CERTIFICATION REPORT FOR AREA 2, PHASE II PART THREE SOIL STOCKPILE 3 FOOTPRINT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JANUARY 2001

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

20450-RP-0004
REVISION A
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LIST OF ACRONYMS AND ABBREVIATIONS

A2PII	Area 2, Phase II
ASCOC	area-specific constituent of concern
ASL	analytical support level
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	constituent of concern
CU	certification unit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FRL	final remediation level
GC	gas chromatography
GC/MS	gas chromatography/mass spectroscopy
HAMDC	highest allowable minimum detectable concentration
ICP-AES	inductively coupled plasma – atomic emission spectroscopy
LCS	laboratory control sample
MDC	minimum detectable concentration
mg/kg	milligrams per kilogram
OEPA	Ohio Environmental Protection Agency
OSDF	On-Site Disposal Facility
OU	Operable Unit
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyl
pCi/g	picoCuries per gram
PSP	Project Specific Plan
QA/QC	Quality Assurance/Quality Control
RAWP	Remedial Action Work Plan
ROD	Record of Decision
RSS	Radiation Scanning System
RTRAK	Real-Time Radiation Tracking System
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SDFP	Soil and Disposal Facility Project
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SP3	Soil Stockpile 3
SWRB	Storm Water Retention Basin
SWUs	Southern Waste Units
TPU	total propagated uncertainty
UCL	upper confidence level
V&V	verification and validation
WAC	waste acceptance criteria

EXECUTIVE SUMMARY

This certification report presents the information and data used by the U.S. Department of Energy (DOE) to determine that existing soil contamination does not exceed final remediation levels (FRLs) in the former Stockpile 3 (SP3) footprint in Area 2, Phase II (A2PII) Part Three at the Fernald Environmental Management Project (FEMP). On the basis of this reported information and supporting project files, DOE has determined that no further remedial actions are required in this area of the site, and therefore, the area can be considered "certified."

The SP3 footprint was divided into two certification units (CUs). Delineation and design of these CUs are presented in the Certification Design Letter (CDL) for the Former SP3 Footprint (DOE 2000a). Certification sampling was conducted in this area of the site to verify that the certification criteria established in the Sitewide Execavation Plan (SEP; DOE 1998) were achieved. These criteria state that: 1) the mean concentrations or activities of the primary area-specific constituents of concern (ASCOCs) within a CU are less than the FRLs at the 95 percent upper confidence level; and, 2) no certification result can exceed two times the FRL (i.e., the hot spot criterion). If either of these criteria is not met, then further investigation and possible excavation is required. If both of these criteria are met for a CU, than it can be released for final land use development.

Based on historical data and precertification real-time scanning data, no above-FRL contamination was found within the SP3 footprint; as a result, precertification and certification began without conducting further remedial activities. The SP3 footprint samples were analyzed at the FEMP on-site laboratories and an off-site, FEMP-approved laboratory, following guidelines outlined in the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ; Procedure FD-1000) and the SEP. All these samples were analyzed and reported at the required analytical support level. Analytical data packages included sample results, with associated quality assurance/quality control data, and all applicable raw data. The data were also subjected to the required validation and verification process, which did not identify any significant quality concerns.

All SP3 footprint CUs met the certification criteria. The determination of passing or failing certification was based on a review of certification sample analytical results from each CU against the certification

criteria. Statistical analysis was only necessary on CU A2P2-SP3-C-1 to determine if an ASCOC passed certification, since this CU was the only CU with an above-FRL results. Both CUs passed final certification relative to the average constituent of concern concentration and the "hot spot" determination on the first round of certification, and no additional corrective actions were necessary.

DOE has restricted access to certified areas (and those currently being certified) in order to maintain their integrity prior to development of the final land use. FEMP procedure EP-0008 has been developed to protect certified areas from becoming recontaminated. Upon approval from the regulatory agencies, this area will become available for future land use or restoration projects.

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 existing soil contamination does not exceed the final remediation levels (FRLs) within the Area 2, Phase II (A2PII) Part Three Soil Stockpile 3 (SP3) footprint. The soil is being certified in order to proceed with future land use. Based on the data generated and summarized in this report, DOE considers the remedial goals achieved in the A2PII Part Three SP3 footprint.

