1.1 NV | 1.1 NV | * | 1.1 NV | 19 NV | * | * |
| A2P3-RA-6 | 2.5-3 | 7.5 | 1.2/1.4 NV | 1.1 NV | 1.0 NV | * | 1.1 NV | 4.5 NV | * | * |
| A2P3-RA-6 | 3.5-4 | 22.5 | 1.2/0.92 - | | | 1.571 - | 0.88 - | 3.8 UJ | 1.01 U | 22.15 - |
| A2P3-RA-7 | 0-0.5 | 100 | 20.91/a - | | | 21.657 - | a | 53.9 NV | 1.0 U | a |
| A2P3-RA-7 | 0.5-1 | 30 | 2.6/2.8 NV | 1.2 NV | 1.2 NV | * | 1.2 NV | 10 NV | * | * |
| A2P3-RA-7 | 2-2.5 | 0 | 1.72/1.43 - | | | 2.04 - | 1.27 - | 4.1 UJ | 0.97 U | 25.36 - |
| A2P3-RA-7 | 2.5-3 | 0 | 1.1/1.4 NV | 1.1 NV | 1.0 NV | * | 1.1 NV | 4.7 NV | * | * |

* Not analyzed
a Not enough sample quantity

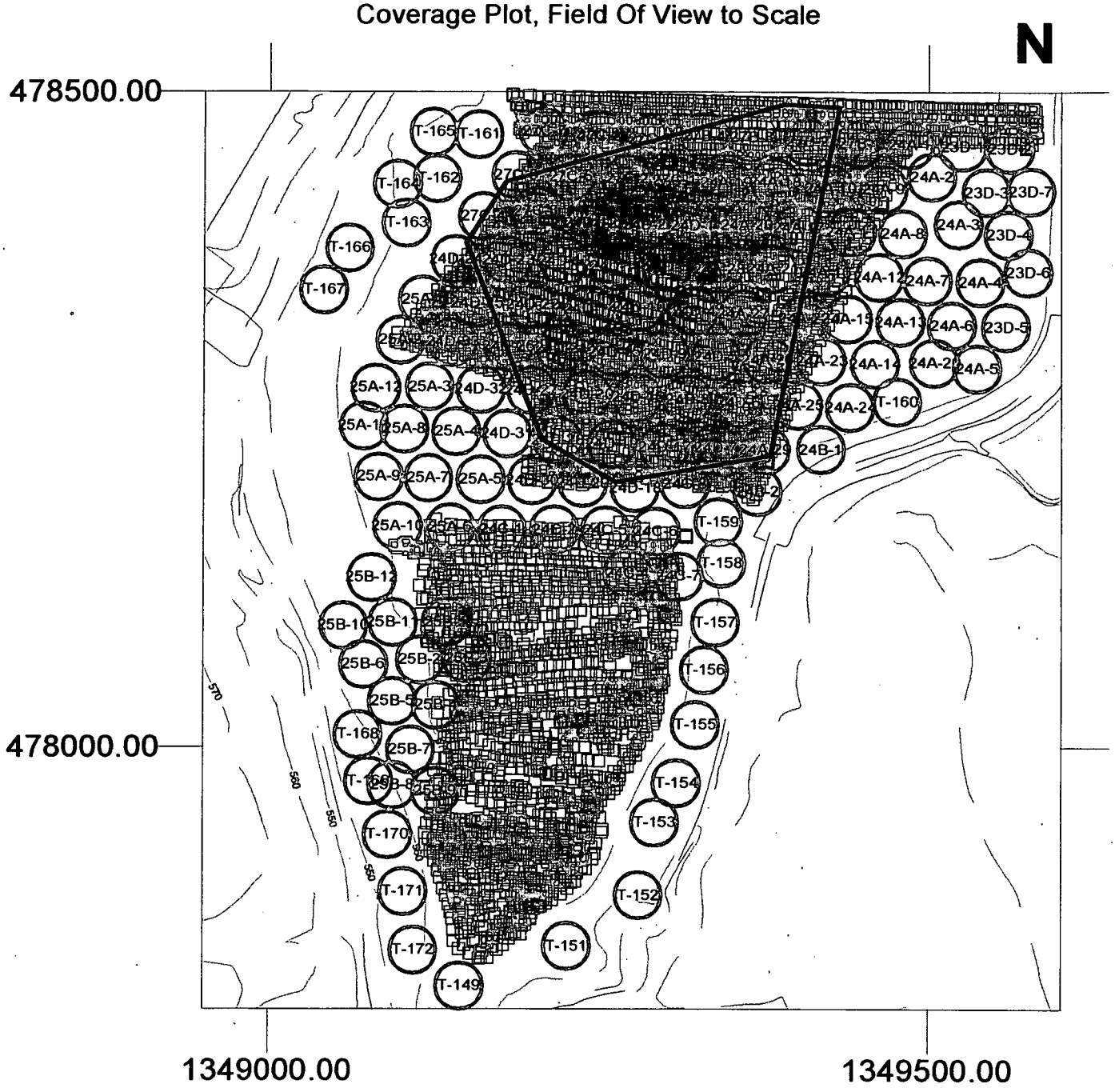
Data Validation Qualifications
NV = Not Validated
- = No Data Qualifier for a Positive Result
U = Non-Detect, MDC>Results
UJ = Non-detect estimated
J = Estimated

