

**CERTIFICATION REPORT FOR THE
AREA 2, PHASE I FORMER INACTIVE FLYASH
PILE, SOUTH FIELD, CAROLINA AREA,
EAST-WEST CONSTRUCTION ROAD AND
EQUIPMENT WHEEL WASH FACILITY**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO**



APRIL 2002

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

20400-RP-0006

REVISION A

DRAFT

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|-----------------|---|
| A2PI | Area 2, Phase I |
| A2PII | Area 2, Phase II |
| AFP | Active Flyash Pile |
| ASCOC | area-specific constituent of concern |
| ASL | analytical support level |
| BTV | benchmark toxicity value |
| CDL | Certification Design Letter |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| COC | constituent of concern |
| CRDL | Contract Required Detection Limit |
| CU | certification unit |
| DOE | U.S. Department of Energy |
| EWWF | Equipment Wheel Wash Facility |
| EPA | U.S. Environmental Protection Agency |
| FEMP | Fernald Environmental Management Project |
| FRL | final remediation level |
| GFAA | graphite furnace atomic absorption |
| GMA | Great Miami Aquifer |
| HAMDC | highest allowable minimum detectable concentration |
| HPGe | high-purity germanium (detector) |
| ICP-AES | inductively coupled plasma atomic emission spectroscopy |
| ICP/MS | inductively coupled plasma mass spectrometry |
| IFP | Inactive Flyash Pile |
| LCS | laboratory control sample |
| MDC | minimum detectable concentration |
| $\mu\text{g/g}$ | micrograms per gram |
| mg/kg | milligrams per kilogram |
| MSL | mean sea level |
| NWU | Non-Waste Unit |
| OEPA | Ohio Environmental Protection Agency |
| OSDF | On-Site Disposal Facility |
| OU | Operable Unit |
| pCi/g | picoCuries per gram |
| ppm | parts per million |
| PSP | Project Specific Plan |
| QA/QC | Quality Assurance/Quality Control |
| RAWP | Remedial Action Work Plan |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RTRAK | Radiation Tracking System |
| SCQ | Sitewide CERCLA Quality Assurance Project Plan |
| SDFP | Soil and Disposal Facility Project |
| SED | Sitewide Environmental Database |
| SEP | Sitewide Excavation Plan |
| SF | South Field |
| SSOD | Storm Sewer Outfall Ditch |

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| | |
|-----------------|------------------------------|
| TPU | total propagated uncertainty |
| UCL | Upper Confidence Limit |
| V/FCN | Variance/Field Change Notice |
| V&V | verification and validation |
| WAC | waste acceptance criteria |
| yd ³ | cubic yards |

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EXECUTIVE SUMMARY

1
2
3 This Certification Report presents the information and data used by the U.S. Department of Energy
4 (DOE) to determine that soils in Area 2, Phase I (A2PI) meet established final remediation levels (FRLs).
5 A2PI is located in the southwest corner of the Fernald Environmental Management Project (FEMP) and
6 consists of the former Inactive Flyash Pile (IFP), South Field (SF), Carolina Area, East-West
7 Construction Road, Equipment Wheel Wash Facility (EWWF), and non-waste units (NWUs) such as
8 ditches, basins, roads, perimeter areas, etc. On the basis of this reported information and supporting
9 project files, DOE has determined that no additional remedial actions are required in this portion of the
10 site. The area will be considered certified when the U.S. Environmental Protection Agency (EPA) and
11 the Ohio Environmental Protection Agency (OEPA) concur that certification criteria have been met. At
12 that time, DOE intends to proceed with final land use activities as outlined in the Natural Resource
13 Restoration Plan (DOE 2002).

14
15 Three phases of A2PI certification were planned. The first phase consisted of the Active Flyash Pile,
16 which was completed. The second and third phases, addressed in this report, cover 24 certification units
17 (CUs). Certain changes to the scope of work originally described in the Certification Design Letter
18 (CDL) were necessary during certification (DOE 2001a). In some instances, these changes impacted the
19 sampling schedule and required some CUs that were originally part of Phase II to be reassigned to
20 Phase III.

21
22 The basin that encompassed CU NWU-13 and the East-West Road were excavated in January 2002, thus
23 impacting the sampling schedule in CUs NWU-07, SF-07, IFP-01 and SF-01. Berms were established at
24 the CU boundaries to prevent any potential leaching of contaminants from the soil beneath the road into
25 the CUs. When the East-West Road excavation is completed, the affected CUs will be sampled in
26 accordance with the previously established certification strategy.

27
28 Excavation of the perimeter area of the EWWF and the Basin 4 footprint will be excavated at a later date,
29 after long-term usage of the EWWF is determined. Certification sampling will take place after
30 excavation is complete. The results of this sampling effort will be forwarded to the regulatory agencies
31 as an addendum to this certification report.

1 During certification sampling, two uranium "hot spots" were discovered in A2PI-SF-C-4. The hot spots
2 will be excavated and an additional CU established within the footprint of the excavated area
3 (A2PI-SF-C-8). Sample results will be forwarded to the regulatory agencies when they become
4 available.

5
6 All Phase II CUs were sampled and statistical analysis was conducted where necessary to ensure
7 certification criteria were met. As discussed in the CDL, A2PI certification criteria are that the average
8 primary area-specific constituents of concern (ASCOC) concentrations within a CU are below-FRLs at a
9 95 percent upper confidence level (90 percent UCL for secondary ASCOCs), and that no certification
10 result is greater than twice the FRL (the hot spot criterion).

11
12 The certification samples were analyzed at laboratories on the FEMP's Approved Laboratories List per
13 the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
14 Quality Assurance Project Plan (SCQ, Procedure FD-1000). All certification samples were analyzed and
15 reported at the required analytical support level (ASL). Analytical data packages included sample results
16 with associated Quality Assurance/Quality Control data and all applicable raw data. The data were also
17 subjected to the required validation and verification process. One sample point was rejected for
18 benzo(a)pyrene and ideno(1,2,3-cd)pyrene because of the way the sample was processed at the
19 laboratory. However, since the sample results for the rest of the CU indicated that the compounds were
20 not detected, the rejected data did not impact certification of this CU.

21
22 DOE has restricted access to certified areas in order to maintain their integrity prior to final land use
23 development. A FEMP procedure (EP-0008) has been developed to implement a process to protect
24 certified areas from becoming re-contaminated.

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1.0 INTRODUCTION

1.1 PURPOSE

This Certification Report presents the information and data used by the U.S. Department of Energy (DOE) to determine that soils in Area 2, Phase I (A2PI) meet established final remediation levels (FRLs). A2PI is located in the southwest corner of the Fernald Environmental Management Project (FEMP) and consists of the former Inactive Flyash Pile (IFP), South Field (SF), Carolina Area, East-West Construction Road, Equipment Wheel Wash Facility (EWWF), and non-waste units (NWUs) such as ditches, basins, roads, perimeter areas, etc. On the basis of this reported information and supporting project files, DOE has determined that no additional remedial actions are required in this portion of the site.

1.2 BACKGROUND

In the Operable Unit (OU) 5 Record of Decision (ROD; DOE 1996a), DOE made a commitment to excavate contaminated soil that exceeds health-based FRLs. The excavated material may be disposed of at the On-Site Disposal Facility (OSDF) or at an off-site disposal facility if it does not meet OSDF waste acceptance criteria (WAC). The OU5 Remedial Investigation Report (DOE 1995a) defined the extent of above-FRL soil contamination and, in general, indicated widespread contamination occurring in approximately 430 acres of the 1,050-acre FEMP.

In the OU5 Remedial Action Work Plan (RAWP; DOE 1996b), DOE agreed to prepare a Sitewide Excavation Plan (SEP; DOE 1998a) that defined the overall approach to cleaning up soil and at- and below-grade debris in accordance with the OU2 (DOE 1995b), OU3 (DOE 1996c), and OU5 RODs.

In the SEP, the FEMP was divided into distinct remedial areas and phases for soil remediation, based on the operable units' remediation schedule. After all necessary remediation is completed within each area/phase, the soil is certified as having attained all clean up goals (i.e., FRLs). The general approach for the removal of contaminated soil and debris followed "Excavation Approach A – Shallow Excavation of Impacted On-Property Area Outside the Former Production Area and Other Waste Storage/ Management Areas," as described in Section 4.1 of the SEP.

1.3 AREA DESCRIPTION

A2PI consists of the Southern Waste Units [IFP, SF and Active Flyash Pile (AFP)], and the adjacent NWU area as shown in Figure 1-1. A2PI certification was conducted in three phases. The first phase consisted of the AFP area east of the South Construction Access Road and has been completed. The second and third phases of certification address the IFP/SF area, which is the scope of this report. The CDL proposed sampling Phases II and III concurrently beginning in October 2001, with completion of four CUs after the 2002 excavation season. However, field activities impacted the sampling schedule, as discussed in Section 3.1, meaning several CUs had to be reassigned to Phase III. The delineation of CUs as addressed in this report is provided in Section 1.4.

The A2PI IFP/SF certification area, which is approximately 26 acres, is bounded as follows:

- To the north by an east-west ditch that runs just north of the East-West Construction Road
- To the east by the South Construction Access Road
- To the south by Paddys Run and the Storm Sewer Outfall Ditch (SSOD)
- To the west by Paddys Run and Area 2, Phase II (A2PII).

There are several remediated footprints in A2PI: the SF and IFP, several storm water and erosion control ditches (Ditches 1 through 8), three retention basins (Basin 1, 2 and 4), Non-Impacted Stockpile 1/ Turnaround area, Carolina debris area, the EWWF, and the East-West Haul Road.

1.4 SCOPE

This certification effort addresses 24 CUs. Phase II covers the following:

- Five in the till areas within the former SF and IFP (contains the former Firing Range) (SF-C-02 through SF-C-06)
- Three in the Carolina debris excavation and adjacent area (NWU-C-6, NWU-C-8, NWU-C-9)
- Three in the Great Miami Aquifer (GMA)/sand areas within the former SF and IFP (IFP-C-2 through IFP-C-4)

- 1 • Two for the former Non-Impacted Stockpile 1/Turnaround area footprint (NWU-C-1,
2 NWU-C-7)
3
4 • Two for former Basin 1 footprint (NWU-C-3, NWU-C-4)
5

6 Phase III covers the following CUs:

- 7
8 • Three in the till areas within the former SF and IFP (SF-C-1, SF-C-7, IFP-C-1)
9
10 • One in the Carolina debris excavation area (NWU-C-7)
11
12 • One for the footprint of Basin 2 (NWU-C-13)
13
14 • One for Ditch 8 which led to Basin 2 (NWU-C-12)
15
16 • One for the Grassy Knoll areas south of Basin 4 (NWU-C-11)
17
18 • One for the footprint of the East-West Construction Road running from the South Access
19 Road west to the EWWF (NWU-C-10)
20
21 • One for the EWWF and Basin 4 footprint (Phase III).
22

23 1.5 OBJECTIVES

24 The objectives of this Certification Report are:

- 25
26 • Summarize the precertification and remedial activities
27
28 • Describe the analytical methods, data validation processes, data reduction and statistical
29 processes used to support the certification process
30
31 • Present certification sampling results for all CUs
32
33 • Present the statistical analysis showing that all CUs have passed the certification criteria,
34 including FRL attainment and hot spot criteria
35
36 • Describe access controls implemented to prevent recontamination.
37

38 1.6 REPORT FORMAT

39 This certification report is presented in six sections with supporting documentation and data in the
40 appendices. These sections are as follows:
41

| | | |
|----|-------------|--|
| 1 | Section 1.0 | Introduction: Purpose, background, area description, scope, and objectives of the report |
| 2 | | |
| 3 | | |
| 4 | Section 2.0 | Certification Approach: The approach for certification sampling and analysis |
| 5 | | |
| 6 | Section 3.0 | Overview of Field Activities: Historical data evaluation, precertification, area preparation, excavation and changes to work scope |
| 7 | | |
| 8 | | |
| 9 | Section 4.0 | Analytical Methodologies, Data Validation Processes and Data Reduction |
| 10 | | |
| 11 | Section 5.0 | Certification Evaluation and Conclusions |
| 12 | | |
| 13 | Section 6.0 | Protection of Certified Areas |
| 14 | | |
| 15 | Appendix A | Certification Samples, Analytical Results and Statistics Tables |
| 16 | | |
| 17 | Appendix B | Variances/Field Change Notices to the Project Specific Plan (PSP) |
| 18 | | |

19 1.7 FEMP MASTER CERTIFICATION MAP

20 In order to track certification and characterization for reuse areas at the FEMP, DOE updates a controlled
21 map (Figure 1-2) showing the status of the soil remediation areas and phased areas with all Certification
22 Reports. This map has been updated to include certification of A2PI (Phase 2 of certification).

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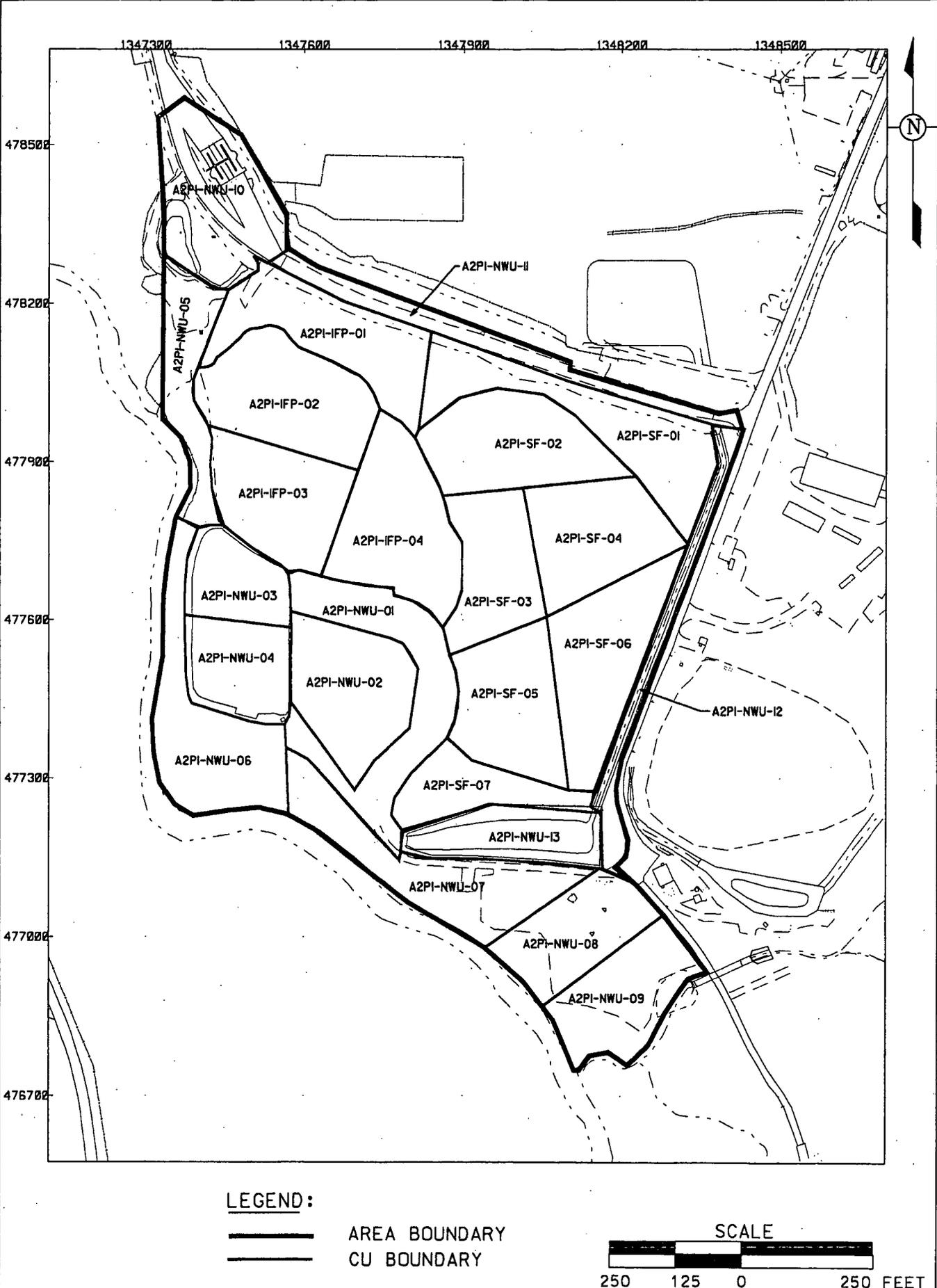
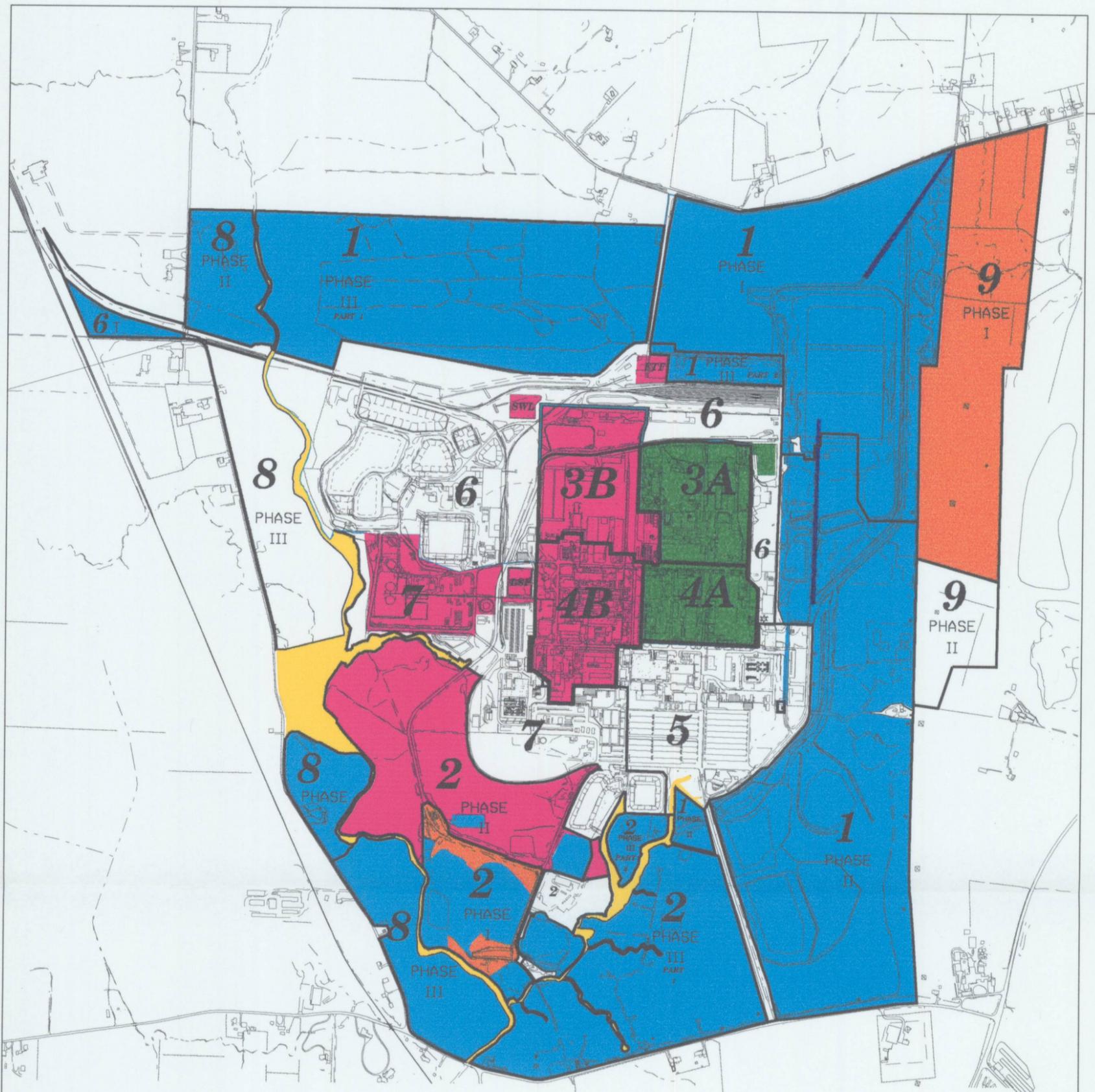