1.2 BACKGROUND

In the 1996 Operable Unit (OU) 5 Record of Decision (ROD; DOE 1996a), DOE committed to excavating contaminated soil that exceeds health-based FRLs with final disposition of the excavated material in the On-Site Disposal Facility (OSDF) or at an off-site disposal facility if the OSDF waste acceptance criteria (WAC) are exceeded. The OU5 Remedial Investigation Report (DOE 1995) defined the extent of soil contamination exceeding the FRLs, and in general, indicated widespread contamination occurring in approximately 430 acres of the 1,050-acre Fernald Environmental Management Project (FEMP). In the OU5 Remedial Action Work Plan (RAWP; DOE 1996b), DOE committed to preparing a Sitewide Excavation Plan (SEP; DOE 1998) to define the overall approach to implementing the soil and at- and below-grade debris cleanup obligations identified in the OU2, OU3, and OU5 RODs. In the SEP, the FEMP has been divided into distinct remedial areas and phases for soil remediation, based on the operable units' remediation schedule.

After all necessary at- and below-grade soil remediation is completed with each area/phase, the soil will be certified as attaining all clean up goals (i.e., FRLs). The SEP describes the general soil remediation and certification process at the FEMP. Since the SP3 footprint consisted of stockpiled soil and debris, excavation Approach A was followed in the SP3 footprint in A2PII Part Three. The stockpile was sampled to assess WAC attainment for disposition into the OSDF, and predesign samples were collected on the stockpile footprint to access FRL attainment prior to precertification. Once the pile was removed, precertification radiological scans were conducted over the footprint prior to certification. Precertification data collection started in October 2000, and data indicated that no soil remediation activities were required. All precertification and certification activities for these areas were conducted in compliance with the SEP.

1.3 AREA DESCRIPTION

The A2PII former SP3 footprint (Figure 1-1) is northeast of the Southern Waste Units (SWUs) and south of the Storm Water Retention Basin's (SWRB's) west chamber. The 2.8-acre SP3 footprint was originally a softball field, constructed in the early 1950s for use by site employees. Stockpiling of soil within the footprint was initiated in 1988 with the placement of excavated material from the SWRB project. SP3 was then used to accommodate excess soil generated during various construction projects in previously uncontrolled areas.

1.4 SCOPE

The scope of this report includes presenting certification results for the A2PII Part Three SP3 footprint and the subsequent conclusions. The remaining portion of A2PII Part Three will be certified at a later date. The SP3 footprint is divided into two certification units (CUs). The certification design for the CUs follows the general approach outlined in Section 3.4 of the SEP and detailed in Certification Design Letter (CDL) for the Former SP3 Footprint (DOE 2000a).

1.5 OBJECTIVES

The objectives of this Certification Report are:

- Describe the area preparation and precertification activities
- Describe the analytical methods, data validation processes, data reduction and statistical processes used to support the certification process
- Present certification sampling results for the two CUs
- Present the statistical analysis showing that all both CUs have passed the certification criteria, including FRL attainment and hot spot criteria
- Describe access controls implemented to prevent recontamination.

1.6 REPORT FORMAT

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

Section 1.0	Introduction: Purpose, background, area description, scope, and objectives of the report
Section 2.0	Certification Approach: The approach for certification sampling and analysis
Section 3.0	Overview of Field Activities: Area preparation, excavation, precertification and changes to work scope
Section 4.0	Analytical Methodologies, Data Validation Processes and Data Reduction
Section 5.0	Certification Evaluation and Conclusions
Section 6.0	Protection of Certified Areas
Appendix A	Certification Statistics
Appendix B	Certification Sample Results

1.7 FEMP CERTIFICATION MASTER MAP

In order to track certification and characterization for reuse areas at the FEMP, DOE updates a controlled map showing the status of the soil remediation areas and phased areas with all Certification Reports. This map has been updated to include certification of the A2PII Part Three SP3 footprint (Figure 1-2).