# FIGURE A-1

## Total Uranium (ppm)

2682

Moisture Corrected
Two Spectra running average
Coverage Plot, Field Of View to Scale




| Legend<br>Total Uranium (ppm) RMS | # of Spectra |
|---|---|
| -50.00 to 82.00 | 5303 |
| 82.00 to 164.00 | 309 |
| 164.00 to 246.00 | 76 |
| 246.00 to 10000.00 | 33 |

| Legend<br>Total Uranium (ppm) HPGe | # of Spectra |
|---|---|
| 0.00 to 82.00 | 162 |
| 82.00 to 164.00 | 0 |
| 164.00 to 246.00 | 0 |
| 246.00 to 10000.00 | 0 |

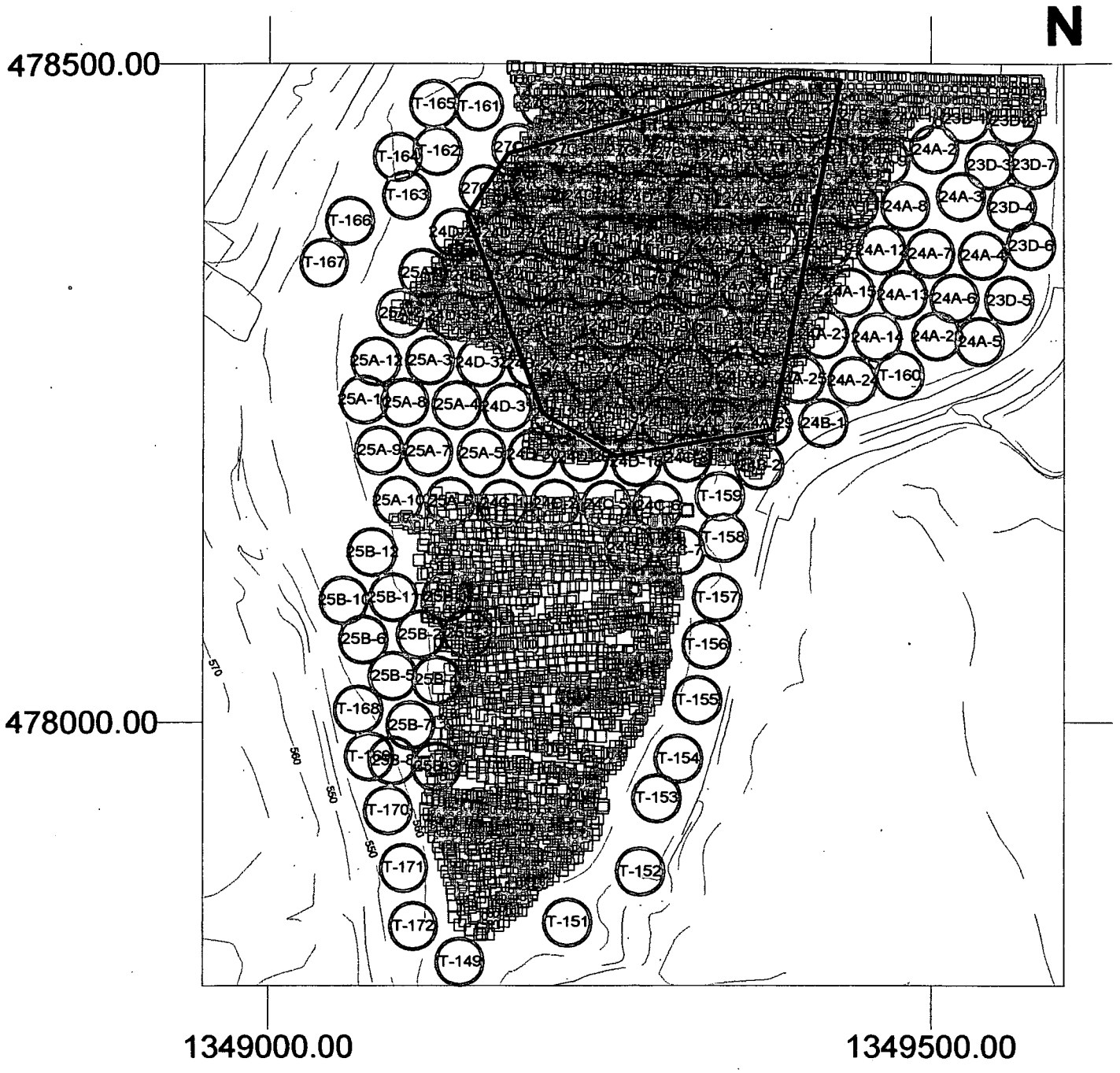
RTIMP DWG Title: A2P3-IP-FIG A1-TU-2PT-MC
Prepared by: David Allen
File: A2P3_IP_FIG A1_TU_2PT_MC.srf
Date prepared: 8/25/99