FIGURE 1-1. AREA 2, PHASE I CU DESIGN

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| AREAS | TOTAL ACRES | APPROVED CERT. ACRES | CERT. ACRES IN PROGRESS | REMEDATION ACRES IN PROGRESS | PREDESIGN ACRES IN PROGRESS | REMAINING ACRES |
|-----------------------|---------------|----------------------|-------------------------|------------------------------|-----------------------------|-----------------|
| AREA 1 | 389.9 | 389.1 | 0 | 0 | 0 | * 0.8 |
| AREA 2 | 176.9 | 100.8 | 8.2 | 0 | 59.4 | 8.5 |
| AREA 3A/4A | 42.8 | 0 | 0 | 42.8 | 0 | 0 |
| AREA 3B/4B | 56.9 | 0 | 0 | 0 | 56.9 | 0 |
| AREA 5 | 53.2 | 0 | 0 | 0 | 0 | 53.2 |
| AREA 6 | 134.6 | 4.4 | 0 | 0 | 2.9 | 127.3 |
| AREA 7 | 70.1 | 0 | 0 | 0 | 21.0 | 49.1 |
| AREA 8 | 98.5 | 60.2 | 0 | 0 | 0 | 38.3 |
| PR/SSOD/PPDD *** | 27.7 | 0 | 0 | 0 | 2.1 | 25.6 |
| TOTAL ON SITE | 1050.6 | 554.5 | 8.2 | 42.8 | 142.3 | 302.8 |
| AREA 9 | 89.6 | 0 | 71.9 | 0 | 0 | 17.7 |
| TOTAL OFF SITE | 89.6 | 0 | 71.9 | 0 | 0 | 17.7 |

* AREA 1 REMAINING ACRES INCLUDES THE DISSOLVED OXYGEN FACILITY AREA. THE INTERIM LEACHATE LINE CORRIDOR IS INCLUDED IN AREA 6

*** PADDY'S RUN/STORMSEWER OUTFALL DITCH CORRIDOR IS IDENTIFIED IN [Yellow Line].

AIPI ROADS EXCLUDED FROM CERTIFICATION. [Blue Line]

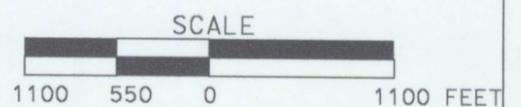


FIGURE 1-2. FEMP CONTROLLED CERTIFICATION MAP

2.0 CERTIFICATION APPROACH

2.1 CERTIFICATION STRATEGY

This section summarizes the area-specific constituent of concern (ASCOC) selection process and the certification approach, including CU establishment, sampling design, and statistical analysis. The general certification strategy is described in Section 3.4 of the SEP, and the A2PI specific strategy is described in the CDL for A2PI.

2.1.1 Area-Specific Constituents of Concern

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary constituents of concern (COCs) and were retained as ASCOCs for this remediation effort. Secondary ASCOCs for Area 2 are listed in the SEP; however, some COCs were not retained for this portion of A2PI based on the area investigation discussed in Section 2.1.3. Table 2-1 lists the secondary ASCOCs identified in the SEP and presents justification for retaining or not retaining them for A2PI certification.

2.1.2 ASCOC Selection Criteria

The selection process for retaining ASCOCs for a remediation area is driven by applying a set of decision criteria. A soil contaminant is retained as an ASCOC if:

- It is listed as a soil COC in the OU5 ROD and,
- It can be traced to site use, either through process knowledge or known release of the constituent to the environment and,
- Analytical results indicate the contaminant is present above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated contract required detection levels (CRDLs) and,
- Physical characteristics of the contaminant, such as degradation rate and volatility, indicate it is likely to persist in the soil between time of release and remediation or,
- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-228 and thorium-232).

2.1.3 ASCOC Selection Process

Using this process and the data presented in Table 2-1, the complete list of primary and secondary COCs presented in Table 2-7 of the SEP for remediation Area 2 will apply for the SF till/clay CUs (IFP-1 and

1 SF-1 through SF-7). Due to the faster migration of contamination in the Great Miami Aquifer (GMA)
2 sands, total volatiles will not be required for the GMA sand CUs (IFP-2 through IFP-4). Finally, no
3 organic analyses will be required for the rest of the CUs based on the absence of above-FRL data points
4 in these perimeter areas. The ASCOCs are identified and listed in Tables 2-2 through 2-4 along with the
5 ecological COCs required for the IFP/SF area (per Appendix C of the SEP). The ecological COCs are
6 added to the list of analytes, but certification is not contingent on benchmark toxicity value (BTV)
7 exceedences.

8 9 2.2 CERTIFICATION APPROACH

10 2.2.1 Certification Design

11 The certification design and sampling strategy follow Section 3.4 of the SEP. The A2PI CUs addressed
12 in this report are:

- 13
14 • Eleven Group 1 CUs with the OU2 total uranium FRL (the IFP/SF area):
 - 15 - IFP-C-1 through -4 – the footprint of the former IFP area
 - 16 - SF-C-1 through -7 – the footprint of the former SF area.
- 17
18 • Thirteen Group 1 CUs with the OU5 total uranium FRL (the NWU area):
 - 19 - NWU-1 and -2 – footprint of the Non-Impacted Material Stockpile 1 and the
 - 20 - turnaround area
 - 21 - NWU-3 and -4 – footprint of Basin 1
 - 22 - NWU-5 – Grassy Knoll area south of Basin 4
 - 23 - NWU-6 through -9 – Footprint and surrounding areas of Carolina and Perimeter
 - 24 - Area excavations
 - 25 - NWU-10 – Footprint of Basin 4 and EWWF
 - 26 - NWU-11 – East-West Construction Haul Road
 - 27 - NWU-12 – Footprint of Ditch 1
 - 28 - NWU-13 – Footprint of Basin 2.

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38
39 An additional CU, A2PI-SF-C-8, was established when two uranium “hot spots” were discovered during
40 certification sampling around A2PI-SF-C-4. This CU is discussed further in Section 3.2.

1 CUs NWU-05, IFP-02, IFP-03 and NWU-03, which are bounded by the SSOD and the unnamed
2 tributaries, extend only partially down the side banks to allow for potential backup during extreme rain
3 events and flooding. The SSOD streambeds and lower side banks were excluded from this certification
4 effort and will be addressed as part of the "Stream Corridors" area. The sizes of the CUs addressed in
5 this report are listed in Table 2-5.

6 7 2.2.2 Sample Selection Process

8 Certification sampling locations were selected according to Section 3.4.2 of the SEP. Each CU was first
9 divided into 16 approximately equal sub-CUs. Sample locations were then generated by randomly
10 selecting easting and northing coordinates within each sub-CU boundary, and testing the locations
11 against the minimum distance criterion for the CU. The minimum distance criterion is the smallest
12 distance allowed between two sample locations within a CU, and is a function of CU size. The formula
13 for calculating the minimum distance is provided in the SEP. If the minimum distance criterion was not
14 met, an alternative random location was selected for that sub-CU, and all the locations were re-tested for
15 minimum distance. The initial CU boundaries are shown in Figure 2-1, and the selected certification
16 sampling locations are shown in Figure 2-2.

17 18 2.2.3 Certification Sampling

19 Four of the 16 locations were randomly selected for archiving, and the other 12 locations were submitted
20 for analysis. All samples were collected from the 0 to 6-inch (surface) soil interval at the designated and
21 surveyed location.

22 23 2.2.4 Statistical Analysis

24 Statistical analysis of certification samples is described in Appendix G of the SEP. Statistical analysis of
25 certification samples is only necessary if a sample result exceeds its associated FRL. In this instance,
26 two criteria must be met for a CU to be certified:

- 27
- 28 1) For a normal or lognormal data distribution, the first criterion is to compare the
29 95 percent UCL to the mean of each primary ASCOC, and the 90 percent UCL on the
30 mean of each secondary ASCOC, to their respective FRLs, leading to a pass/fail decision
31 for each individual CU. (If the data distribution is not normal or lognormal, then the
32 appropriate non-parametric approach discussed in Appendix G of the SEP is used to
33 evaluate the 95 percent UCL on the mean.)

- 1 2) The second criterion is related to the hot spot criterion, which states that if a certification
2 sample for a primary radiological ASCOC exceeds two times the FRL, then further
3 action is necessary per Section 3.4.5 and Figure 3-11 of the SEP.
4
- 5 When the given UCL on the mean for each COC is less than its FRL, and the hot spot criterion is met,
6 the CU will be considered certified.

**TABLE 2-1
AREA 2 SECONDARY ASCOC LIST**

| Area 2 Secondary ASCOC | Number of Above-FRL Hits | Number of Samples | Retained as ASCOC | Justification |
|------------------------|--------------------------|-------------------|-------------------|---|
| Aroclor-1254 and 1260 | 7 | 291 | Yes | All above-FRL hits are located within the IFP CUs and the SF CUs. This was retained as a secondary COC for the IFP and SF CUs. |
| Arsenic | 22 | 232 | Yes | N/A |
| Benzo(a)pyrene | 2 | 174 | Yes | All above-FRL hits are located within the IFP CUs and the SF CUs. This was retained as a secondary COC for the IFP and SF CUs. |
| Beryllium | 24 | 150 | Yes | N/A |
| Bromodichloromethane | 0 | 144 | Yes | All above-FRL hits are within the IFP and SF CUs. This was retained as a secondary COC in the till/clay area but was not retained in the GMA/sand because compound was expected to have volatilized completely during excavation and in sand. |
| Cesium-137 | 3 | 463 | Yes | The above-FRL locations were within CU NWU-12. It was retained as a secondary COC in this CU. |
| Dibenzo(a,h)anthracene | 1 | 174 | Yes | All above-FRL hits were located within the IFP CUs and the SF CUs. This was retained as a secondary COC for the IFP and SF CUs. |
| 1,1-Dichloroethene | 0 | 180 | Yes | N/A |
| Dieldrin | 1 | 169 | No | The one above-FRL location was within the excavation footprint. Therefore, this was not retained as a COC. |
| Lead | 42 | 553 | Yes | All above-FRL hits were located within CU SF-05 where the firing range was located. Lead was retained as a secondary COC in this CU. |
| Neptunium-237 | 0 | 289 | No | No hits at or greater than FRL |
| Technetium-99 | 1 | 327 | No | The one above-FRL location was within the excavation footprint. Therefore, this was not retained as a COC. |
| Thorium-230 | 2 | 297 | Yes | The above-FRL locations were within CU NWU-12. This was retained as a secondary COC in this CU. |

* Number of hits did not include non-detects with minimum detectable concentrations (MDCs) greater than FRL.

TABLE 2-2
ASCOC LIST FOR IFP/SF CUs IFP-1 AND SF-1 THROUGH SF-7 (TILL CLAY AREA)

| ASCOC | FRL | Reason Retained |
|------------------------|------------|---|
| Total Uranium | 10 mg/kg | Retained as a primary ASCOC |
| Radium-226 | 1.7 pCi/g | Retained as a primary ASCOC |
| Radium-228 | 1.8 pCi/g | Retained as a primary ASCOC |
| Thorium-228 | 1.7 pCi/g | Retained as a primary ASCOC |
| Thorium-232 | 1.5 pCi/g | Retained as a primary ASCOC |
| Arsenic | 12 mg/kg | Retained as a secondary ASCOC |
| Beryllium | 1.5 mg/kg | Retained as a secondary ASCOC |
| Lead | 400 mg/kg | Retained as a secondary/ecological ASCOC* |
| Aroclor-1254 | .13 mg/kg | Retained as a secondary ASCOC |
| Aroclor-1260 | .13 mg/kg | Retained as a secondary ASCOC |
| Benzo(a)pyrene | 2.0 mg/kg | Retained as a secondary ASCOC |
| Bromodichloromethane | 4.0 mg/kg | Retained as a secondary ASCOC |
| 1,1-dichloroethene | 0.41 mg/kg | Retained as a secondary ASCOC |
| Dibenzo(a,h)anthracene | 2.0 mg/kg | Retained as a secondary ASCOC |
| Indeno(1,2,3-cd)pyrene | 20.0 mg/kg | Retained as a secondary ASCOC |
| Thorium-230 | 6.97 pCi/g | Retained as a secondary ASCOC |
| Molybdenum | 10 mg/kg | Retained as an ecological ASCOC** |

mg/kg – milligrams per kilogram

pCi/g – picoCuries per gram

* Retained as a secondary COC for CU SF-5 where the Firing Range was located and as an ecological COC for CUs SF-2 through SF-4, and SF-6 only

** Retained as an ecological COC for CUs SF-2 through SF-6 only.

TABLE 2-3
ASCOC LIST FOR IFP/SF CUs IFP-2 THROUGH IFP-4 (IFP GMA/SAND AREA)

| ASCOC | FRL | Reason Retained |
|------------------------|------------|-------------------------------|
| Total Uranium | 10 mg/kg | Retained as a primary ASCOC |
| Radium-226 | 1.7 pCi/g | Retained as a primary ASCOC |
| Radium-228 | 1.8 pCi/g | Retained as a primary ASCOC |
| Thorium-228 | 1.7 pCi/g | Retained as a primary ASCOC |
| Thorium-232 | 1.5 pCi/g | Retained as a primary ASCOC |
| Arsenic | 12 mg/kg | Retained as a secondary ASCOC |
| Beryllium | 1.5 mg/kg | Retained as a secondary ASCOC |
| Aroclor-1254 | .13 mg/kg | Retained as a secondary ASCOC |
| Aroclor-1260 | .13 mg/kg | Retained as a secondary ASCOC |
| Benzo(a)pyrene | 2.0 mg/kg | Retained as a secondary ASCOC |
| Dibenzo(a,h)anthracene | 2.0 mg/kg | Retained as a secondary ASCOC |
| Indeno(1,2,3-cd)pyrene | 20.0 mg/kg | Retained as a secondary ASCOC |
| Thorium-230 | 6.97 pCi/g | Retained as a secondary ASCOC |

TABLE 2-4
ASCOC LIST FOR IFP/SF CUs NWU-1 THROUGH NWU-13

| ASCOC | FRL | Reason Retained |
|---------------|------------|-------------------------------|
| Total Uranium | 82 mg/kg | Retained as a primary ASCOC |
| Radium-226 | 1.7 pCi/g | Retained as a primary ASCOC |
| Radium-228 | 1.8 pCi/g | Retained as a primary ASCOC |
| Thorium-228 | 1.7 pCi/g | Retained as a primary ASCOC |
| Thorium-232 | 1.5 pCi/g | Retained as a primary ASCOC |
| Cesium-137 | 1.4 pCi/g | Retained as a primary ASCOC* |
| Arsenic | 12 mg/kg | Retained as a secondary ASCOC |
| Beryllium | 1.5 mg/kg | Retained as a secondary ASCOC |

* Cesium-137 was retained as a primary ASCOC for NWU-12 only.