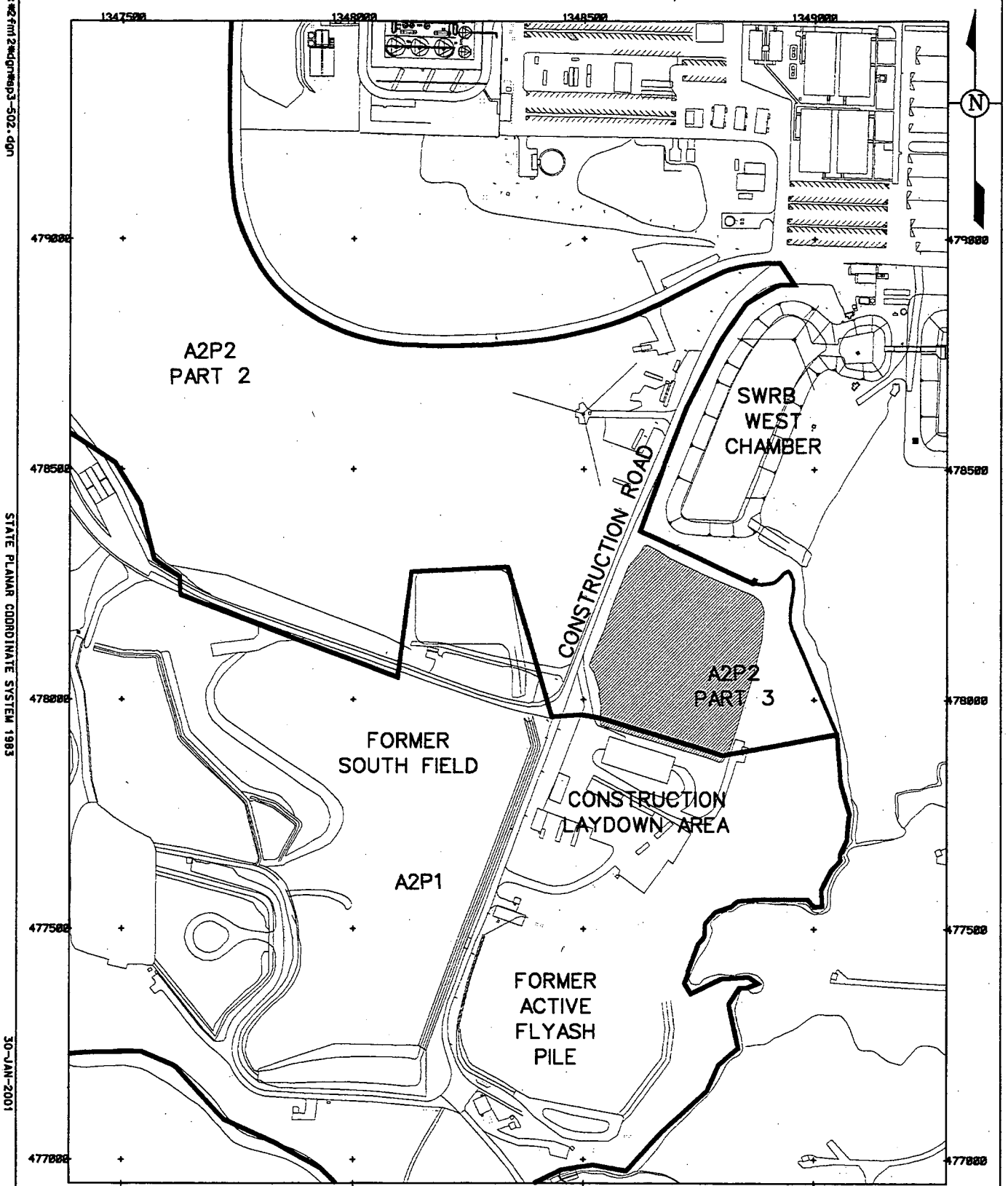
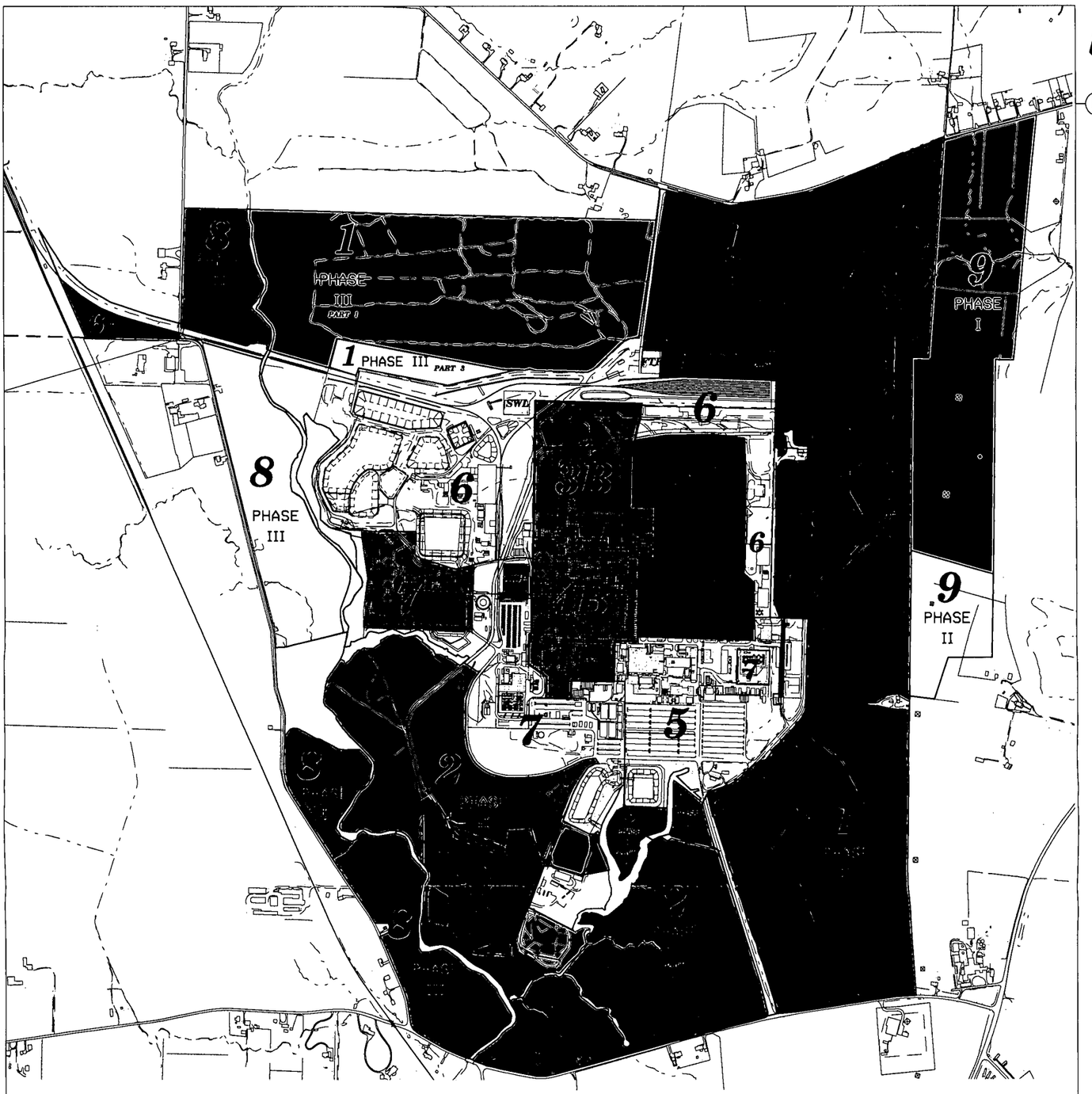