# FIGURE A-2

2682

## Thorium 232 (pCi/gm)

Moisture Corrected
Two Spectra running average
Coverage Plot, Field Of View to Scale




| Legend RMS Th-232 (pCi/gm) | # of Spectra |
|---|---|
| -0.20 to 1.50 | 5724 |
| 1.50 to 3.00 | 0 |
| 3.00 to 4.50 | 0 |
| 4.50 to 10000.00 | 0 |

| Legend HPGe Th-232 (pCi/g) | # of Spectra |
|---|---|
| 0.00 to 1.50 | 162 |
| 1.50 to 3.00 | 0 |
| 3.00 to 4.50 | 0 |
| 5.10 to 10000.00 | 0 |

RTIMP DWG Title: A2P3-IP-FIG A2-TH-2PT-MC
Prepared by: David Allen
File: A2P3_IP_FIG A2_TH_2PT_MC.srf
Date prepared: 8/25/99

# FIGURE A-3

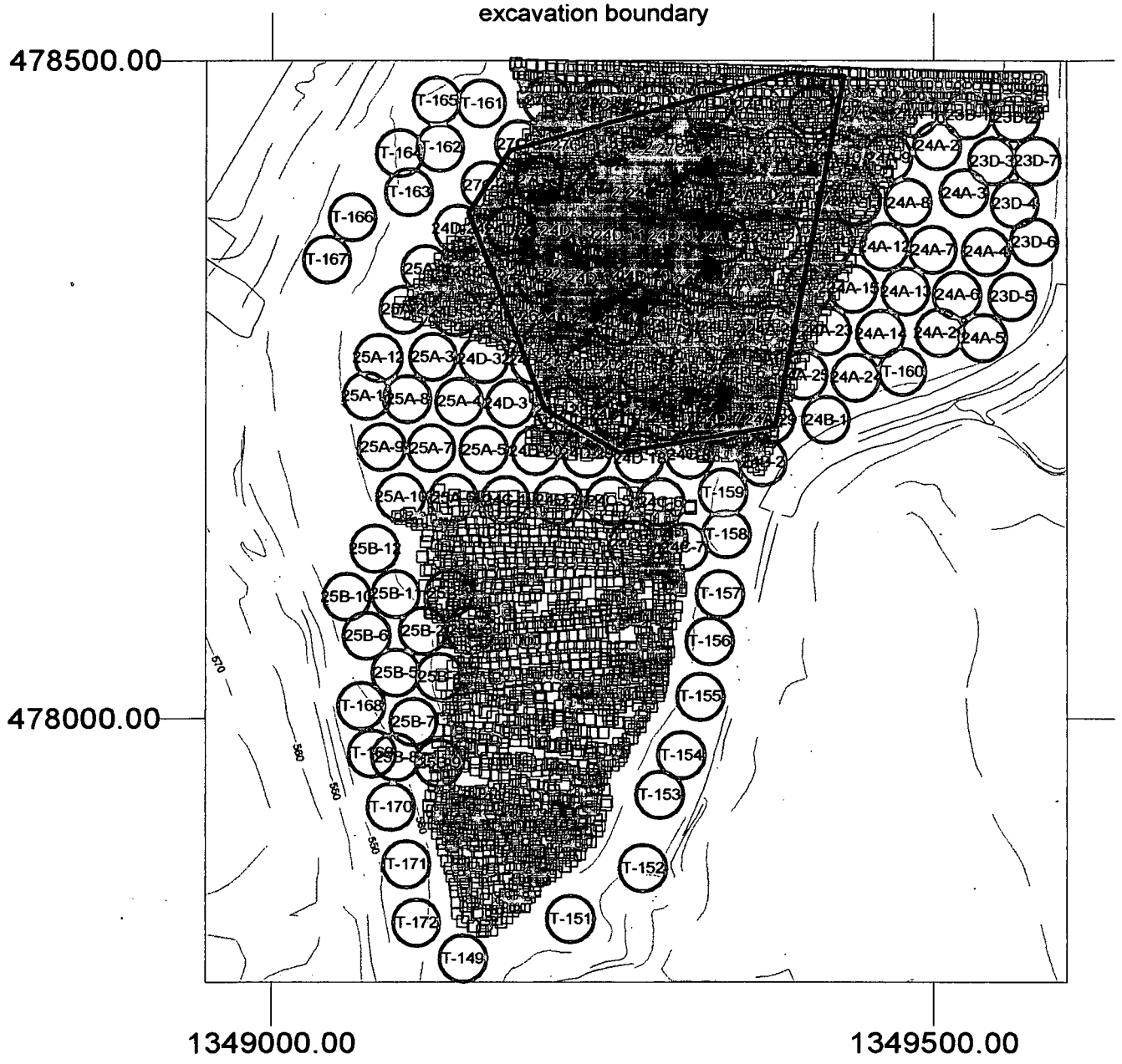
2682

## Radium 226 (pCi/gm)

Moisture & Radon Corrected
Two Spectra running average
Coverage Plot, Field Of View to Scale

All points in the highest category are within the excavation boundary

N




| Legend RMS Ra-226 (pCi/gm). | # of Spectra Ra-226 (pCi/g) |
|---|---|
| -0.20 to 1.70 | 4804 |
| 1.70 to 3.40 | 306 |
| 3.40 to 5.10 | 163 |
| 5.10 to 10000.00 | 451 |