**TABLE 2-5
A2PI CERTIFICATION UNIT SIZES**

| Certification Unit | Size (Square Feet) |
|---------------------------|---------------------------|
| A2PI-IFP-01 | 55,372.6 |
| A2PI-IFP-02 | 60,383.7 |
| A2PI-IFP-03 | 50,933.9 |
| A2PI-IFP-04 | 61,270.0 |
| A2PI-NWU-01 | 61,109.9 |
| A2PI-NWU-02 | 53,186.2 |
| A2PI-NWU-03 | 29,236.0 |
| A2PI-NWU-04 | 35,676.2 |
| A2PI-NWU-05 | 34,422.1 |
| A2PI-NWU-06 | 60,563.7 |
| A2PI-NWU-07 | 59,120.3 |
| A2PI-NWU-08 | 41,721.3 |
| A2PI-NWU-09 | 44,995.1 |
| A2PI-NWU-10 | 60,681.2 |
| A2PI-NWU-11 | 30,445.7 |
| A2PI-NWU-12 | 28,270.3 |
| A2PI-NWU-13 | 33,988.9 |
| A2PI-SF-01 | 61,749.0 |
| A2PI-SF-02 | 55,602.5 |
| A2PI-SF-03 | 42,638.2 |
| A2PI-SF-04 | 50,878.7 |
| A2PI-SF-05 | 50,727.6 |
| A2PI-SF-06 | 59,438.1 |
| A2PI-SF-07 | 30,004.3 |

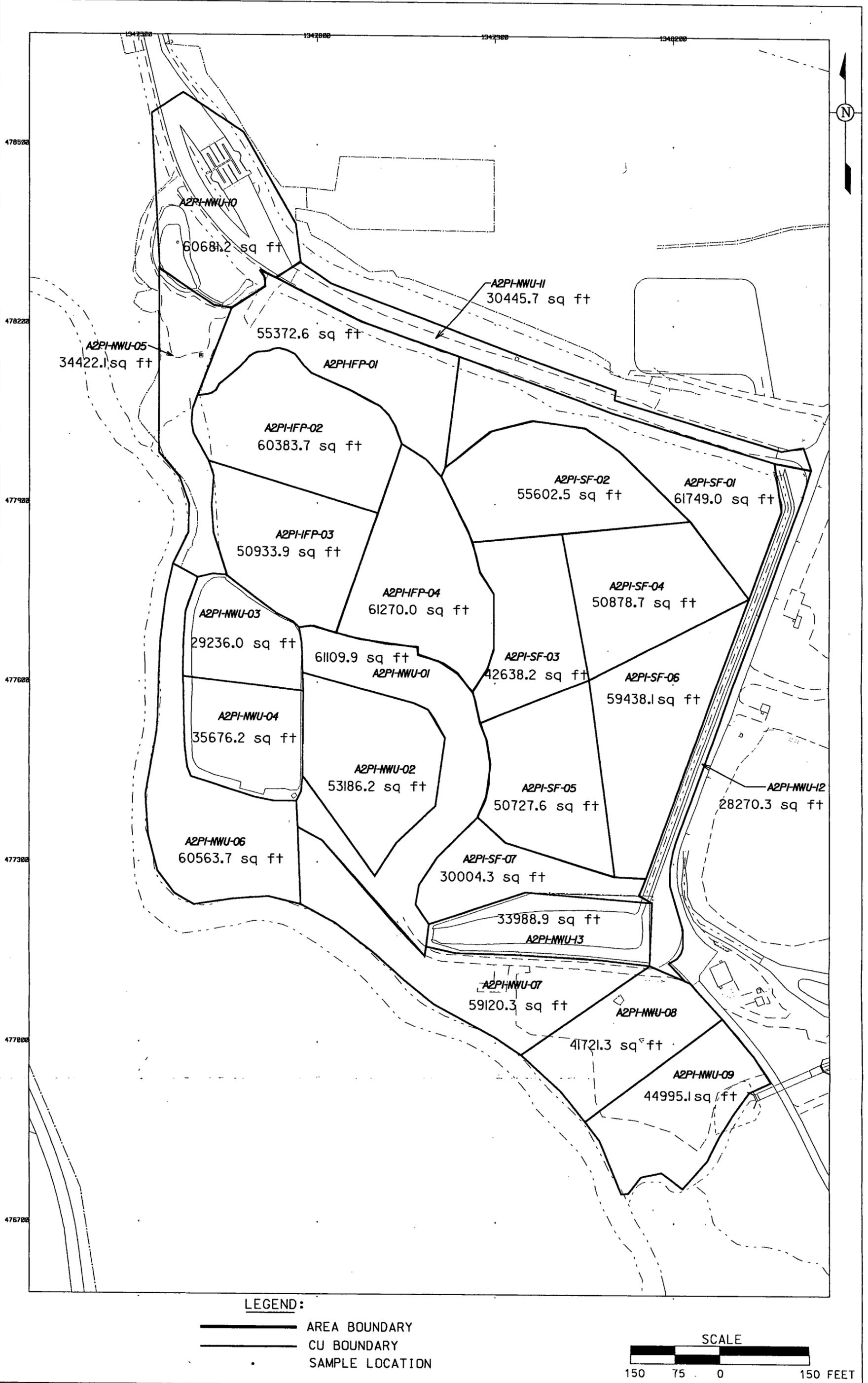
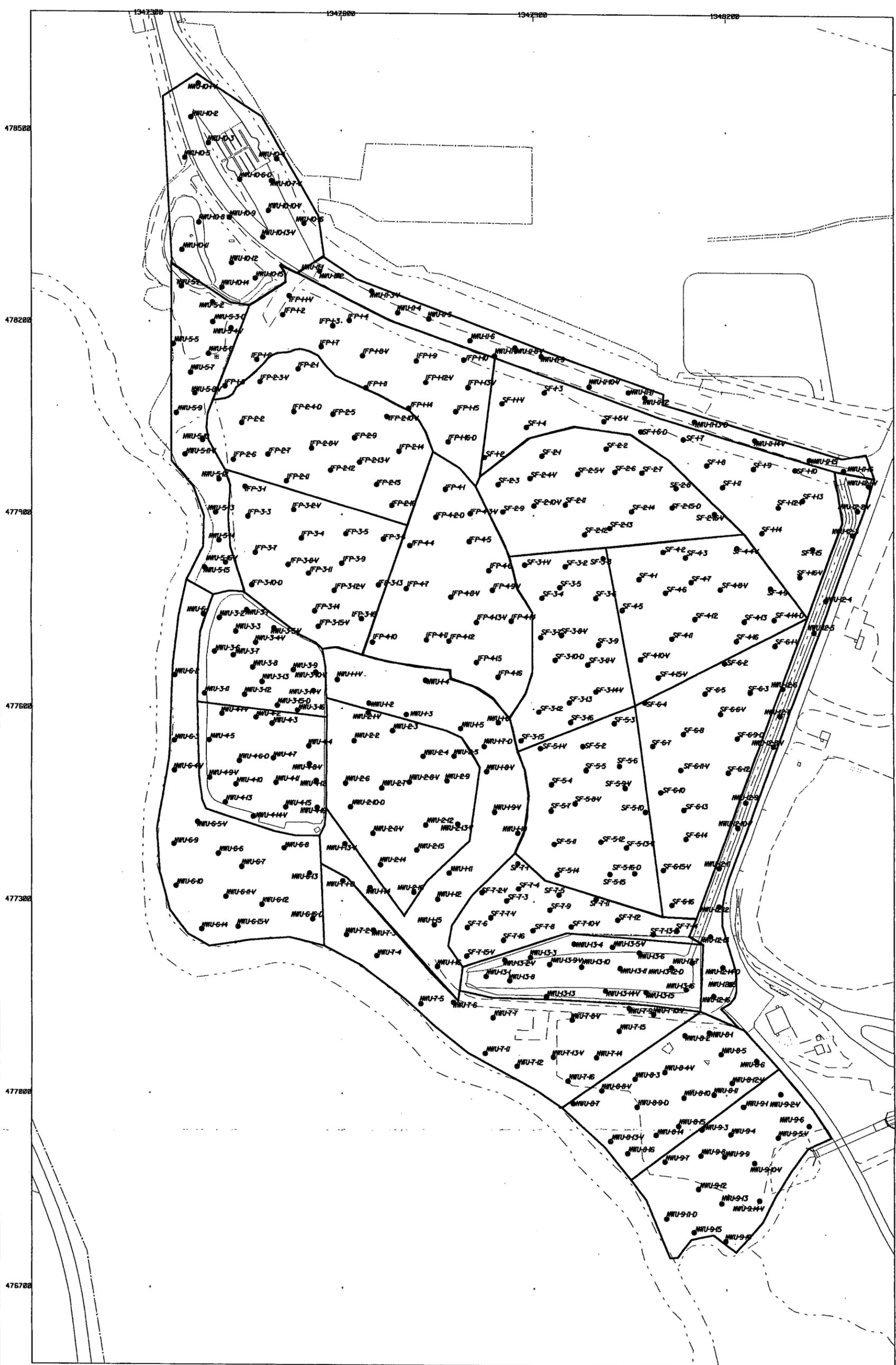


FIGURE 2-1. AREA 2, PHASE I CUs WITH AREA SIZES



LEGEND:
 ——— AREA BOUNDARY
 ——— CU BOUNDARY
 • SAMPLE LOCATION

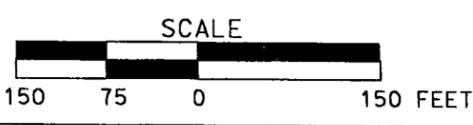


FIGURE 2-2. AREA 2, PHASE I CU SAMPLE LOCATIONS

3.0 OVERVIEW OF FIELD ACTIVITIES

3.1 DATA EVALUATION, PRECERTIFICATION AND AREA PREPARATION

As discussed in the A2PI Southern Waste Units Implementation Plan for OU2 (DOE 1998b), the A2PI NWU Perimeter Area Implementation Plan (DOE 2001b) and the CDL, historical data and information were evaluated to determine the remedial design. The rationale for retaining ASCOCs for certification sampling is in Section 2.1.3.

Additional sampling and real-time data were collected before and during site preparation as well as during remediation. This section summarizes field activities that were conducted based on these sample data.

Non-Waste Units

All predesign real-time scan data for total uranium, radium-226 and thorium-232 were below two times the FRL. All predesign analytical data indicated below-FRL concentrations for primary radionuclides. Six NWU predesign boring locations were found to contain impacted material (flyash) in CUs 3, 4 and 5. One location, NWU-24, was remediated as part of the Carolina Area debris removal. The remaining five locations were remediated during the 2001 excavation season, and precertification scanning was conducted in disturbed portions of the area. Data collected from these scanning activities were forwarded to the Agencies as an appendix to the CDL.

Debris was excavated from the Carolina Area (6,116 yd³), located just south of Basin 2, beginning in October 2000. FRL scanning and sampling confirmed the excavated footprint was below FRLs. These data are provided in the CDL.

Sample point NWU-5-15 was re-located in February 2002, when unexpectedly rocky conditions were discovered in the original sampling location. The sample point was re-located 4 feet to the east. This re-location was documented in Variance/Field Change Notice (V/FCN) 20400-PSP-0004-3 to the PSP.

Inactive Flyash Pile

The IFP and SF excavation limits were designed based on historical RI/FS data. The IFP was excavated to final grade and beyond in the 1998 excavation season (total volume 104,203 yd³). An iteration of final

1 excavation boundary measurements (both real-time and physical soil samples) within the IFP began in
2 November 1998.

3
4 At end of November 1998, a Radiation Tracking System (RTRAK) lift scan (Lift 12 - most of area at
5 average elevation 544 feet) was completed at the approximate final grade based on design drawings.
6 Using these lift scan data, elevated total uranium locations were identified and soil cores were collected
7 to determine the final excavation boundary. These soil core intervals were scanned for radioactivity with
8 a high-purity germanium (HPGe) core counter, and some of the intervals were submitted for total
9 uranium analysis.

10
11 In December 1998, physical soil sample results and core counting indicated above-FRL contamination
12 north and south of the east-west leg of Interceptor Ditch 2 to a depth of 3 to 4 feet. In addition, results
13 indicated an above-WAC location to a depth of 2 feet on the southern edge of the formerly designated
14 above-WAC excavation area (around the IFP-CC-3 sample location eventually named IFP-13-3). The
15 excavation contractor was directed to conduct a 2-foot deep, above-WAC excavation around sample
16 location IFP-CC-3 [beginning elevation at 544 feet mean sea level (MSL)]. After this above-WAC
17 excavation, HPGe measurements verified that the excavation footprint was below WAC. The excavation
18 contractor was also directed to excavate to a depth of 4 feet south of the east-west leg of Interceptor
19 Ditch 2 and then transition to a 3-foot excavation south of the former above-WAC area. The excavation
20 contractor completed the above-WAC and above-FRL excavation, including an exploratory trench in the
21 southern end of the IFP, on December 2, 1998.

22
23 In early February 1999, additional core samples were collected at the IFP-CC-3 location (now identified
24 as IFP-13-3) to determine depth of additional above-FRL excavation (current elevation after
25 December 1998 excavation is 540 feet MSL). In addition, this sampling determined that the lateral
26 extent of above-FRL contamination was present to a 4-foot depth in a 100-foot by 100-foot area around
27 IFP-13-3. Based on this contamination grid size (100 feet by 100 feet), the remainder of the IFP
28 footprint was sectioned into eight grids, and one HPGe measurement was taken in the center of each grid.
29 This exercise resulted in an additional 1-foot excavation over southern end of the IFP, based on one
30 HPGe measurement within each 100-foot by 100-foot contamination grid.

1 Beginning in March 1999, the subcontractor excavated to a 4-foot depth the 100-foot by 100-foot area
2 around IFP-13-3. In addition, a 1-foot deep excavation of the southern tip of the IFP was also completed.

3 After the 4-foot deep, 100-foot by 100-foot excavation around IFP-13-3 (top of elevation now 536 feet
4 MSL), additional core samples and HPGe measurements (IFP-14) were collected. Based on these data,
5 another 5 feet was excavated to reach the 10-parts per million (ppm) FRL for total uranium. In the field,
6 Fluor Fernald Construction instructed the excavation subcontractor to take another 2 feet immediately
7 around IFP-13-3. After this March excavation, the depth at the IFP-13-3 location was 529 feet MSL.

8
9 In May 1999, another complete lift scan was conducted over the IFP footprint (IFP-14 RTRAK and
10 HPGe measurements) south of the east-west leg of Interceptor Ditch 2. The data were evaluated for
11 highest total uranium and gross activity. The lift scan indicated that most of the footprint was close to
12 the 10-ppm total uranium FRL. An HPGe measurement next to the IFP-13-3 location (IFP-15-14) was
13 26 ppm. Per the OEPA, a sample was taken at this location to determine above-FRL depth. Results of
14 the sample analysis indicated total uranium concentrations close to FRL attainment at a 2-foot depth.

15
16 In late July 1999, the subcontractor excavated 3+/-1 foot from the area north of the east-west leg of
17 Interceptor Ditch 2. Also, an additional 2 feet was excavated in a 20-foot radius around the IFP-15-14
18 HPGe location. During this excavation, above-WAC material was encountered just north of Interceptor
19 Ditch 2 and two special material measurements (IFP-SM-96 and 97) were collected. After excavation on
20 August 2, 1999, real-time measurements (one RTRAK scan) were collected, and the results indicated
21 total uranium concentrations less than two times the FRL. The final grade scan data is presented in
22 Appendix A of the CDL. Excavation in the IFP was concluded at this time pending certification. The
23 total volume of soil excavated during the 1999 season was 19,857 yd³.

24 25 South Field

26 The total volume of soil excavated from the South Field in 1999 and 2000 was 145,463 yd³. Beginning
27 in the late July 2000, after remedial activities were completed to the design limits in the majority of the
28 SF, final grade HPGe scans were performed to determine if total uranium concentrations were reasonably
29 close to the FRLs. The HPGe measurements are depicted in Appendix A along with the associated total
30 uranium concentration. In addition, 14 soil borings were collected along the interface of the SF and the
31 IFP to assess FRL attainment at final grade. Some of the boring locations (SF-FG-1 through SF-FG-6)
32 were placed to assess potential contamination migration from the former IFP above-WAC area and the

000027

1 asbestos/debris area in the northwest corner of the SF. Sample intervals ranging from the surface to
2 24 feet at depth were analyzed for total uranium, with a few samples analyzed for total arsenic. The data
3 for these samples are depicted and summarized in Appendix A of the CDL. Based on these data, a
4 shallow excavation was conducted April 2001 at location SF-FG-7 as specified in the Implementation
5 Plan for the A2PI NWUs Perimeter Area. A deep excavation at location SF-FG-2 was also conducted.
6 An estimated 18,000 yd³ was excavated from these two excavation locations.

7
8 Certification samples were collected after excavation of the deep area in the SF before interim grading and
9 natural sloughing of surrounding material would begin to fill the deep excavation. One Group 1 CU was
10 drawn around this deep excavation area and the adjacent area to the west. This Group 1 CU encompassed
11 an area approximately 60,098 square feet. This CU was sub-divided into 16 sub-CUs of approximately
12 equal size. One sample location was randomly generated inside each of the sub-CUs using guidance from
13 Section 3 of the SEP. Twelve soil samples plus one duplicate sample were collected from 0 to 6 inches
14 and analyzed to ASL D for both primary radionuclides and secondary COCs. The CU identifier was
15 SWU-C-DP.

16
17 The certification sample results for total uranium at sample locations SWU-C-DP-8-R and
18 SWU-C-DP-8-R-D were 26 and 30 ppm, respectively, which is greater than two times the FRL. As
19 required in the SEP, any single certification sample location greater than two times the FRL will be
20 remediated. A 2-foot scrape over the sub-CU was conducted. Two certification samples and one
21 duplicate were then collected in the sub-CU that was excavated. The associated data are provided in the
22 CDL. After this excavation, all results for this CU were below FRL.

23 24 3.2 CHANGES TO SCOPE OF WORK

25 The scope of work for A2PI certification sampling was originally documented in the final CDL.
26 However, due to construction activities that impacted some A2PI CUs, certain changes to the execution
27 of Phases II and III as presented in the CDL were necessary.

28
29 NWU Basin 2: The basin that encompassed CU NWU-13 was excavated in January 2002, along with
30 the surrounding area. Therefore the sampling schedule in adjacent CUs NWU-07 and SF-07 was pushed
31 back into Phase III. In addition, the East-West Road was excavated in January 2002, which impacted
32 some portions of CUs IFP-01 and SF-01. Berms were established at the CU boundaries to prevent any

1 potential leaching of contaminants from the soil beneath the road into the CUs. When the East-West
2 Road excavation is completed, the CUs will be sampled in accordance with the previously established
3 certification strategy, and all sample results will be included.

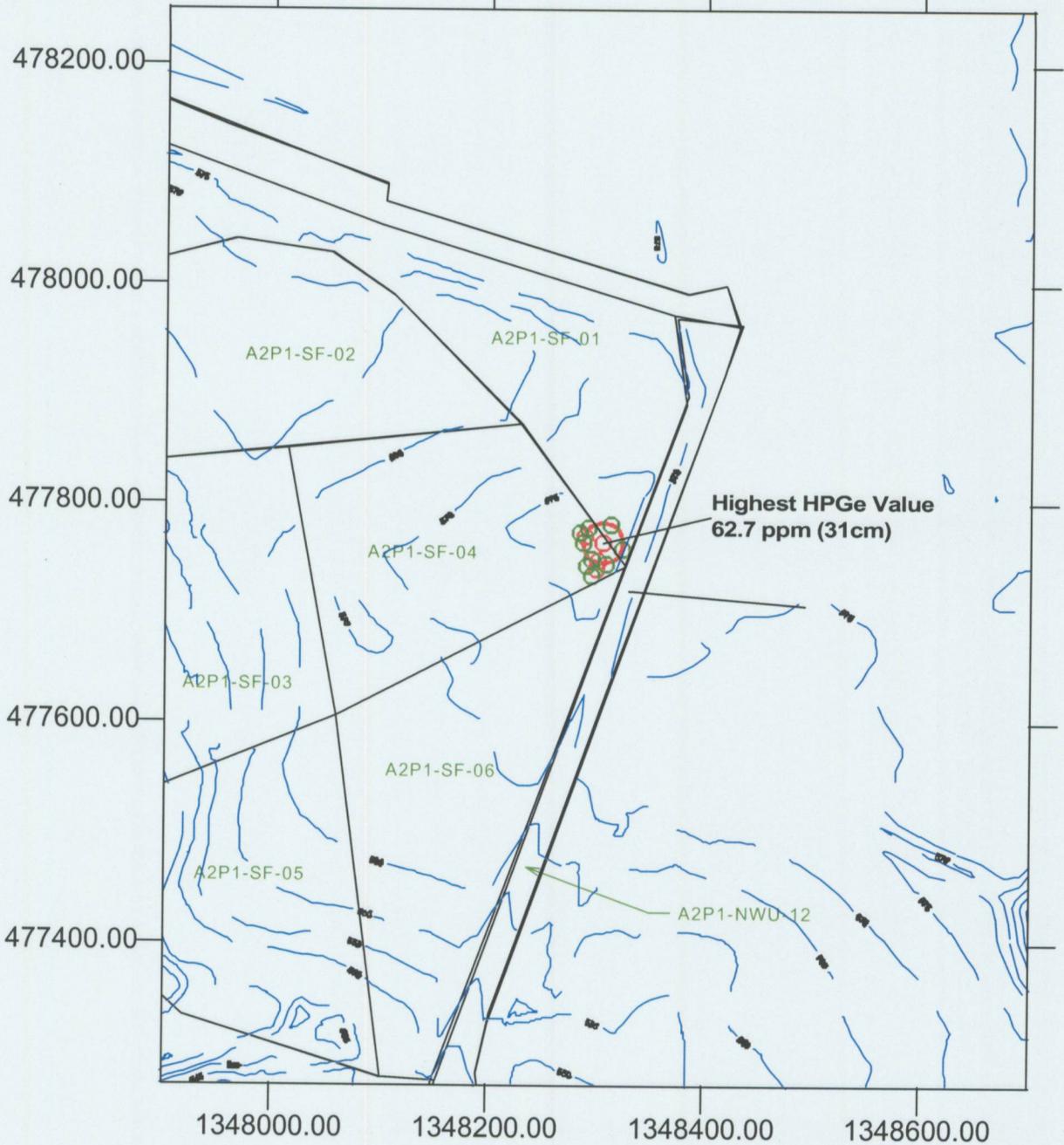
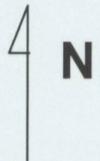
4
5 EWWF Perimeter and Basin 4 Footprint: The perimeter area of the EWWF and the Basin 4 footprint
6 (A2PI-NWU-C-10) will be excavated at a later date after EWWF long-term usage is determined, at
7 which time sampling will be conducted. The results of this sampling effort will be forwarded to the
8 regulatory agencies as an addendum to this certification report.