FIGURE 1-1. A2PII SP-3 FOOTPRINT LOCATION MAP



AREAS	TOTAL ACRES	[redacted]	CERT. ACRES IN PROGRESS	[redacted]	[redacted]	REMAINING ACRES
AREA 1	395.5	277.8	107.2	0	0	• 10.5
AREA 2	175.7	74.1	8.0	25.4	60.4	•• 7.8
AREA 3A/4A	41.5	0	0	41.5	0	0
AREA 3B/4B	56.9	0	0	0	56.9	0
AREA 5	56.5	0	0	0	0	56.5
AREA 6	123.0	4.4	0	0	0	118.6
AREA 7	68.8	0	0	0	14.6	54.2
AREA 8	99.2	60.3	0	0	0	38.9
PR/SSOD/PPDD	••• 33.1	0	0	0	2.1	31.0
TOTAL ON SITE	1050.0	416.6	115.4	25.4	117.1	375.7
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 OSDF EQUIPMENT WASH FACILITY AREA, INTERIM LEACHATE LINE CORRIDOR, AND THE DISSOLVED OXYGEN FACILITY AREA.

•• AREA 2 REMAINING ACRES INCLUDES 2.3 ACRES OF CHARACTERIZED FOR REUSE AREAS (BASIN 1 AND 2 [redacted]) AND SUBSURFACE SOIL FOR THE UTILITY CORRIDORS/TRANSFER LINES WITHIN THE AFP CERTIFICATION AREA.