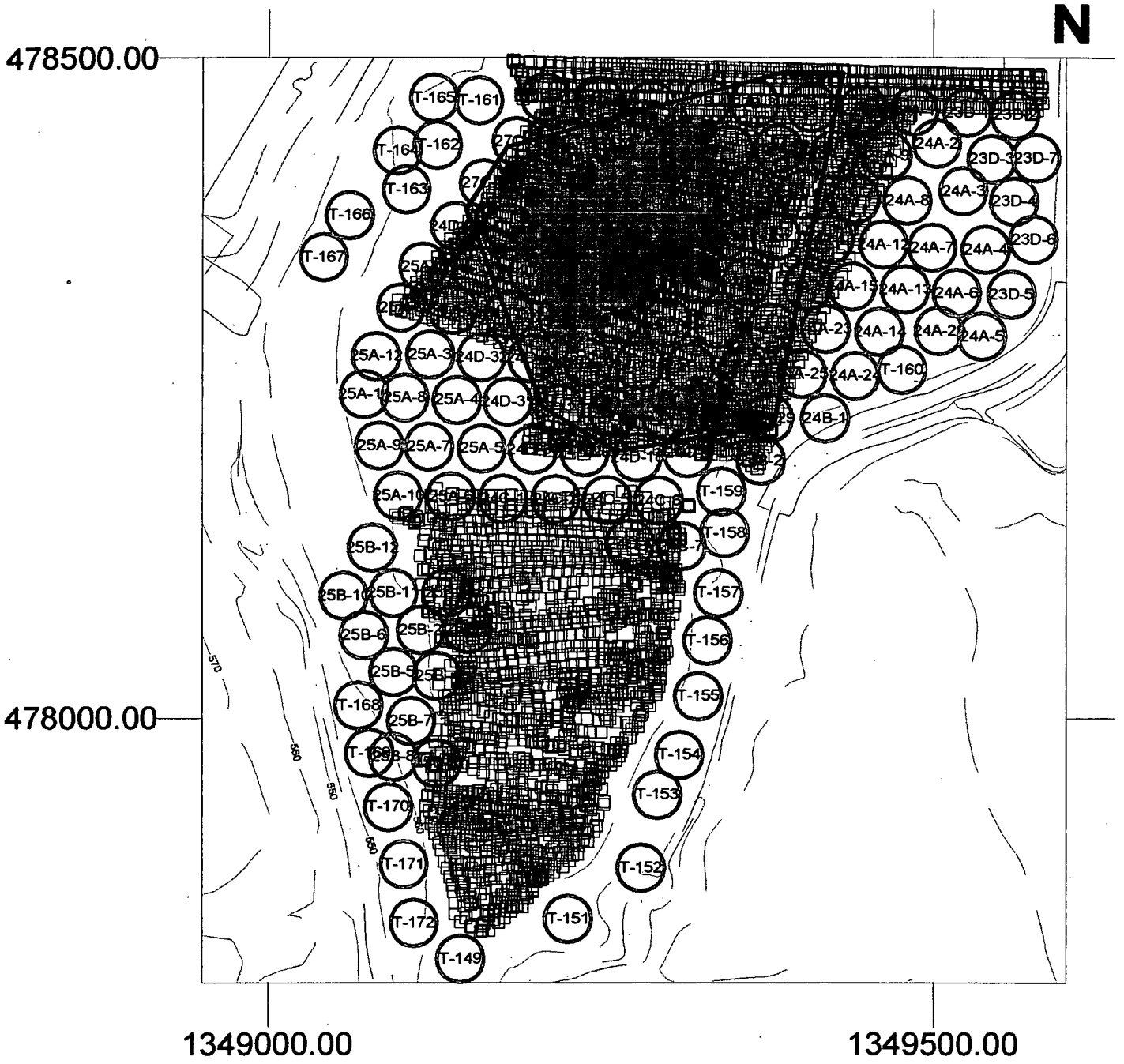
| Legend HPGe Ra-226 (pCi/g) | # of Spectra Ra-226 (pCi/g) |
|---|---|
| 0.00 to 1.70 | 138 |
| 1.70 to 3.40 | 7 |
| 3.40 to 5.10 | 7 |
| 5.10 to 10000.00 | 10 |

RTIMP DWG Title: A2P3-IP-FIG A3-RA-2PT-MC
Prepared by: David Allen
File: A2P3_IP_FIG A3_RA_2PT_MC.srf
Date prepared: 8/25/99

# FIGURE A-4

## Total Counts per Second (cps)

One Spectra, no average
Coverage Plot, Field Of View to Scale
No HPGE cps, locations provided for coverage only




| Legend cps RMS | # of Spectra |
|---|---|
| 1000.00 to 2000.00 | 17 |
| 2000.00 to 3000.00 | 4737 |
| 3000.00 to 4000.00 | 320 |
| 4000.00 to 10000.00 | 589 |

HPGe coverage
○ 162 Spectra

RTIMP DWG Title: A2P3-IP-FIG A4-TC-1PT-
Prepared by: David Allen
File: A2P3_IP_FIG A4_TC_1PT_MC.srf
Date prepared: 8/25/99