9
10 South Field Failed Certification Area: Two uranium "hot spots" were detected during certification
11 sampling. A physical sample with a result of 62.7 micrograms per gram ($\mu\text{g/g}$) indicated a hot spot in
12 A2PI-SF-C-4-13, and a real-time scan indicated a hot spot at A2PI-SF-C-4-14 (Figure 3-1), causing the
13 CU to fail certification. A 0.4-acre remediation area was designed for a 6-inch excavation to encompass
14 the failing physical sample location within the CU. Along with the excavation footprint, the real-time
15 hot spot will be excavated after all bounding has been performed. Depending on the size of the total
16 excavated footprint, either one or two additional CUs will be established for certification. The CU(s)
17 will be re-sampled in accordance with the PSP and analyzed for total uranium. These data will be
18 submitted with the Phase III addendum to this report.

19
20 Other additions and changes to the scope were documented in V/FCNs 20400-PSP-0004-01 through -06;
21 these documents are included in this report as Appendix B.

Figure 3-1 Total Uranium Hotspot in A2P1-SF-C-4

Confirmed by A2P1-P2-42B-G
Moisture Corrected Total Uranium
Field of View to Scale
HPGe DET#: 30687,31204
Measurement Dates: 03/14/02 thru 03/22/02



| HPGe @ 31cm Total U FRL=10ppm | |
|--------------------------------------|-------------------|
| ○ | 0.00 to 20.00 |
| ○ | 20.00 to 928.00 |
| ● | 928.00 to 9999.00 |

| HPGe @ 100cm Total U FRL=10ppm | |
|--------------------------------------|-------------------|
| ○ | 0.00 to 20.00 |
| ○ | 20.00 to 400.00 |
| ● | 400.00 to 9999.00 |

RTIMP DWG Title: A2P1_HS42_PRE_EXC_TU.srf
 Project Name: A2P1 PreCert
 Project #: 20400-PSP-0003
 Prepared By: Brian McDaniel/11058
 Date Prepared: 04/01/02
 Support Data:
 A2P1_HS42_PRE_EXC_HPGe_31cm.xls;
 A2P1_HS42_PRE_EXC_HPGe_100cm.xls

4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES, AND DATA REDUCTION

4.1 ANALYTICAL METHODOLOGIES

A2PI samples were analyzed at the FEMP on-site laboratory, which complies with SCQ requirements. The SCQ is the source for analytical methodologies (Appendix G), data validation and verification, and analytical and field quality assurance/quality control (QA/QC) requirements.

For all the certification data, laboratory analysis met all requirements for Analytical Support Level (ASL) D with ASL E exceptions. For soil samples, the project-specified MDC for total uranium, thorium-228 and thorium-232 by gamma spectroscopy is less stringent than the ASL D SCQ highest allowable minimum detectable concentration (HAMDC). Therefore, the total uranium, thorium-228 and thorium-232 gamma spectroscopy data were considered ASL E for the NWU area although the data deliverable is identical in all other specifications for ASL D per Appendix G of the SCQ. Also, the on-site laboratory prepared an ASL D data package, which included sample results with associated QA/QC data and all applicable raw data. The MDC for the SF and IFP areas required total uranium samples to be re-logged for analysis by inductively coupled plasma/ mass spectrometry (ICP/MS). Certification analytical results are provided in Appendix A, and a summary of the analytical methods follows.

4.1.1 Chemical Methods

Metals

Samples were analyzed for arsenic using graphite furnace atomic absorption (GFAA) and for beryllium using inductively coupled plasma atomic emission spectroscopy (ICP-AES).

4.1.2 Radiochemical Methods

The radiochemical analytical methods depended on the specific nuclides of interest. Performance-based specification criteria included HAMDC, percent overall tracer/chemical recovery, percent matrix spike recovery, method blank concentration, percent recovery of laboratory control sample (LCS), and relative error ration for duplicate samples for each analyte. The on-site laboratory was required to meet these specifications using the methodologies described below.

000031

Total Uranium

NWU samples were analyzed for uranium-238 using gamma spectrometry, and the results were used to calculate the total uranium value. The calculation used was as follows:

$$\text{Total uranium (mg/kg)} = (2.998544) \times \text{uranium-238 gamma spectrometry result (pCi/g)}$$

The validation qualifier assigned to the total uranium value was the same as the uranium-238 qualifier.

Samples in the SF and IFP footprints were analyzed using ICP/MS Method 5502 after it was determined that the gamma spectrometry method could not meet the required MDC for these areas. This change was documented in V/FCN 20400-PSP-0004-04, which is included in Appendix B of this report.

Radium-226

Samples were analyzed by gamma spectrometry, and radium-226 was quantified by measuring gamma rays emitted by members of its decay chain. This method does not require chemical separation, but the samples must be allowed a 20-day progeny in-growth period before counting. The on-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all A2PI certification results.

Radium-228

Following gamma spectrometry analysis, radium-228 was also quantified by measuring gamma rays emitted by members of its decay chain. The on-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all A2PI CUs.

Isotopic Thorium

Isotopic thorium (thorium-228 and thorium-232) was also quantified by measuring gamma rays emitted by members of its decay chain by gamma spectrometry. The on-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all A2PI CUs.

4.2 DATA VERIFICATION AND VALIDATION

This section discusses the data verification and validation (V&V) process used to examine the quality of field and laboratory results. Data were qualified to indicate the level of data usability, or level of

1 confidence in the reported analytical results. The U.S. Environmental Protection Agency (EPA) National
2 Functional Guidelines for Data Review (Inorganic Data) (EPA 1994), as adapted and approved by EPA
3 Region V, was used for this process.
4

5 Specific parameters associated with the data were evaluated during V&V to determine whether or not the
6 data quality objectives were met. Five principal QA parameters (i.e., precision, accuracy, completeness,
7 comparability, and representativeness) were addressed during V&V. Field sampling and handling,
8 laboratory analysis and reporting, and non-conformances and discrepancies in the data were examined to
9 ensure compliance with appropriate and applicable procedures.
10

11 The V&V process evaluated the following parameters:

- 12
- 13 • Specific field forms for sample collection and handling
- 14 • Chain of Custody forms
- 15 • Completeness of laboratory data deliverable.
16

17 The data validation process examined the analytical data to determine the validation qualifier of the
18 results. General areas examined that apply to all the chemical data include the following:

- 19
- 20 • Holding Times
- 21 • Instrument calibrations
- 22 • Calculation of results
- 23 • Matrix spike/matrix spike duplicate recoveries
- 24 • Laboratory/field duplicate precision
- 25 • Field/Laboratory Blank contamination
- 26 • Dry weight correction for solid samples
- 27 • Correct detection limits reported
- 28 • LCS recoveries and compliance with established limits.
29

30 Parameters unique to the evaluation of radiochemical analyses include:

- 31
- 32 • Calibration data for specific energies
- 33 • Background checks
- 34 • Relative Error ratios
- 35 • Detector efficiencies
- 36 • Background count correction.
37

38 For this project, all the radiological data were reviewed and validated for all criteria noted above. Per
39 project requirements, a minimum of 10 percent of the certification data were validated to Level D. This

1 validation included the same review process as for Level B, but included a systematic review of the raw
2 data and recalculations. One of the analytical releases was validated to Level D (A2PI-SF-C-3), while all
3 remaining data were validated to Level B.

4
5 Following V&V, qualifier codes were applied to specific data points, reflecting the level of confidence
6 assigned to the particular datum. These codes included:

- 7
- 8 - No qualification; the positive result or detection limit is confident as reported
 - 9
 - 10 J Positive result is estimated or imprecise; data point is usable for decision-making
11 purposes. Positive results less than the contract required reporting limit are also
12 qualified in this manner
 - 13
 - 14 R Positive result or detection limit is considered unreliable; data point should not be used
15 for decision-making purposes
 - 16
 - 17 U Undetected result at the stated limit of detection
 - 18
 - 19 UJ Undetected result; detection limit is considered estimated or imprecise; the data point is
20 usable for decision-making purposes
 - 21
 - 22 N Positive result is tentatively identified - that is, there is some question regarding the
23 actual identification and quantification of the result. Compound reported is best
24 professional judgement of the interpretation of the supporting data, such as mass spectra.
25 Caution must be exercised with the use of these data
 - 26
 - 27 NV Not Validated. The results for this sample were not validated
 - 28
 - 29 Z This result, or detection limit in this analysis is not the best one to use; another analysis
30 (e.g., the dilution or re-analysis) contains a more confident and usable result.
 - 31

32 The V&V of this data set did not identify any problems with the data set except for one sample point that
33 was rejected (R) for benzo(a)pyrene and indeno(1,2,3-cd)pyrene. In this instance, the result had been
34 previously qualified by the laboratory as a non-detect (U), as were all other results in the area. Therefore,
35 this result did not impact the overall acceptability of the data. All other results were either not qualified or
36 qualified as estimated (J) and/or nondetects (U). No other results were qualified as rejected.

37

38 4.3 DATA REDUCTION

39 Each sample used to support the A2PI area certification decision was entered in the FEMP Sitewide
40 Environmental Database (SED) with the following information:

000034

1 Field Information

- 2
- 3 • Sample Identification Number - A unique number assigned to each discrete sample point
 - 4 • Coordinate Information - Northing and Easting locations.
- 5

6 Laboratory Information

7 For each sample result the following information is entered:

8

- 9 • Laboratory Result - The reported analytical value from the laboratory
- 10
- 11 • Laboratory Qualifier - The qualifier reported from the lab. For radiological parameters
- 12 non-detect values are assigned a U qualifier
- 13
- 14 • Total Propagated Uncertainty (TPU) - This value represents the uncertainty associated
- 15 with the reported result. TPU includes the counting error, as well as uncertainty from
- 16 other laboratory measurements and data reduction. (Applicable to radiological
- 17 parameters only.)
- 18
- 19 • Units - The units in which the Laboratory Result is reported.
- 20

21 Validation Information

- 22
- 23 • Validation Result - The result based on the validation process. During the validation
 - 24 process, sample results may be adjusted. If the laboratory result is less than the
 - 25 associated MDC, the validation result becomes the MDC value
 - 26
 - 27 • Validation TPU - The TPU based on the validation process (applicable to radiological
 - 28 parameters only.)
 - 29
 - 30 • Validation Qualifier - The qualifier assigned as a result of the data validation process
 - 31
 - 32 • Validation Units - The units in which the Validation Result is reported.
 - 33

34 Using the information as summarized above, the following actions were taken for data reduction of each

35 CU data set.

36

- 37 1. All the data for each CU were queried from the SED. All the data were used even if the
- 38 CU had more than the minimum required data points
- 39
- 40 2. The data from the validation fields were used for statistical calculations
- 41
- 42 3. Data with a qualifier of R or Z was not used in the statistical calculations
- 43

- 1 4. The highest of the two duplicate results was used in the statistical calculations
- 2
- 3 5. One half of the non-detect (U or UJ) values were used in the statistical calculations.

5.0 CERTIFICATION EVALUATION AND CONCLUSIONS

5.1 CERTIFICATION RESULTS AND EVALUATION

After remediation of impacted material, all A2PI CUs met the certification criteria. Certification success or failure was based on sample data from each CU against criteria discussed in Section 2.2.4. All but three results were below the FRLs; all CUs except one passed on the first round of certification.

In A2PI-NWU-C5, there was an above-FRL arsenic reading; however, this reading was less than two times the FRL, the threshold for corrective action. A statistical analysis was conducted on the arsenic results in NWU-C5 indicated that the CU met all certification criteria as discussed in Section 2.2.4.

In A2PI-IFP-C-3-10, a total uranium sample result was 9.883 mg/kg; however, the laboratory result 20.071 mg/kg. These values were averaged, and the resulting value passed the hot spot criterion for total uranium.

Corrective actions will be implemented in A2PI-SF-C4 for above-FRL total uranium results. Additional sampling will be performed to bound the hot spots, and the area will be excavated and re-sampled to confirm that the above-FRL contamination has been removed. Final certification data will be provided as part of the Phase III addendum to this report.

5.2 A2PI CERTIFICATION CONCLUSIONS

Based on currently available results, precertification data, and statistical analysis, DOE has determined that the remedial objectives in the OU2 and OU5 RODs have been achieved for Phase II of A2PI, and no further remedial actions are required. This portion of the FEMP will be released for final land use upon EPA and OEPA concurrence.

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6.0 PROTECTION OF CERTIFIED AREAS

DOE has restricted access to certified areas in order to maintain their integrity prior to transfer for final land use. FEMP Procedure EP-0008 has been developed to implement a process to protect certified areas from becoming re-contaminated.

The procedure is summarized as follows:

- At the beginning of certification sampling activities for a remediation area, the perimeter of the "certified" area will be clearly delineated
- Signs will be posted upon the temporary perimeter limiting access to authorized individuals or projects
- To gain access to conduct work in a "certified" area, the person or project desiring access will submit a written request to the Compliance section of Soil and Disposal Facility Project (SDFP)
- Any equipment to be used within the "certified" area must have been cleaned in accordance with FEMP certified area access
- Employees/operators should be briefed on the entry and exit requirements for a "certified" area
- Additional restrictions apply to certified areas that have been restored. The SDFP Natural Resources Group will approve request for access in writing prior to entry.

After DOE, EPA and OEPA agree that an area is certified, the area will be released for final land use. At that time, best management practices and administrative controls will be used to protect the area from contamination, and other controls will be implemented as needed.

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APPENDIX A

**CERTIFICATION SAMPLES, ANALYTICAL
RESULTS AND STATISTICS TABLES**

A2P1-NWU-C-01

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium |
| A2P1-NWU-C-01-02 | 1.068 J | 0.786 J | 0.8 J | 0.786 J | 3.02 U | 5.98 J | 0.21 - |
| A2P1-NWU-C-01-03 | 1.538 J | 1.073 J | 1.054 J | 1.073 J | 3.505 U | 6.65 J | 0.84 - |
| A2P1-NWU-C-01-04 | 1.321 J | 1.058 J | 1.026 J | 1.058 J | 5.14 J | 4.55 J | 0.64 - |
| A2P1-NWU-C-01-05 | 1.214 J | 0.815 J | 0.796 J | 0.815 J | 3.349 U | 4.73 J | 0.43 - |
| A2P1-NWU-C-01-06 | 1.024 J | 0.761 J | 0.741 J | 0.761 J | 6.085 J | 3.34 J | 0.53 - |
| A2P1-NWU-C-01-07 | 1.281 J | 1.039 J | 1.006 J | 1.039 J | 5.337 J | 3.68 J | 0.5 - |
| A2P1-NWU-C-01-07-D | 1.209 J | 1.145 J | 1.139 J | 1.145 J | 4.132 J | 3.82 J | 0.54 - |
| A2P1-NWU-C-01-10 | 1.115 J | 1.024 J | 1.001 J | 1.024 J | 3.843 J | 3.59 J | 0.19 - |
| A2P1-NWU-C-01-11 | 1.298 J | 0.975 J | 0.982 J | 0.975 J | 4.739 J | 7.03 J | 0.48 - |
| A2P1-NWU-C-01-12 | 1.192 J | 1.063 J | 1.065 J | 1.063 J | 3.537 U | 8.46 J | 0.57 - |
| A2P1-NWU-C-01-14 | 0.726 J | 0.393 J | 0.397 J | 0.393 J | 2.798 U | 2.82 J | 0.03 J |
| A2P1-NWU-C-01-15 | 1.126 J | 0.713 J | 0.721 J | 0.713 J | 5.456 J | 3.61 J | 0.21 - |
| A2P1-NWU-C-01-16 | 0.906 J | 0.57 J | 0.544 J | 0.57 J | 5.642 J | 3.18 J | 0.11 J |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 12 | 1.5 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% |
| Max Result | 1.538 @ | 1.145 @ | 1.139 @ | 1.145 @ | 6.085 @ | 8.460 @ | 0.840 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-NWU-C-02

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium |
| A2P1-NWU-C-02-02 | 0.491 J | 0.286 J | 0.291 J | 0.286 J | 2.462 U | 6.37 J | 0.17 - |
| A2P1-NWU-C-02-03 | 1.325 J | 1.052 J | 1.03 J | 1.052 J | 3.417 U | 4.27 J | 0.68 - |
| A2P1-NWU-C-02-04 | 0.814 J | 0.506 J | 0.506 J | 0.506 J | 2.778 U | 3.21 J | 0.29 - |
| A2P1-NWU-C-02-05 | 1.238 J | 0.795 J | 0.765 J | 0.795 J | 3.351 U | 4.35 J | 0.45 - |
| A2P1-NWU-C-02-06 | 0.685 J | 0.38 J | 0.365 J | 0.38 J | 2.509 U | 3.94 J | 0.19 - |
| A2P1-NWU-C-02-07 | 0.895 J | 0.706 J | 0.7 J | 0.706 J | 3.022 U | 3.07 J | 0.4 - |
| A2P1-NWU-C-02-09 | 1.1 J | 0.718 J | 0.716 J | 0.718 J | 5.218 J | 5.82 J | 0.73 - |
| A2P1-NWU-C-02-10 | 0.559 J | 0.357 J | 0.326 J | 0.357 J | 2.597 U | 2.93 J | 0.1 J |
| A2P1-NWU-C-02-10-D | 0.586 J | 0.332 J | 0.324 J | 0.332 J | 2.315 U | 2.45 J | 0.17 - |
| A2P1-NWU-C-02-12 | 0.983 J | 0.799 J | 0.795 J | 0.799 J | 3.314 U | 4.23 J | 0.46 - |
| A2P1-NWU-C-02-14 | 0.839 J | 0.71 J | 0.71 J | 0.71 J | 2.966 U | 4.4 J | 0.37 - |
| A2P1-NWU-C-02-15 | 1.059 J | 0.746 J | 0.735 J | 0.746 J | 2.968 U | 4.45 J | 0.31 - |
| A2P1-NWU-C-02-16 | 1.001 J | 0.679 J | 0.695 J | 0.679 J | 4.676 J | 4.35 J | 0.48 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 12 | 1.5 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% |
| Max Result | 1.325 @ | 1.052 @ | 1.030 @ | 1.052 @ | 5.218 @ | 6.370 @ | 0.730 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium |
| A2P1-NWU-C-03-01 | 1.241 J | 0.929 J | 0.932 J | 0.929 J | 5.685 J | 6.7 J | 0.22 J |
| A2P1-NWU-C-03-02 | 1.172 J | 0.956 J | 0.937 J | 0.956 J | 7.19 J | 6.9 J | 0.24 J |
| A2P1-NWU-C-03-03 | 1.191 J | 0.91 J | 0.893 J | 0.91 J | 4.706 J | 5.57 J | 0.13 J |
| A2P1-NWU-C-03-06 | 1.181 J | 0.906 J | 0.884 J | 0.906 J | 5.592 J | 6.99 J | 0.16 J |
| A2P1-NWU-C-03-07 | 1.027 J | 0.813 J | 0.802 J | 0.813 J | 3.257 U | 5.72 J | 0.25 J |
| A2P1-NWU-C-03-08 | 1.074 J | 0.964 J | 0.944 J | 0.964 J | 4.881 J | 2.8 J | 0.6 J |
| A2P1-NWU-C-03-09 | 1.216 J | 0.947 J | 0.91 J | 0.947 J | 3.47 U | 6.57 J | 0.24 J |
| A2P1-NWU-C-03-11 | 1.048 J | 0.889 J | 0.864 J | 0.889 J | 3.26 J | 3.61 J | 0.16 J |
| A2P1-NWU-C-03-12 | 1.215 J | 0.948 J | 0.93 J | 0.948 J | 4.131 J | 5.72 J | 0.12 J |
| A2P1-NWU-C-03-13 | 1.026 J | 0.933 J | 0.919 J | 0.933 J | 3.384 U | 6.99 J | 0.21 J |
| A2P1-NWU-C-03-15 | 1.126 J | 0.952 J | 0.952 J | 0.952 J | 5.786 J | 4.62 J | 0.28 J |
| A2P1-NWU-C-03-15-D | 1.178 J | 0.965 J | 0.955 J | 0.965 J | 3.962 J | 5 J | 0.16 J |
| A2P1-NWU-C-03-16 | 1.232 J | 0.946 J | 0.925 J | 0.946 J | 3.513 U | 6.8 J | 0.31 J |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 12 | 1.5 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% |
| Max Result | 1.241 @ | 0.965 @ | 0.955 @ | 0.965 @ | 7.190 @ | 6.990 @ | 0.600 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

- * This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-NWU-C-04

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium |
| A2P1-NWU-C-04-02 | 1.212 J | 0.975 J | 0.952 J | 0.975 J | 4.193 UJ | 6.58 - | 0.43 - |
| A2P1-NWU-C-04-03 | 1.281 J | 0.967 J | 0.97 J | 0.967 J | 4.36 UJ | 5.7 - | 0.33 - |
| A2P1-NWU-C-04-04 | 1.212 J | 0.919 J | 0.895 J | 0.919 J | 5.447 J | 5.46 - | 0.43 - |
| A2P1-NWU-C-04-05 | 1.293 J | 0.979 J | 0.956 J | 0.979 J | 3.855 UJ | 3.04 J | 0.45 - |
| A2P1-NWU-C-04-06 | 1.065 J | 0.884 J | 0.874 J | 0.884 J | 7.462 J | 5.6 - | 0.31 - |
| A2P1-NWU-C-04-06-D | 1.066 J | 0.873 J | 0.886 J | 0.873 J | 4.273 UJ | 6 J | 0.35 - |
| A2P1-NWU-C-04-07 | 1.211 J | 1.036 J | 1.019 J | 1.036 J | 4.304 UJ | 4.7 J | 0.42 - |
| A2P1-NWU-C-04-10 | 1.079 J | 0.805 J | 0.734 J | 0.805 J | 4.266 UJ | 4.68 J | 0.38 - |
| A2P1-NWU-C-04-11 | 1.225 J | 0.942 J | 0.927 J | 0.942 J | 4.166 UJ | 8.49 J | 0.71 - |
| A2P1-NWU-C-04-12 | 1.329 J | 1.033 J | 1.021 J | 1.033 J | 4.333 UJ | 4.55 J | 0.49 - |
| A2P1-NWU-C-04-13 | 1.053 J | 0.858 J | 0.814 J | 0.858 J | 4.146 UJ | 3.55 J | 0.44 - |
| A2P1-NWU-C-04-15 | 1.285 J | 1.029 J | 1.038 J | 1.029 J | 3.793 UJ | 6.07 J | 0.4 - |
| A2P1-NWU-C-04-16 | 1.116 J | 0.738 J | 0.679 J | 0.738 J | 4 UJ | 3.96 J | 0.43 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 12 | 1.5 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% |
| Max Result | 1.329 @ | 1.036 @ | 1.038 @ | 1.036 @ | 7.462 @ | 8.490 @ | 0.710 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
 The maximum value of the two duplicates was used in all statistical equations.
 * This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
 The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-NWU-C-05

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium |
| A2P1-NWU-C-05-01 | 1.124 J | 0.789 J | 0.762 J | 0.789 J | 7.199 J | 6.44 J | 0.12 J |
| A2P1-NWU-C-05-02 | 1.163 J | 0.779 J | 0.756 J | 0.779 J | 5.071 J | 5.3 J | 0.3 - |
| A2P1-NWU-C-05-03 | 1.027 J | 0.87 J | 0.883 J | 0.87 J | 3.022 U | 6.21 J | 0.15 - |
| A2P1-NWU-C-05-03-D | 1.18 J | 0.812 J | 0.779 J | 0.812 J | 3.843 U | 6.41 J | 0.11 J |
| A2P1-NWU-C-05-05 | 0.979 J | 0.699 J | 0.67 J | 0.699 J | 8.532 J | 2.45 UJ | 0.022 U |
| A2P1-NWU-C-05-06 | 0.86 J | 0.625 J | 0.595 J | 0.625 J | 2.886 U | 4.04 J | 0.07 J |
| A2P1-NWU-C-05-07 | 0.762 J | 0.369 J | 0.35 J | 0.369 J | 2.554 U | 13.2 J | 0.07 J |
| A2P1-NWU-C-05-09 | 0.98 J | 0.744 J | 0.735 J | 0.744 J | 3.105 U | 7.32 J | 0.13 J |
| A2P1-NWU-C-05-10 | 0.882 J | 0.634 J | 0.613 J | 0.634 J | 7.683 J | 4.99 J | 0.14 J |
| A2P1-NWU-C-05-12 | 0.908 J | 0.653 J | 0.647 J | 0.653 J | 4.456 J | 3.93 J | 0.28 - |
| A2P1-NWU-C-05-13 | 1.061 J | 0.7 J | 0.706 J | 0.7 J | 4.251 J | 4.2 J | 0.11 J |
| A2P1-NWU-C-05-14 | 1.239 J | 0.754 J | 0.739 J | 0.754 J | 5.619 J | 3.85 J | 0.13 J |
| A2P1-NWU-C-05-15 | 0.756 J | 0.593 J | 0.604 J | 0.593 J | 3.077 U | 4.48 J | 0.24 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 12 | 1.5 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% |
| Max Result | 1.239 @ | 0.870 @ | 0.883 @ | 0.870 @ | 8.532 @ | 13.2 | 0.300 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | 2.42 | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | 0.098 | -- |
| Test Procedure | -- | -- | -- | -- | -- | t-Test (LN) | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Estimated Mean** | -- | -- | -- | -- | -- | 5.596 | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | 7.33 | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | Pass | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | Pass | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | 3 | -- |
| Size Calculation | -- | -- | -- | -- | -- | Pass | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-NWU-C-06

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium |
| A2P1-NWU-C-06-01 | 1.158 J | 0.765 J | 0.776 J | 0.765 J | 3.454 J | 5.11 J | 0.15 - |
| A2P1-NWU-C-06-02 | 1.2 J | 0.618 J | 0.638 J | 0.618 J | 5.023 J | 2.96 J | 0.023 U |
| A2P1-NWU-C-06-03 | 1.264 J | 0.567 J | 0.555 J | 0.567 J | 2.996 U | 2.69 J | 0.022 U |
| A2P1-NWU-C-06-06 | 1.304 J | 0.716 J | 0.687 J | 0.716 J | 5.581 J | 3.73 J | 0.12 - |
| A2P1-NWU-C-06-07 | 1.137 J | 0.585 J | 0.588 J | 0.585 J | 3.748 J | 3.54 J | 0.04 - |
| A2P1-NWU-C-06-08 | 1.302 J | 0.891 J | 0.809 J | 0.891 J | 3.52 U | 3.44 J | 0.19 - |
| A2P1-NWU-C-06-09 | 0.967 J | 0.615 J | 0.603 J | 0.615 J | 6.983 J | 2.43 J | 0.024 U |
| A2P1-NWU-C-06-10 | 1.065 J | 0.629 J | 0.646 J | 0.629 J | 3.296 U | 3.39 J | 0.021 U |
| A2P1-NWU-C-06-12 | 0.718 J | 0.408 J | 0.411 J | 0.408 J | 2.615 U | 3.24 J | 0.021 U |
| A2P1-NWU-C-06-13 | 1.196 J | 0.906 J | 0.905 J | 0.906 J | 3.453 U | 3.12 J | 0.19 - |
| A2P1-NWU-C-06-14 | 1.05 J | 0.591 J | 0.555 J | 0.591 J | 2.665 U | 4.53 J | 0.019 U |
| A2P1-NWU-C-06-16 | 0.857 J | 0.471 J | 0.467 J | 0.471 J | 2.56 U | 2.6 J | 0.019 U |
| A2P1-NWU-C-06-16-D | 0.904 J | 0.411 J | 0.396 J | 0.411 J | 2.915 J | 3.92 J | 0.04 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 12 | 1.5 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% |
| Max Result | 1.304 @ | 0.906 @ | 0.905 @ | 0.906 @ | 6.983 @ | 5.110 @ | 0.190 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

000046 The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium |
| A2P1-NWU-C-08-01 | 1.133 J | 0.711 J | 0.696 J | 0.711 J | 18.451 J | 6.82 J | 0.18 - |
| A2P1-NWU-C-08-02 | 0.922 J | 0.599 J | 0.58 J | 0.599 J | 9.59 J | 8.1 J | 0.23 - |
| A2P1-NWU-C-08-03 | 1.016 J | 0.852 J | 0.852 J | 0.852 J | 3.014 UJ | 6.39 J | 0.26 - |
| A2P1-NWU-C-08-05 | 1.314 J | 0.788 J | 0.778 J | 0.788 J | 28.454 J | 9.67 J | 0.41 - |
| A2P1-NWU-C-08-06 | 0.838 J | 0.535 J | 0.532 J | 0.535 J | 4.448 J | 6.66 - | 0.2 - |
| A2P1-NWU-C-08-07 | 0.852 J | 0.512 J | 0.499 J | 0.512 J | 8.622 UJ | 4.96 J | 0.41 - |
| A2P1-NWU-C-08-09 | 1.067 J | 0.844 J | 0.838 J | 0.844 J | 3.516 UJ | 7.3 J | 0.25 - |
| A2P1-NWU-C-08-09-D | 1.153 J | 0.81 J | 0.81 J | 0.81 J | 5.036 J | 8.2 J | 0.3 - |
| A2P1-NWU-C-08-10 | 0.849 J | 0.558 J | 0.549 J | 0.558 J | 5.983 J | 7.99 J | 0.17 - |
| A2P1-NWU-C-08-11 | 0.76 J | 0.442 J | 0.434 J | 0.442 J | 2.849 J | 5.33 J | 0.11 - |
| A2P1-NWU-C-08-14 | 1.128 J | 0.719 J | 0.723 J | 0.719 J | 2.895 J | 6.92 J | 0.18 - |
| A2P1-NWU-C-08-15 | 1.227 J | 0.792 J | 0.775 J | 0.792 J | 9.351 J | 7.4 J | 0.25 - |
| A2P1-NWU-C-08-16 | 1.301 J | 0.842 J | 0.85 J | 0.842 J | 5.673 J | 6.77 J | 0.15 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 12 | 1.5 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% |
| Max Result | 1.314 @ | 0.852 @ | 0.852 @ | 0.852 @ | 28.454 @ | 9.670 @ | 0.410 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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4202

A2P1-NWU-C-09

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium |
| A2P1-NWU-C-09-01 | 0.991 J | 0.721 J | 0.719 J | 0.721 J | 2.877 U | 5.24 J | 0.12 - |
| A2P1-NWU-C-09-03 | 0.968 J | 0.573 J | 0.581 J | 0.573 J | 4.78 J | 4.86 J | 0.056 - |
| A2P1-NWU-C-09-04 | 0.823 J | 0.527 J | 0.517 J | 0.527 J | 2.53 J | 3.74 J | 0.042 - |
| A2P1-NWU-C-09-06 | 0.688 J | 0.477 J | 0.469 J | 0.477 J | 2.802 U | 3.55 J | 0.037 - |
| A2P1-NWU-C-09-07 | 1.255 J | 0.624 J | 0.618 J | 0.624 J | 5.414 J | 4.68 J | 0.022 U |
| A2P1-NWU-C-09-08 | 1.365 J | 0.83 J | 0.797 J | 0.83 J | 10.253 J | 9.25 J | 0.32 - |
| A2P1-NWU-C-09-09 | 0.8 J | 0.498 J | 0.497 J | 0.498 J | 2.815 J | 3.82 J | 0.02 U |
| A2P1-NWU-C-09-11 | 0.959 J | 0.596 J | 0.578 J | 0.596 J | 4.215 J | 4.96 J | 0.023 U |
| A2P1-NWU-C-09-11-D | 1.084 J | 0.691 J | 0.684 J | 0.691 J | 5.935 J | 4.94 J | 0.023 U |
| A2P1-NWU-C-09-12 | 1.527 J | 0.886 J | 0.867 J | 0.886 J | 5.708 J | 4.92 J | 0.1 - |
| A2P1-NWU-C-09-13 | 1.095 J | 0.775 J | 0.747 J | 0.775 J | 8.837 J | 4.14 J | 0.1 - |
| A2P1-NWU-C-09-15 | 1.121 J | 0.615 J | 0.6 J | 0.615 J | 6.42 J | 7.02 J | 0.043 - |
| A2P1-NWU-C-09-16 | 1.244 J | 1.066 J | 1.085 J | 1.085 J | 16.751 J | 5.06 J | 0.022 U |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 82 | 12 | 1.5 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% |
| Max Result | 1.527 @ | 1.066 @ | 1.085 @ | 1.085 @ | 16.751 @ | 9.250 @ | 0.320 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|-------------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium | Thorium-230 |
| A2P1-IFP-C-02-01 | 0.882 J | 0.594 J | 0.601 J | 0.594 J | 1.69 - | 3.98 J | 0.12 J | 1.0857 - |
| A2P1-IFP-C-02-02 | 0.679 J | 0.276 J | 0.232 J | 0.276 J | 1.71 - | 3.27 J | 0.019 UJ | 0.9259 - |
| A2P1-IFP-C-02-04 | 0.636 J | 0.325 J | 0.319 J | 0.325 J | 1.59 - | 2.61 J | 0.019 UJ | 0.7514 J |
| A2P1-IFP-C-02-04-D | 0.678 J | 0.279 J | 0.245 J | 0.279 J | 1.79 - | 2.62 J | 0.019 UJ | 0.7613 - |
| A2P1-IFP-C-02-05 | 0.631 J | 0.27 J | 0.254 J | 0.27 J | 1.88 - | 2.42 J | 0.018 UJ | 0.6841 J |
| A2P1-IFP-C-02-06 | 0.915 J | 0.547 J | 0.544 J | 0.547 J | 1.29 J | 3.97 J | 0.06 J | 0.8294 - |
| A2P1-IFP-C-02-07 | 1.206 J | 0.885 J | 0.876 J | 0.885 J | 1.15 J | 3.60 J | 0.04 J | 1.2564 - |
| A2P1-IFP-C-02-09 | 0.789 J | 0.324 J | 0.299 J | 0.324 J | 1.98 J | 3.24 J | 0.02 UJ | 0.665 J |
| A2P1-IFP-C-02-11 | 0.669 J | 0.302 J | 0.284 J | 0.302 J | 1.88 J | 2.26 J | 0.02 UJ | 0.8052 - |
| A2P1-IFP-C-02-12 | 0.94 J | 0.448 J | 0.453 J | 0.448 J | 2.39 J | 4.33 J | 0.021 UJ | 0.9569 - |
| A2P1-IFP-C-02-14 | 0.625 J | 0.319 J | 0.283 J | 0.319 J | 1.04 J | 2.50 J | 0.02 UJ | 1.0712 - |
| A2P1-IFP-C-02-15 | 0.773 J | 0.322 J | 0.288 J | 0.322 J | 2.66 J | 3.81 J | 0.06 J | 0.9374 - |
| A2P1-IFP-C-02-16 | 0.745 J | 0.298 J | 0.295 J | 0.298 J | 8.18 J | 2.76 J | 0.019 UJ | 0.8754 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 10 | 12 | 1.5 | 6.97 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg | pCi/g |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% |
| Max Result | 1.206 @ | 0.885 @ | 0.876 @ | 0.885 @ | 8.18 @ | 4.33 @ | 0.12 @ | 1.256 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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4202

A2P1-IFP-C-02

| Station Number | SECONDARY COCs | | | | |
|---------------------------|----------------|--------------|----------------|------------------------|------------------------|
| | Aroclor-1254 | Aroclor-1260 | Benzo(a)pyrene | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene |
| A2P1-IFP-C-02-01 | 36.3 UJ | 36.3 UJ | 364 UJ | 1.82 U | 364 UJ |
| A2P1-IFP-C-02-02 | 35.4 UJ | 35.4 UJ | 354 UJ | 1.77 U | 354 UJ |
| A2P1-IFP-C-02-04 | 35.1 UJ | 35.1 UJ | 350 UJ | 1.75 U | 350 UJ |
| A2P1-IFP-C-02-04-D | 35 UJ | 35 UJ | 350 UJ | 1.75 U | 350 UJ |
| A2P1-IFP-C-02-05 | 34.6 UJ | 34.6 UJ | 346 UJ | 1.52 J | 346 UJ |
| A2P1-IFP-C-02-06 | 38.3 UJ | 38.3 UJ | 382 UJ | 1.66 J | 382 UJ |
| A2P1-IFP-C-02-07 | 39.6 UJ | 39.6 UJ | 396 UJ | 1.98 U | 396 UJ |
| A2P1-IFP-C-02-09 | 35.1 UJ | 35.1 UJ | 350 UJ | 1.75 U | 350 UJ |
| A2P1-IFP-C-02-11 | 36.1 UJ | 36.1 UJ | 362 UJ | 1.81 U | 362 UJ |
| A2P1-IFP-C-02-12 | 36.4 UJ | 36.4 UJ | 364 UJ | 1.82 U | 364 UJ |
| A2P1-IFP-C-02-14 | 35.3 UJ | 35.3 UJ | 354 UJ | 1.77 U | 354 UJ |
| A2P1-IFP-C-02-15 | 37.8 UJ | 37.8 UJ | 378 UJ | 1.89 U | 378 UJ |
| A2P1-IFP-C-02-16 | 36.1 UJ | 36.1 UJ | 362 UJ | 1.81 U | 362 UJ |
| FRL | 130 | 130 | 2000 | 2000 | 20000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Confidence Level | 90% | 90% | 90% | 90% | 90% |
| Max Result | 396 U @ | 39.6 UJ @ | 396 U @ | 1.66 @ | 396 U @ |
| Standardized Skewness | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 12 | 12 | 12 | 10 | 12 |
| Estimated Mean** | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|-------------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium | Thorium-230 |
| A2P1-IFP-C-03-01 | 0.974 J | 0.773 J | 0.75 J | 0.773 J | 2.655 J | 5.02 J | 0.23 - | 1.2314 - |
| A2P1-IFP-C-03-03 | 0.707 J | 0.497 J | 0.487 J | 0.497 J | 3.789 J | 7.22 J | 0.029 U | 1.0598 - |
| A2P1-IFP-C-03-04 | 1.056 J | 0.648 J | 0.645 J | 0.648 J | 5.986 J | 10.6 J | 0.141 J | 1.4107 - |
| A2P1-IFP-C-03-05 | 0.596 J | 0.296 J | 0.292 J | 0.296 J | 2.174 J | 3.93 J | 0.027 U | 2.3739 - |
| A2P1-IFP-C-03-06 | 0.667 J | 0.318 J | 0.313 J | 0.318 J | 4.925 J | 3.66 J | 0.027 U | 1.0899 - |
| A2P1-IFP-C-03-07 | 0.843 J | 0.654 J | 0.652 J | 0.654 J | 10.151 J | 8.2 J | 0.48 - | 1.0863 - |
| A2P1-IFP-C-03-09 | 1.099 J | 0.846 J | 0.844 J | 0.846 J | 2.871 J | 4.67 J | 0.33 - | 1.4987 - |
| A2P1-IFP-C-03-10 | 0.855 J | 0.602 J | 0.593 J | 0.602 J | 9.883 J | 3.85 J | 0.026 U | 3.5373 J |
| A2P1-IFP-C-03-10-D | 0.66 J | 0.563 J | 0.551 J | 0.563 J | 20.071 J | 3.6 J | 0.054 J | 1.0013 J |
| A2P1-IFP-C-03-11 | 1.035 J | 0.646 J | 0.645 J | 0.646 J | 5.311 J | 5.95 J | 0.22 - | 1.0478 - |
| A2P1-IFP-C-03-13 | 0.666 J | 0.395 J | 0.379 J | 0.395 J | 3.56 J | 4.33 J | 0.063 J | 1.5305 - |
| A2P1-IFP-C-03-14 | 1.048 J | 0.724 J | 0.711 J | 0.724 J | 5.853 J | 4.95 J | 0.16 - | 1.3253 - |
| A2P1-IFP-C-03-16 | 1.021 J | 0.675 J | 0.657 J | 0.675 J | 4.897 J | 5.59 J | 0.18 - | 1.3977 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 10 | 12 | 1.5 | 6.97 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg | pCi/g |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% |
| Max Result | 1.099 @ | 0.846 @ | 0.844 @ | 0.846 @ | 20.071 | 10.6 @ | 0.48 @ | 3.537 @ |
| Standardized Skewness | -- | -- | -- | -- | 3.52 | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | 0.31 | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | t-Test (LN) | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Estimated Mean** | -- | -- | -- | -- | 5.932 | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | 9.027 | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | Pass | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | Fail | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | 6 | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | Pass | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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4202

A2P1-IFP-C-03

| Station Number | SECONDARY COCs | | | | |
|---------------------------|----------------|--------------|----------------|------------------------|------------------------|
| | Aroclor-1254 | Aroclor-1260 | Benzo(a)pyrene | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene |
| A2P1-IFP-C-03-01 | 40.2 UJ | 40.2 UJ | 402 U | 2.01 U | 402 U |
| A2P1-IFP-C-03-03 | 38.4 UJ | 38.4 UJ | 384 U | 1.92 U | 384 U |
| A2P1-IFP-C-03-04 | 45 UJ | 45 UJ | 450 U | 2.25 U | 450 U |
| A2P1-IFP-C-03-05 | 35 UJ | 35 UJ | 350 U | 1.75 U | 350 U |
| A2P1-IFP-C-03-06 | 34.9 UJ | 34.9 UJ | 349 U | 1.74 U | 349 U |
| A2P1-IFP-C-03-07 | 37 UJ | 37 UJ | 38 J | 1.85 U | 19.5 J |
| A2P1-IFP-C-03-09 | 37.8 UJ | 37.8 UJ | 378 U | 1.89 U | 378 U |
| A2P1-IFP-C-03-10 | 36.8 UJ | 36.8 UJ | 368 U | 1.84 U | 368 U |
| A2P1-IFP-C-03-10-D | 36.8 UJ | 36.8 UJ | 368 U | 1.84 U | 368 U |
| A2P1-IFP-C-03-11 | 38.4 UJ | 38.4 UJ | 384 U | 1.92 U | 384 U |
| A2P1-IFP-C-03-13 | 37.3 UJ | 37.3 UJ | 373 U | 1.87 U | 373 U |
| A2P1-IFP-C-03-14 | 39.2 UJ | 39.2 UJ | 392 U | 1.96 U | 392 U |
| A2P1-IFP-C-03-16 | 37.9 UJ | 37.9 UJ | 379 U | 1.9 U | 379 U |
| FRL | 130 | 130 | 2000 | 2000 | 20000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Confidence Level | 90% | 90% | 90% | 90% | 90% |
| Max Result | 45 UJ @ | 45 UJ @ | 450 U @ | 2.25 U @ | 450 U @ |
| Standardized Skewness | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 12 | 12 | 11 | 12 | 11 |
| Estimated Mean** | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|-------------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium | Thorium-230 |
| A2P1-IFP-C-04-01 | 0.913 J | 0.63 J | 0.633 J | 0.63 J | 2.04 - | 2.32 U | 0.28 - | 0.9961 - |
| A2P1-IFP-C-04-02 | 0.606 J | 0.291 J | 0.293 J | 0.291 J | 3.56 - | 2.85 J | 0.018 U | 0.8079 - |
| A2P1-IFP-C-04-02-D | 0.76 J | 0.274 J | 0.253 J | 0.274 J | 3.44 - | 2.51 J | 0.018 U | 0.8112 - |
| A2P1-IFP-C-04-04 | 0.757 J | 0.355 J | 0.339 J | 0.355 J | 14 - | 3.16 J | 0.02 U | 0.8981 - |
| A2P1-IFP-C-04-05 | 0.733 J | 0.328 J | 0.334 J | 0.328 J | 2.5 - | 2.08 U | 0.019 U | 0.8283 - |
| A2P1-IFP-C-04-06 | 0.62 J | 0.334 J | 0.339 J | 0.334 J | 2.96 - | 3.6 J | 0.018 U | 0.9162 - |
| A2P1-IFP-C-04-07 | 0.916 J | 0.453 J | 0.454 J | 0.453 J | 14.7 - | 2.3 U | 0.07 - | 1.1362 - |
| A2P1-IFP-C-04-10 | 1.129 J | 0.768 J | 0.756 J | 0.768 J | 3.77 - | 5.54 J | 0.3 - | 1.3738 - |
| A2P1-IFP-C-04-11 | 0.764 J | 0.42 J | 0.418 J | 0.42 J | 4.31 - | 3.1 J | 0.019 U | 1.1753 - |
| A2P1-IFP-C-04-12 | 0.715 J | 0.349 J | 0.334 J | 0.349 J | 4.44 - | 3.56 J | 0.021 U | 1.1905 - |
| A2P1-IFP-C-04-14 | 1.369 J | 1.044 J | 1.014 J | 1.044 J | 1.45 J | 5.53 J | 0.66 - | 1.6539 - |
| A2P1-IFP-C-04-15 | 1.152 J | 0.798 J | 0.774 J | 0.798 J | 4.9 J | 4.78 J | 0.11 - | 1.6959 - |
| A2P1-IFP-C-04-16 | 0.969 J | 0.711 J | 0.693 J | 0.711 J | 4.92 J | 4.44 J | 0.43 - | 1.363 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 10 | 12 | 1.5 | 6.97 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg | pCi/g |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% |
| Max Result | 1.369 @ | 1.044 @ | 1.014 @ | 1.044 @ | 14.7 | 5.54 @ | 0.66 @ | 1.696 @ |
| Standardized Skewness | -- | -- | -- | -- | 2.5 | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | 0.223 | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | t-Test (LN) | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 0 |
| Estimated Mean** | -- | -- | -- | -- | 5.275 | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | 8.642 | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | Pass | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | Pass | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | 2 | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | Pass | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

- * This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

A2P1-IFP-C-04

| SECONDARY COCs | | | | | |
|---------------------------|--------------|--------------|----------------|------------------------|------------------------|
| Station Number | Aroclor-1254 | Aroclor-1260 | Benzo(a)pyrene | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene |
| A2P1-IFP-C-04-01 | 38 UJ | 38 UJ | 380 UJ | 1.9 U | 380 UJ |
| A2P1-IFP-C-04-02 | 34.4 UJ | 34.4 UJ | 344 UJ | 1.72 U | 344 UJ |
| A2P1-IFP-C-04-02-D | 34.7 UJ | 34.7 UJ | 348 UJ | 1.74 U | 348 UJ |
| A2P1-IFP-C-04-04 | 35.4 UJ | 35.4 UJ | 354 UJ | 3.12 - | 354 UJ |
| A2P1-IFP-C-04-05 | 34.5 UJ | 34.5 UJ | 346 UJ | 1.73 U | 346 UJ |
| A2P1-IFP-C-04-06 | 35.2 UJ | 35.2 UJ | 352 UJ | 1.76 U | 352 UJ |
| A2P1-IFP-C-04-07 | 37.9 UJ | 37.9 UJ | 380 UJ | 1.9 U | 380 UJ |
| A2P1-IFP-C-04-10 | 42.9 UJ | 42.9 UJ | 8.5 UJ | 2.14 U | 10.1 UJ |
| A2P1-IFP-C-04-11 | 37.4 UJ | 37.4 UJ | 374 UJ | 1.87 U | 374 UJ |
| A2P1-IFP-C-04-12 | 37.6 UJ | 37.6 UJ | 376 UJ | 1.88 U | 376 UJ |
| A2P1-IFP-C-04-14 | 40.9 UJ | 40.9 UJ | 408 UJ | 2.04 U | 408 UJ |
| A2P1-IFP-C-04-15 | 39.3 UJ | 39.3 UJ | 392 UJ | 1.96 U | 392 UJ |
| A2P1-IFP-C-04-16 | 39.4 UJ | 39.4 UJ | 394 UJ | 1.97 U | 394 UJ |
| FRL | 130 | 130 | 2000 | 2000 | 20000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Confidence Level | 90% | 90% | 90% | 90% | 90% |
| Max Result | 42.9 UJ @ | 42.9 UJ @ | 408 UJ @ | 3.12 @ | 408 UJ @ |
| Standardized Skewness | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 12 | 12 | 12 | 11 | 12 |
| Estimated Mean** | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-SF-C-02

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | | | | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|--------|------------|-------------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium | Lead | Molybdenum | Thorium-230 |
| A2P1-SF-C-02-01 | 1.077 J | 0.842 J | 0.76 J | 0.842 J | 4.16 - | 7.72 J | 0.28 - | 16.4 - | 1.31 - | 1.4941 - |
| A2P1-SF-C-02-02 | 1.074 J | 0.835 J | 0.834 J | 0.835 J | 6.96 - | 7.93 J | 0.25 - | 17.2 - | 1.45 - | 1.4142 - |
| A2P1-SF-C-02-03 | 0.84 J | 0.669 J | 0.654 J | 0.669 J | 2.39 - | 4.64 J | 0.14 - | 11.3 - | 1.54 - | 1.2396 - |
| A2P1-SF-C-02-06 | 1.016 J | 0.707 J | 0.709 J | 0.707 J | 3.53 - | 5.88 J | 0.28 - | 12.9 - | 0.78 - | 1.1628 - |
| A2P1-SF-C-02-07 | 1.033 J | 0.753 J | 0.74 J | 0.753 J | 3.57 - | 5.6 J | 0.3 - | 14.4 - | 0.77 - | 1.3555 - |
| A2P1-SF-C-02-08 | 1.177 J | 0.738 J | 0.718 J | 0.738 J | 5.35 - | 5.58 J | 0.16 - | 14.1 - | 0.57 - | 1.6418 - |
| A2P1-SF-C-02-09 | 0.933 J | 1.027 J | 1.017 J | 1.027 J | 7.09 - | 6.71 J | 0.15 - | 10.9 - | 1.1 - | 1.6404 - |
| A2P1-SF-C-02-11 | 0.861 J | 0.522 J | 0.502 J | 0.522 J | 4.37 - | 5.21 J | 0.22 - | 11.8 - | 0.72 - | 1.495 - |
| A2P1-SF-C-02-12 | 1.137 J | 0.75 J | 0.746 J | 0.75 J | 3.88 - | 5.87 J | 0.32 - | 15.7 - | 0.43 - | 1.4537 - |
| A2P1-SF-C-02-13 | 1.052 J | 0.763 J | 0.746 J | 0.763 J | 2.96 - | 11.8 J | 0.36 - | 18 - | 1.1 - | 1.4419 - |
| A2P1-SF-C-02-14 | 1.039 J | 0.811 J | 0.809 J | 0.811 J | 3.74 - | 10.5 J | 0.37 - | 15.2 - | 0.82 - | 1.5001 - |
| A2P1-SF-C-02-15 | 1.17 J | 0.786 J | 0.751 J | 0.786 J | 4.42 - | 11.2 J | 0.32 - | 14.8 - | 0.57 - | 1.5612 - |
| A2P1-SF-C-02-15-D | 1.148 J | 0.721 J | 0.695 J | 0.721 J | 3.73 - | 10.2 J | 0.26 - | 15 - | 0.92 - | 1.5779 - |
| FRL (BTV) | 1.7 | 1.8 | 1.7 | 1.5 | 10 | 12 | 1.5 | (200) | (10) | 6.97 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg | mg/kg | mg/kg | pCi/g |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 1.177 @ | 1.027 @ | 1.017 @ | 1.027 @ | 7.09 @ | 11.8 @ | 0.37 @ | 18.0 @ | 1.54 @ | 1.642 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
 The maximum value of the two duplicates was used in all statistical equations.
 * This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
 The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-SF-C-02

| SECONDARY COCs | | | | | | | |
|---------------------------|--------------|--------------|--------------------|----------------|----------------------|------------------------|------------------------|
| Station Number | Aroclor-1254 | Aroclor-1260 | 1,1-Dichloroethene | Benzo(a)pyrene | Bromodichloromethane | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene |
| A2P1-SF-C-02-01 | 40.7 UJ | 40.7 UJ | 50.3 U | 24.8 J | 490 U | 2.03 U | 12.4 J |
| A2P1-SF-C-02-02 | 39.5 UJ | 39.5 UJ | 49.8 U | 2.9 J | 486 U | 1.97 U | 395 U |
| A2P1-SF-C-02-03 | 36 UJ | 36 UJ | 45 U | 360 U | 438 U | 1.8 U | 360 U |
| A2P1-SF-C-02-06 | 37.2 UJ | 37.2 UJ | 45.4 U | 4.6 J | 442 U | 1.86 U | 372 U |
| A2P1-SF-C-02-07 | 38.8 UJ | 38.8 UJ | 47.2 U | 388 U | 460 U | 1.94 U | 388 U |
| A2P1-SF-C-02-08 | 41.5 UJ | 41.5 UJ | 49 U | 3 J | 478 U | 2.08 U | 2 J |
| A2P1-SF-C-02-09 | 4.2 J | 37.5 UJ | 44.5 U | 6.8 J | 434 U | 1.88 U | 375 U |
| A2P1-SF-C-02-11 | 36.6 UJ | 36.6 UJ | 44.5 U | 366 U | 434 U | 1.83 U | 366 U |
| A2P1-SF-C-02-12 | 39.4 UJ | 39.4 UJ | 49.9 U | 394 U | 487 U | 1.97 U | 394 U |
| A2P1-SF-C-02-13 | 37.4 UJ | 37.4 UJ | 45.6 U | 374 U | 445 U | 1.87 U | 374 U |
| A2P1-SF-C-02-14 | 37.4 UJ | 37.4 UJ | 45.7 U | 374 U | 446 U | 1.87 U | 374 U |
| A2P1-SF-C-02-15 | 40.5 UJ | 40.5 UJ | 49.4 U | 405 U | 482 U | 2.02 U | 405 U |
| A2P1-SF-C-02-15-D | 40.2 UJ | 40.2 UJ | 48.8 U | 402 U | 476 U | 2.01 U | 402 U |
| FRL | 130 | 130 | 410 | 2000 | 4000 | 2000 | 20000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Confidence Level | 90% | 90% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 41.5 UJ @ | 41.5 UJ @ | 50.3 U @ | 405 U @ | 490 U @ | 2.08 U @ | 405 U @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 11 | 12 | 12 | 7 | 12 | 12 | 12 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-SF-C-03

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | | | | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|--------|------------|-------------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium | Lead | Molybdenum | Thorium-230 |
| A2P1-SF-C-03-02 | 0.839 J | 0.551 J | 0.531 J | 0.551 J | 1.97 - | 6.35 J | 0.43 - | 8.49 - | 0.54 J | 1.2831 - |
| A2P1-SF-C-03-03 | 1.004 J | 0.686 J | 0.672 J | 0.686 J | 1.43 - | 3.33 J | 0.21 - | 8.45 - | 3.3 - | 1.3249 - |
| A2P1-SF-C-03-04 | 0.975 J | 0.666 J | 0.657 J | 0.666 J | 3.01 - | 5.25 J | 0.31 - | 10.4 - | 1.34 - | 1.1634 - |
| A2P1-SF-C-03-05 | 0.938 J | 0.741 J | 0.73 J | 0.741 J | 2.62 - | 5.39 J | 0.055 J | 7.45 - | 1.29 - | 1.2553 - |
| A2P1-SF-C-03-06 | 0.862 J | 0.607 J | 0.598 J | 0.607 J | 1.35 - | 5.33 J | 0.022 U | 7.64 - | 1.24 - | 1.0061 - |
| A2P1-SF-C-03-07 | 1.138 J | 0.861 J | 0.82 J | 0.861 J | 3.82 - | 7.15 J | 0.67 - | 12.9 - | 0.98 J | 1.4475 - |
| A2P1-SF-C-03-09 | 0.962 J | 0.635 J | 0.615 J | 0.635 J | 1.99 - | 4.05 J | 0.16 - | 6.31 - | 1.05 - | 1.1074 - |
| A2P1-SF-C-03-10 | 1.144 J | 0.877 J | 0.865 J | 0.877 J | 4.25 - | 5.32 J | 0.44 - | 14.1 - | 0.61 J | 1.3334 - |
| A2P1-SF-C-03-10-D | 1.103 J | 0.799 J | 0.755 J | 0.799 J | 3.7 - | 6.25 J | 0.5 - | 12.3 - | 0.7 J | 1.5124 - |
| A2P1-SF-C-03-12 | 1.256 J | 1.1 J | 1.081 J | 1.1 J | 2.07 - | 5.13 J | 0.47 - | 13.5 - | 0.6 J | 1.6596 - |
| A2P1-SF-C-03-13 | 1.424 J | 0.985 J | 0.963 J | 0.985 J | 1.53 - | 5.93 J | 0.56 - | 15.2 - | 0.51 J | 1.5483 - |
| A2P1-SF-C-03-15 | 0.87 J | 0.652 J | 0.624 J | 0.652 J | 2.52 - | 4.38 J | 0.3 - | 11.6 - | 0.63 J | 1.2936 - |
| A2P1-SF-C-03-16 | 1.1 J | 0.811 J | 0.79 J | 0.811 J | 3.58 - | 5.18 J | 0.43 - | 11.9 - | 0.49 J | 1.3306 - |
| FRL (BTV) | 1.7 | 1.8 | 1.7 | 1.5 | 10 | 12 | 1.5 | (200) | (10) | 6.97 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg | mg/kg | mg/kg | pCi/g |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 1.424 @ | 1.100 @ | 1.081 @ | 1.100 @ | 4.25 @ | 7.15 @ | 0.67 @ | 15.2 @ | 3.3 @ | 1.660 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-SF-C-03

| SECONDARY COCs | | | | | | | |
|---------------------------|--------------|--------------|--------------------|----------------|----------------------|------------------------|------------------------|
| Station Number | Aroclor-1254 | Aroclor-1260 | 1,1-Dichloroethene | Benzo(a)pyrene | Bromodichloromethane | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene |
| A2P1-SF-C-03-02 | 38.1 UJ | 38.1 UJ | 46.1 U | 381 U | 450 U | 1.9 U | 381 U |
| A2P1-SF-C-03-03 | 40.2 UJ | 40.2 UJ | 48.6 U | 402 U | 474 U | 2.01 U | 402 U |
| A2P1-SF-C-03-04 | 38 UJ | 38 UJ | 46.6 U | 380 U | 455 U | 1.9 U | 380 U |
| A2P1-SF-C-03-05 | 37.6 UJ | 37.6 UJ | 45.4 U | 376 U | 443 U | 1.88 U | 376 U |
| A2P1-SF-C-03-06 | 41 UJ | 41 UJ | 50.1 U | 410 U | 489 U | 2.05 U | 410 U |
| A2P1-SF-C-03-07 | 37 UJ | 37 UJ | 46 U | 370 U | 448 U | 1.85 U | 2.6 J |
| A2P1-SF-C-03-09 | 39 UJ | 39 UJ | 48.4 U | 390 U | 472 U | 1.82 U | 390 U |
| A2P1-SF-C-03-10 | 37.9 UJ | 37.9 UJ | 47.4 U | 379 U | 462 U | 1.89 U | 3.9 J |
| A2P1-SF-C-03-10-D | 37.6 UJ | 37.6 UJ | 48.1 U | 376 U | 470 U | 1.88 U | 376 U |
| A2P1-SF-C-03-12 | 39.4 UJ | 39.4 UJ | 48.6 U | 394 U | 474 U | 1.97 U | 394 U |
| A2P1-SF-C-03-13 | 39.3 UJ | 39.3 UJ | 49.2 U | 1.9 J | 480 U | 1.96 U | 393 U |
| A2P1-SF-C-03-15 | 7.1 J | 38.3 UJ | 47.2 U | 383 U | 461 U | 1.91 U | 383 U |
| A2P1-SF-C-03-16 | 38.3 UJ | 38.3 UJ | 48.1 U | 383 U | 469 U | 1.91 U | 383 U |
| FRL | 130 | 130 | 410 | 2000 | 4000 | 2000 | 20000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Confidence Level | 90% | 90% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 41 UJ @ | 41 UJ @ | 50.1 U @ | 410 U @ | 489 U @ | 2.05 U @ | 410 U @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 11 | 12 | 12 | 11 | 12 | 12 | 12 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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4202

A2P1-SF-C-04

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | | | | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|--------|------------|-------------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium | Lead | Molybdenum | Thorium-230 |
| A2P1-SF-C-04-01 | 1.182 J | 0.908 J | 0.914 J | 0.908 J | 2.29 - | 3.59 J | 0.33 - | 9.01 J | 1.78 J | 1.519 - |
| A2P1-SF-C-04-02 | 1.261 J | 0.976 J | 0.962 J | 0.976 J | 2.59 - | 2.33 J | 0.32 - | 9.45 J | 0.77 J | 1.5933 - |
| A2P1-SF-C-04-03 | 1.201 J | 0.922 J | 0.883 J | 0.922 J | 2.89 - | 2.42 J | 0.23 - | 8.44 J | 0.54 J | 1.4665 - |
| A2P1-SF-C-04-05 | 1.132 J | 0.834 J | 0.825 J | 0.834 J | 2.32 - | 5.39 J | 0.57 - | 8.57 J | 1.14 J | 1.4823 - |
| A2P1-SF-C-04-06 | 1.132 J | 0.863 J | 0.859 J | 0.863 J | 1.89 - | 3.01 J | 0.51 - | 9.12 J | 1.21 J | 1.4055 - |
| A2P1-SF-C-04-07 | 0.959 J | 0.732 J | 0.713 J | 0.732 J | 2.82 - | 2.49 J | 0.31 - | 5.66 J | 0.47 J | 1.2662 - |
| A2P1-SF-C-04-09 | 1.286 J | 1.055 J | 1.02 J | 1.055 J | 7.18 - | 5.02 J | 0.46 - | 16.9 J | 0.51 J | 1.4925 - |
| A2P1-SF-C-04-11 | 1.12 J | 0.901 J | 0.888 J | 0.901 J | 1.45 - | 2.28 J | 0.22 - | 10.8 J | 0.4 J | 1.2879 - |
| A2P1-SF-C-04-12 | 1.137 J | 0.955 J | 0.914 J | 0.955 J | 4.82 - | 5.45 J | 0.71 - | 12.9 J | 1.06 J | 1.551 - |
| A2P1-SF-C-04-13 | 1.612 J | 1.228 J | 1.224 J | 1.228 J | 62.7 - | 4.58 J | 0.67 - | 11.7 J | 0.51 J | 2.0798 - |
| A2P1-SF-C-04-14 | 1.816 J | 1.232 J | 1.197 J | 1.232 J | 5.14 J | 6.9 J | 0.35 - | 20.1 J | 0.48 J | 1.8215 - |
| A2P1-SF-C-04-14-D | 1.766 J | 1.263 J | 1.247 J | 1.263 J | 2.23 J | 6.11 J | 0.42 - | 15.8 J | 0.69 J | 1.8736 - |
| A2P1-SF-C-04-16 | 1.077 J | 0.828 J | 0.819 J | 0.828 J | 4.89 - | 4.02 J | 0.59 - | 8.5 J | 0.44 J | 1.6069 - |
| FRL (BTV) | 1.7 | 1.8 | 1.7 | 1.5 | 10 | 12 | 1.5 | (200) | (10) | 6.97 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg | mg/kg | mg/kg | pCi/g |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 1.816 | 1.263 @ | 1.247 @ | 1.263 @ | 62.7 | 6.9 @ | 0.71 @ | 20.1 @ | 1.78 @ | 2.080 @ |
| Standardized Skewness | 2.3 | -- | -- | -- | 4.82 | -- | -- | -- | -- | -- |
| W-Statistic Probability * | 0.056 | -- | -- | -- | 0 | -- | -- | -- | -- | -- |
| Test Procedure | t-Test (LN) | -- | -- | -- | Sign Test | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Estimated Mean** | 1.243 | -- | -- | -- | 2.855 | -- | -- | -- | -- | -- |
| UCL of the Mean | 1.369 | -- | -- | -- | 5.14 | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | 0.003 | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | Pass | -- | -- | -- | Pass | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | Pass | -- | -- | -- | Fail | -- | -- | -- | -- | -- |
| a posteriori Sample | 4 | -- | -- | -- | 7 | -- | -- | -- | -- | -- |
| Size Calculation | Pass | -- | -- | -- | Pass | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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4202

A2P1-SF-C-04

| Station Number | SECONDARY COCs | | | | | | |
|---------------------------|----------------|--------------|--------------------|----------------|----------------------|------------------------|------------------------|
| | Aroclor-1254 | Aroclor-1260 | 1,1-Dichloroethene | Benzo(a)pyrene | Bromodichloromethane | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene |
| A2P1-SF-C-04-01 | 39.8 UJ | 39.8 UJ | 51 U | 398 U | 497 U | 1.99 U | 398 U |
| A2P1-SF-C-04-02 | 39.4 UJ | 39.4 UJ | 49 U | 394 U | 478 U | 1.97 U | 394 U |
| A2P1-SF-C-04-03 | 39 UJ | 39 UJ | 48.2 U | 390 U | 470 U | 1.95 U | 390 U |
| A2P1-SF-C-04-05 | 40.6 UJ | 40.6 UJ | 50.5 U | 406 U | 492 U | 2.03 U | 406 U |
| A2P1-SF-C-04-06 | 40.6 UJ | 40.6 UJ | 48.6 U | 406 U | 474 U | 2.03 U | 406 U |
| A2P1-SF-C-04-07 | 41.4 UJ | 41.4 UJ | 50.4 U | 414 U | 492 U | 2.07 U | 414 U |
| A2P1-SF-C-04-09 | 38.4 UJ | 38.4 UJ | 48.3 U | 384 U | 471 U | 1.92 U | 384 U |
| A2P1-SF-C-04-11 | 39.2 UJ | 39.2 UJ | 49.3 U | 392 U | 481 U | 1.96 U | 392 U |
| A2P1-SF-C-04-12 | 39.1 UJ | 39.1 UJ | 48.2 U | 391 U | 470 U | 1.96 U | 391 U |
| A2P1-SF-C-04-13 | 40.8 UJ | 40.8 UJ | 51.3 U | 408 U | 500 U | 2.04 U | 408 U |
| A2P1-SF-C-04-14 | 42.2 UJ | 42.2 UJ | 53.1 U | 422 U | 518 U | 2.11 U | 422 U |
| A2P1-SF-C-04-14-D | 42.3 UJ | 42.3 UJ | 52.4 U | 423 U | 511 U | 1.13 J | 423 U |
| A2P1-SF-C-04-16 | 39.1 UJ | 39.1 UJ | 48.5 U | 391 U | 473 U | 1.95 U | 391 U |
| FRL | 130 | 130 | 410 | 2000 | 4000 | 2000 | 20000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Confidence Level | 90% | 90% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 42.3 UJ @ | 42.3 UJ @ | 53.1 U @ | 423 U @ | 518 U @ | 2.11 U @ | 423 U @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

- * This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-SF-C-05

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | | | | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|--------|------------|-------------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium | Lead | Molybdenum | Thorium-230 |
| A2P1-SF-C-05-02 | 1.261 J | 0.852 J | 0.846 J | 0.852 J | 1.37 - | 4.72 J | 0.023 U | 11.6 - | 0.33 U | 1.4485 - |
| A2P1-SF-C-05-03 | 0.924 J | 0.54 J | 0.555 J | 0.54 J | 1.33 - | 5.95 J | 0.021 U | 8.84 J | 0.89 J | 0.9759 J |
| A2P1-SF-C-05-04 | 0.716 J | 0.313 J | 0.333 J | 0.313 J | 1.17 - | 5.63 J | 0.08 - | 6.71 - | 1.11 - | 1.1408 - |
| A2P1-SF-C-05-05 | 1.119 J | 0.726 J | 0.713 J | 0.726 J | 1.54 - | 5.89 J | 0.022 U | 9.5 - | 0.8 J | 1.1587 - |
| A2P1-SF-C-05-06 | 1.504 J | 1.038 J | 1 J | 1.038 J | 1.57 - | 8.89 J | 0.5 - | 15.9 J | 0.69 J | 1.5416 - |
| A2P1-SF-C-05-07 | 0.757 J | 0.258 J | 0.256 J | 0.258 J | 1.04 - | 3.21 J | 0.019 U | 6.17 - | 1.56 - | 0.7873 J |
| A2P1-SF-C-05-10 | 1.201 J | 0.807 J | 0.805 J | 0.807 J | 2.71 - | 6.59 J | 0.34 - | 49.7 J | 0.92 J | 1.3511 - |
| A2P1-SF-C-05-11 | 0.744 J | 0.295 J | 0.298 J | 0.295 J | 0.963 - | 4.75 J | 0.019 U | 5.97 - | 0.72 J | 0.7817 J |
| A2P1-SF-C-05-12 | 0.674 J | 0.31 J | 0.297 J | 0.31 J | 1.04 - | 4.22 J | 0.019 U | 6.04 - | 0.47 J | 1.0947 - |
| A2P1-SF-C-05-14 | 1.208 J | 0.778 J | 0.748 J | 0.778 J | 1.23 - | 5.91 J | 0.34 - | 11.3 - | 0.48 J | 1.4424 - |
| A2P1-SF-C-05-15 | 1.062 J | 0.741 J | 0.73 J | 0.741 J | 1.49 - | 4.97 J | 0.28 - | 10.9 - | 0.68 J | 2.9045 - |
| A2P1-SF-C-05-16 | 1.312 J | 0.931 J | 0.944 J | 0.931 J | 1.54 - | 5.41 J | 0.31 - | 11.3 - | 0.61 J | 1.3248 - |
| A2P1-SF-C-05-16-D | 1.252 J | 0.826 J | 0.844 J | 0.826 J | 1.56 - | 5.09 J | 0.25 - | 13.4 J | 0.69 J | 1.538 - |
| FRL | 1.7 | 1.8 | 1.7 | 1.5 | 10 | 12 | 1.5 | 200 | 10 | 6.97 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg | mg/kg | mg/kg | pCi/g |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 1.504 @ | 1.038 @ | 1.000 @ | 1.038 @ | 2.71 @ | 8.89 @ | 0.50 @ | 49.7 @ | 1.56 @ | 2.905 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 1 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median).

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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4202

A2P1-SF-C-05

| SECONDARY COCs | | | | | | | |
|--------------------------------------|--------------|--------------|--------------------|----------------|----------------------|------------------------|------------------------|
| Station Number | Aroclor-1254 | Aroclor-1260 | 1,1-Dichloroethene | Benzo(a)pyrene | Bromodichloromethane | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene |
| A2P1-SF-C-05-02 | 38.3 UJ | 38.3 UJ | 48.2 U | 383 UJ | 470 U | 1.91 U | 383 UJ |
| A2P1-SF-C-05-03 | 37.4 UJ | 37.4 UJ | 45.5 U | 374 UJ | 444 U | 1.87 U | 374 UJ |
| A2P1-SF-C-05-04 | 34.5 UJ | 34.5 UJ | 43.1 U | 345 UJ | 420 U | 1.73 U | 345 UJ |
| A2P1-SF-C-05-05 | 40.3 UJ | 40.3 UJ | 50.8 U | 403 UJ | 495 U | 2.01 U | 403 UJ |
| A2P1-SF-C-05-06 | 39 UJ | 39 UJ | 48.4 U | 390 UJ | 472 U | 1.95 U | 390 UJ |
| A2P1-SF-C-05-07 | 34 UJ | 34 UJ | 42.7 U | 340 UJ | 416 U | 1.7 U | 340 UJ |
| A2P1-SF-C-05-10 | 38.3 UJ | 38.3 UJ | 47.2 U | 383 UJ | 461 U | 1.92 U | 383 UJ |
| A2P1-SF-C-05-11 | 34.7 UJ | 34.7 UJ | 43.2 U | 347 UJ | 422 U | 1.73 U | 347 UJ |
| A2P1-SF-C-05-12 | 34.9 UJ | 34.9 UJ | 43.5 U | 3.9 J | 424 U | 1.75 U | 349 UJ |
| A2P1-SF-C-05-14 | 36.9 UJ | 36.9 UJ | 45.4 U | 4.5 J | 443 U | 1.84 U | 369 UJ |
| A2P1-SF-C-05-15 | 36.6 UJ | 36.6 UJ | 43.9 U | 366 R | 428 U | 1.83 U | 366 R |
| A2P1-SF-C-05-16 | 37.7 UJ | 37.7 UJ | 46.2 U | 377 UJ | 451 U | 1.89 U | 377 UJ |
| A2P1-SF-C-05-16-D | 38 UJ | 38 UJ | 48.8 U | 380 UJ | 476 U | 1.9 U | 380 UJ |
| FRL | 130 | 130 | 410 | 2000 | 4000 | 2000 | 20000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Confidence Level | 90% | 90% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 40.3 UJ @ | 40.3 UJ @ | 50.8 U @ | 403 UJ @ | 495 U @ | 2.01 U @ | 403 UJ @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 11 | 12 | 12 | 11 |
| Number of NDs | 12 | 12 | 12 | 9 | 12 | 12 | 11 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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4202

A2P1-SF-C-06

| Station Number | PRIMARY COCs | | | | | SECONDARY COCs | | | | |
|---------------------------|--------------|------------|-------------|-------------|----------------|----------------|-----------|--------|------------|-------------|
| | Radium-226 | Radium-228 | Thorium-228 | Thorium-232 | Uranium, Total | Arsenic | Beryllium | Lead | Molybdenum | Thorium-230 |
| A2P1-SF-C-06-02 | 1.046 J | 0.9 J | 0.897 J | 0.9 J | 6.24 J | 3.42 J | 0.3 - | 9.96 - | 0.49 - | 1.3258 - |
| A2P1-SF-C-06-03 | 1.14 J | 0.885 J | 0.863 J | 0.885 J | 1.26 J | 5.12 - | 0.31 - | 10.2 - | 0.3 U | 1.5505 - |
| A2P1-SF-C-06-04 | 0.924 J | 0.792 J | 0.753 J | 0.792 J | 2.71 - | 2.79 - | 0.21 - | 7.5 - | 0.63 - | 1.2784 - |
| A2P1-SF-C-06-05 | 1.153 J | 0.904 J | 0.869 J | 0.904 J | 4.13 - | 6.23 - | 0.41 - | 12.9 - | 0.54 - | 1.3179 - |
| A2P1-SF-C-06-07 | 1.119 J | 0.784 J | 0.775 J | 0.784 J | 2.93 - | 2.52 - | 0.43 - | 6.61 - | 0.85 - | 1.1711 - |
| A2P1-SF-C-06-08 | 1.081 J | 0.899 J | 0.892 J | 0.899 J | 3.56 - | 5.45 - | 0.33 - | 10.9 - | 0.91 - | 1.24 - |
| A2P1-SF-C-06-09 | 1.187 J | 0.857 J | 0.817 J | 0.857 J | 8.97 - | 6.19 - | 0.28 - | 14.4 - | 0.67 - | 1.4454 - |
| A2P1-SF-C-06-09-D | 1.109 J | 0.873 J | 0.856 J | 0.873 J | 7.82 - | 4.85 - | 0.43 - | 20.2 - | 0.32 U | 1.4627 - |
| A2P1-SF-C-06-10 | 0.821 J | 0.585 J | 0.583 J | 0.585 J | 6.91 - | 5.33 - | 0.1 - | 9.75 - | 0.66 - | 1.0861 J |
| A2P1-SF-C-06-12 | 0.998 J | 0.786 J | 0.769 J | 0.786 J | 3.5 - | 6.26 - | 0.14 - | 11.9 - | 0.38 - | 1.2072 - |
| A2P1-SF-C-06-13 | 0.775 J | 0.686 J | 0.671 J | 0.686 J | 2.15 - | 7.84 - | 0.022 U | 9.18 - | 1.57 - | 0.9991 J |
| A2P1-SF-C-06-14 | 0.972 J | 0.698 J | 0.689 J | 0.698 J | 3.23 - | 3.07 - | 0.021 U | 7.16 - | 0.32 - | 1.3829 - |
| A2P1-SF-C-06-16 | 1.191 J | 0.799 J | 0.77 J | 0.799 J | 3.32 - | 6.32 - | 0.3 - | 15.1 - | 0.38 - | 1.5604 - |
| FRL (BTV) | 1.7 | 1.8 | 1.7 | 1.5 | 10 | 12 | 1.5 | (200) | (10) | 6.97 |
| Units | pCi/g | pCi/g | pCi/g | pCi/g | ug/g | mg/kg | mg/kg | mg/kg | mg/kg | pCi/g |
| Confidence Level | 95% | 95% | 95% | 95% | 95% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 1.191 @ | 0.904 @ | 0.897 @ | 0.904 @ | 8.97 @ | 7.84 @ | 0.43 @ | 20.2 @ | 1.57 @ | 1.560 @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.

The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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A2P1-SF-C-06

| Station Number | SECONDARY COCs | | | | | | |
|---------------------------|----------------|--------------|--------------------|----------------|----------------------|------------------------|------------------------|
| | Aroclor-1254 | Aroclor-1260 | 1,1-Dichloroethene | Benzo(a)pyrene | Bromodichloromethane | Dibenzo(a,h)anthracene | Indeno(1,2,3-cd)pyrene |
| A2P1-SF-C-06-02 | 40.6 UJ | 40.6 UJ | 51.1 U | 406 UJ | 498 U | 2.03 U | 406 UJ |
| A2P1-SF-C-06-03 | 39.4 UJ | 39.4 UJ | 49 U | 394 UJ | 478 U | 1.03 J | 394 UJ |
| A2P1-SF-C-06-04 | 39.5 UJ | 39.5 UJ | 49.3 U | 395 UJ | 481 U | 1.98 U | 395 UJ |
| A2P1-SF-C-06-05 | 38.2 UJ | 38.2 UJ | 47.8 U | 382 UJ | 466 U | 1.91 U | 382 UJ |
| A2P1-SF-C-06-07 | 9.7 UJ | 40.1 UJ | 49 U | 401 UJ | 478 U | 2 U | 401 UJ |
| A2P1-SF-C-06-08 | 38.3 UJ | 38.3 UJ | 47.3 U | 125 J | 461 U | 1.91 U | 73 J |
| A2P1-SF-C-06-09 | 40.3 UJ | 40.3 UJ | 50.3 U | 403 UJ | 491 U | 2.02 U | 403 UJ |
| A2P1-SF-C-06-09-D | 42.5 UJ | 42.5 UJ | 50.1 U | 425 UJ | 489 U | 2.12 U | 425 UJ |
| A2P1-SF-C-06-10 | 39.8 UJ | 39.8 UJ | 48.7 U | 398 UJ | 475 U | 1.99 U | 398 UJ |
| A2P1-SF-C-06-12 | 38.9 UJ | 38.9 UJ | 49.5 U | 389 UJ | 483 U | 1.94 U | 389 UJ |
| A2P1-SF-C-06-13 | 39.7 UJ | 39.7 UJ | 47.5 U | 4.3 J | 464 U | 1.98 U | 397 UJ |
| A2P1-SF-C-06-14 | 6.2 UJ | 38.1 UJ | 46.7 U | 381 UJ | 456 U | 1.9 U | 381 UJ |
| A2P1-SF-C-06-16 | 41.2 UJ | 41.2 UJ | 50.4 U | 412 UJ | 492 U | 2.06 U | 412 UJ |
| FRL | 130 | 130 | 410 | 2000 | 4000 | 2000 | 20000 |
| Units | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg |
| Confidence Level | 90% | 90% | 90% | 90% | 90% | 90% | 90% |
| Max Result | 42.5 UJ @ | 42.5 UJ @ | 51.1 U @ | 425 UJ @ | 498 U @ | 2.12 U @ | 425 UJ @ |
| Standardized Skewness | -- | -- | -- | -- | -- | -- | -- |
| W-Statistic Probability * | -- | -- | -- | -- | -- | -- | -- |
| Test Procedure | -- | -- | -- | -- | -- | -- | -- |
| Sample Size | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of NDs | 12 | 12 | 12 | 10 | 12 | 11 | 11 |
| Estimated Mean** | -- | -- | -- | -- | -- | -- | -- |
| UCL of the Mean | -- | -- | -- | -- | -- | -- | -- |
| Non-Parametric Prob. | -- | -- | -- | -- | -- | -- | -- |
| Est. Mean - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| 2x Rule - Pass / Fail | -- | -- | -- | -- | -- | -- | -- |
| a posteriori Sample | -- | -- | -- | -- | -- | -- | -- |
| Size Calculation | -- | -- | -- | -- | -- | -- | -- |

Note: ** Estimated Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)

The maximum value of the two duplicates was used in all statistical equations.

- * This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

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APPENDIX B

**VARIANCE/FIELD CHANGE NOTICES
FOR THE A2PI CERTIFICATION PSP**

| | |
|--|-----------------------|
| VARIANCE / FIELD CHANGE NOTICE | V/F 20400-PSP-0004-01 |
| WBS NO.: PROJECT/DOCUMENT/ECDC #20400-PSP-0004 REV 0 | Page 1 of 1 |
| PROJECT TITLE: PSP for Certification Sampling of the Area 2 Phase I Former Inactive Flyash Pile, South Field, Carolina Area, East-West Construction Road and Equipment Wheel Wash Facility | Date 11/08/01 |

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents the change to the sample analysis process for certification samples from the South Field.

The samples are for certification purposes and are to be sent off-site for analysis. Alpha/beta screening will not be conducted on these samples.

Justification

Process knowledge (per Andy Rogers, ESH&Q) and the precertification data indicate that FRLs will be met in the South Field since the area has undergone remediation. Therefore, any samples sent off-site for analysis are below established FRLs and alpha/beta screening is not necessary.

ORIGINAL

REQUESTED BY: Frank Miller Date: 11/08/01

| X IF REQD | VARIANCE/FCN APPROVAL | DATE | X IF REQD | VARIANCE/FCN | DATE |
|-----------|--|----------|-----------|---|---------|
| X | QUALITY ASSURANCE <i>[Signature]</i> | 11-08-01 | X | PROJECT MANAGER <i>[Signature]</i> | 11/8/01 |
| | DATA QUALITY MANAGEMENT | | X | Characterization Manager <i>[Signature]</i> | 11/8/01 |
| X | ANALYTICAL CUSTOMER SUPPORT <i>[Signature]</i> | 11/8/01 | X | Sampling Manager <i>[Signature]</i> | 11/8/01 |

VARIANCE/FCN APPROVED YES NO REVISION REQUIRED: YES NO

DISTRIBUTION

| | | |
|--------------------|----------------------------------|--------|
| PROJECT MANAGER: | DOCUMENT CONTROL: Jeannie Rosser | OTHER: |
| QUALITY ASSURANCE: | OTHER: | OTHER: |
| FIELD MANAGER: | OTHER: | OTHER: |

VARIANCE / FIELD CHANGE NOTICE

4202

V/F 20400-PSP-0004-

WBS NO.: PROJECT/DOCUMENT/ECDC #20400-PSP-0004 REV 0

Page 1 of 1

PROJECT TITLE: PSP for Certification Sampling of the Area 2 Phase I Former Inactive Flyash Pile, South Field, Carolina Area, East-West Construction Road and Equipment Wheel Wash Facility

Date 11/16/01

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents the change to the CUs designated for validation to ASL D.

Referring to Section 4.1, Page 4-1, the reference to "A2PI-NWU-C-11" should be "A2PI-NWU-C-12" and the reference to "A2PI-SF-C-8" should be "A2PI-SF-C-7."

Justification

A2PI-SF-C-8 does not exist; the variance will correct a typographical error and submit a third release for validation. Since A2PI-NWU-C-12 contains Cs-137, it would be more conservative to validate this CU to ASL D, and validate A2PI-NWU-C-11 to ASL B.

REQUESTED BY: Ana Madani

Date: 11/16/01

| X IF REQD | VARIANCE/FCN APPROVAL | DATE | X IF REQD | VARIANCE/FCN | DATE |
|-----------|--|----------|-----------|---|----------|
| X | QUALITY ASSURANCE <i>Michelle Wysocka</i> | 11/16/01 | X | PROJECT MANAGER <i>John D. O'Connell</i> | 11/16/01 |
| | DATA QUALITY MANAGEMENT | | X | Characterization Manager <i>Paul Miller</i> | 11/16/01 |
| X | ANALYTICAL CUSTOMER SUPPORT <i>Denise M. Aruco</i> | 11/20/01 | X | Sampling Manager <i>Tom Sablaga</i> | 11/17/01 |

VARIANCE/FCN APPROVED YES NO

REVISION REQUIRED: YES NO

DISTRIBUTION

| | | |
|--------------------|----------------------------------|--------|
| PROJECT MANAGER: | DOCUMENT CONTROL: Jeannie Rosser | OTHER: |
| QUALITY ASSURANCE: | OTHER: | OTHER: |
| FIELD MANAGER: | OTHER: | OTHER: |

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VARIANCE / FIELD CHANGE NOTICE

4202

V/F 20400-PSP-0004-03

WBS NO.: PROJECT/DOCUMENT/ECDC #20400-PSP-0004 REV 0

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PROJECT TITLE: PSP for Certification Sampling of the Area 2 Phase I Former Inactive Flyash Pile, South Field, Carolina Area, East-West Construction Road and Equipment Wheel Wash Facility

Date 02/07/02

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents the re-location of sample point NWU-5-15.

This sample point will be re-located four feet to the east. The new sample coordinates are Northing 477816.14; Easting 1347389.77.

Justification

NWU-5-15 is currently located in a rocky area, which makes sampling very difficult. Re-locating the sample point will ensure sufficient soil material can be obtained for sampling. In accordance with the PSP, re-location of any sample point greater than three feet from its original location requires documentation in a variance.

REQUESTED BY: Ana Madani

Date: 02/07/02

| X IF REQD | VARIANCE/FCN APPROVAL | DATE | X IF REQD | VARIANCE/FCN | DATE |
|-----------|-----------------------------|------|-----------|---|--------|
| X | QUALITY ASSURANCE | | X | PROJECT MANAGER <i>[Signature]</i> | 2-7-02 |
| | DATA QUALITY MANAGEMENT | | X | Characterization Manager <i>[Signature]</i> | 2-7-02 |
| | ANALYTICAL CUSTOMER SUPPORT | | X | Sampling Manager <i>[Signature]</i> | 2/7/02 |

VARIANCE/FCN APPROVED YES NO

REVISION REQUIRED: YES NO

DISTRIBUTION

| | | |
|--------------------|----------------------------------|--------|
| PROJECT MANAGER: | DOCUMENT CONTROL: Jeannie Rosser | OTHER: |
| QUALITY ASSURANCE: | OTHER: | OTHER: |
| FIELD MANAGER: | OTHER: | OTHER: |

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ORIGINAL

VARIANCE / FIELD CHANGE NOTICE

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V/F 20400-PSP-0004

WBS NO.: PROJECT/DOCUMENT/ECDC #20400-PSP-0004 REV 0

Page 1 of 1

PROJECT TITLE: PSP for Certification Sampling of the Area 2 Phase I Former Inactive Flyash Pile, South Field, Carolina Area, East-West Construction Road and Equipment Wheel Wash Facility

Date 02/07/02

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents a change in the analytical process for Total Uranium for the following sample releases:

- 23989 (IFP-4)*
- 23990 (IFP-2)*
- 24073 (SF-6) ASL D/VAL D
- 24078 (SF-5)*
- 24085 (SF-3)*
- 24243 (SF-4)*
- 24324 (SF-2)*

These releases will have Total Uranium re-logged for analysis by ICP-MS, Method 5502.

All releases designated "*" require ASL D analysis and data packages. The data are to be validated at ASL B.

In addition, samples collected from CUs IFP-1, SF-1 and SF-7 will have Total Uranium analyzed by ICP-MS; the same analytical and validation processes specified in the PSP shall otherwise apply.

Justification

This change is necessary to meet a lower MDC (1 mg/kg) for the IFP and SF areas of A2PI.

REQUESTED BY: Ana Madani

Date: 02/07/02

| X IF REQD | VARIANCE/FCN APPROVAL | DATE | X IF REQD | VARIANCE/FCN | DATE |
|-----------|--|--------|-----------|---|---------|
| X | QUALITY ASSURANCE <i>[Signature]</i> | 2/7/02 | X | PROJECT MANAGER <i>[Signature]</i> | 2/19/02 |
| | DATA QUALITY MANAGEMENT <i>[Signature]</i> | 2/7/02 | X | Characterization Manager <i>[Signature]</i> | 2/7/02 |
| X | ANALYTICAL CUSTOMER SUPPORT <i>[Signature]</i> | 2/7/02 | | Sampling Manager | |

VARIANCE/FCN APPROVED YES NO

REVISION REQUIRED: YES NO

DISTRIBUTION

| | | |
|--------------------|----------------------------------|---------------|
| PROJECT MANAGER: | DOCUMENT CONTROL: Jeannie Rosser | OTHER: |
| QUALITY ASSURANCE: | OTHER: | OTHER: |
| FIELD MANAGER: | OTHER: | OTHER: 000069 |

ORIGINAL

VARIANCE / FIELD CHANGE NOTICE

4202

V/F 20400-PSP-0004-05

WBS NO.: PROJECT/DOCUMENT/ECDC #20400-PSP-0004 REV 0

Page 1 of 1

PROJECT TITLE: PSP for Certification Sampling of the Area 2 Phase I Former Inactive Flyash Pile, South Field, Carolina Area, East-West Construction Road and Equipment Wheel Wash Facility

Date 03/18/02

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents the collection of additional samples in A2P1-SF-CU4 for total uranium analysis.

Sample locations are shown on the attached figure; sample location coordinates are provided in Attachment 1. Samples will be analyzed by ICP-MS, Method 5502. Field data will be validated. All analytical data will be validated at ASL B.

THIS VARIANCE WAS CANCELLED. DATA FROM THE REAL-TIME SCAN OF THE CU WAS USED IN LIEU OF PHYSICAL SAMPLING, AND THE HOT SPOT WILL BE EXCAVATED.

Justification

Above-FRL total uranium concentrations have been detected in this CU. Archive samples will be analyzed to confirm the presence of total uranium and to determine whether these concentrations will cause the CU to fail.

REQUESTED BY: Ana Madani

Date: 03/18/02

| X IF REQD | VARIANCE/FCN APPROVAL | DATE | X IF REQD | VARIANCE/FCN | DATE |
|---|-----------------------------|----------------------------------|--|--------------------------|------|
| | QUALITY ASSURANCE | | X | PROJECT MANAGER | |
| | DATA QUALITY MANAGEMENT | | X | CHARACTERIZATION MANAGER | |
| X | ANALYTICAL CUSTOMER SUPPORT | | | SAMPLING MANAGER | |
| VARIANCE/FCN APPROVED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | | | REVISION REQUIRED: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | |
| DISTRIBUTION | | | | | |
| PROJECT MANAGER: | | DOCUMENT CONTROL: Jeannie Rosser | | OTHER: | |
| QUALITY ASSURANCE: | | OTHER: | | OTHER: | |
| FIELD MANAGER: | | OTHER: | | OTHER: 000070 | |

VARIANCE / FIELD CHANGE NOTICE

4202

V/F 20400-PSP-0004

WBS NO.: PROJECT/DOCUMENT/ECDC #20400-PSP-0004 REV 0

Page 1 of 1

PROJECT TITLE: PSP for Certification Sampling of the Area 2 Phase I Former Inactive Flyash Pile, South Field, Carolina Area, East-West Construction Road and Equipment Wheel Wash Facility

Date 03/27/02

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents a change to data validation for the South Field Certification Units.

Total Uranium was originally to be validated at ASL D for A2PI-SF-C-7, in accordance with the PSP and Variance 2. However, data were instead validated for A2PI-SF-C-6.

Justification

Sampling has been delayed for A2PI-SF-C-7 due to excavation of Basin 1.

REQUESTED BY: Ana Madani

Date: 03/27/02

| X IF REQD | VARIANCE/FCN APPROVAL | DATE | X IF REQD | VARIANCE/FCN | DATE |
|-----------|--|---------|-----------|---|---------|
| X | QUALITY ASSURANCE <i>[Signature]</i> | 3/27/02 | X | PROJECT MANAGER <i>[Signature]</i> | 3/27/02 |
| | DATA QUALITY MANAGEMENT | | X | CHARACTERIZATION MANAGER <i>[Signature]</i> | 3/27/02 |
| X | ANALYTICAL CUSTOMER SUPPORT <i>[Signature]</i> | 4/1/02 | | SAMPLING MANAGER | |

VARIANCE/FCN APPROVED YES NO

REVISION REQUIRED: YES NO

DISTRIBUTION

| | | |
|--------------------|----------------------------------|--------|
| PROJECT MANAGER: | DOCUMENT CONTROL: Jeannie Rosser | OTHER: |
| QUALITY ASSURANCE: | OTHER: | OTHER: |
| FIELD MANAGER: | OTHER: | OTHER: |

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