••• PADDYS RUN/STORMSEWER OUTFALL DITCH/PILOT PLANT DRAINAGE DITCH CORRIDOR IS IDENTIFIED IN [redacted].

AIPI ROADS EXCLUDED FROM CERTIFICATION. [redacted]

SCALE

1100 550 0 1100 FEET

DRAFT

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 purpose of certification sampling is to verify that the mean concentrations or activities of primary ASCOCs remaining in the soil of a CU following remedial activities are less than the FRLs at a 95-percent upper confidence level (UCL), and at a 90-percent UCL for secondary ASCOCs. The certification process also includes the hot spot criterion, which states that if any of the certification results exceeds two times the FRL, further action is required as discussed in Section 2.2.5. If the mean residual ASCOC concentrations or activities are below the FRLs within the respective confidence bounds, and the hot spot criterion is met, then the remedial objectives have been achieved for the CU. It can then be released for regrading, reseeding and development of a final land use. The general certification strategy is described in Section 3.4 of the SEP, and the A2PII Part Three SP3 footprint specific strategy is described in the CDL for the former SP3 footprint.

2.1.1 Selection of Area-Specific Contaminants of Concern

As stated in the SEP, the primary radiological constituents of concern (COCs) (total uranium, radium-226, radium-228, thorium-228, and thorium-232) were retained sitewide as ASCOCs in each remediation area. The selection process for retaining secondary ASCOCs for a remediation area is driven by applying a set of decision criteria, as follows:

- The ASCOC must be listed as a soil COC in either the OU2 or OU5 ROD
- The ASCOC must be traced to site use, either through process knowledge or known release of the constituent to the environment
- Analytical results must indicate the COC is present at concentrations sufficiently above its FRL to possibly fail certification criteria, and the above-FRL results are not attributable to false positives or elevated contract required detection limits.

2.1.2 ASCOC Selection Process for SP3 Footprint

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary COCs and were retained as ASCOCs.

Historical aerial photos indicate no production operations were conducted in the former SP3 footprint. The area was used primarily as a softball field prior to the creation of the soil pile. The reasons for not retaining certain secondary COCs as an ASCOC were based on the historical data from the soil pile and the physical characteristics of the COCs (i.e., volatility, degradation, mobility, etc.). Arsenic, beryllium, aroclor-1254, aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were retained as secondary ASCOCs since these COCs could potentially be present after the removal of SP3. Eight of the 12 random sample locations within each CU were analyzed for the organic secondary COCs, as required in Section 3.0 of the SEP. The complete ASCOC list can be found in Table 2-1.

2.2 CERTIFICATION APPROACH

Excavation Approach A, as described in Section 4.5 of the SEP, was used as the basis for certification in this area. The certification design for the SP3 footprint follows the general approach outlined in Section 3.4 of the SEP.

2.2.1 Certification Design

The certification design and sampling strategy follows Section 3.4 of the SEP. Two Group 1 CUs (which can be as large as 62,500 square feet) are identified and depicted in Figure 2-1. The two Group 1 CUs cover the entire area of the SP3 footprint and are bounded to the north and east by runoff berms. The small ditch area between the road and footprint boundary will be certified during certification of roads and corridors. This ditch can then catch runoff from the road and will not impact a certified area.

2.2.2 Sample Selection Process

The selection of certification sampling locations was conducted according to Section 3.4.2 of the SEP. Each CU was first divided into 16 approximately equal sub-CUs. Sample locations were then generated by randomly selecting easting and northing coordinates within each sub-CU boundary and testing the locations against the minimum distance criterion for the CU. The selected SP3 footprint certification samples are shown in Figure 2-2. The minimum distance criterion is the smallest distance allowed between two sample locations within a CU and is a function of CU size. The formula for calculating the minimum distance is presented in the SEP. As necessary, the locations were re-tested, and alternate random locations were selected for that sub-CU. This process continued until all random locations met the minimum distance criterion.

2.2.3 Certification Sampling and Analysis

Each CU sample was collected from the 0 to 6-inch (surface) soil interval at the designated and surveyed location. Four of the 16 locations (one per each quadrant of the CU) were randomly selected for archiving, and the other 12 locations were submitted for analysis.

2.2.4 Statistical Analysis

The statistical analysis of certification samples is discussed in Appendix G of the SEP. The statistical analysis of certification results for each CU is presented in Appendix A.

TABLE 2-1
ASCOC LIST FOR SP3 FOOTPRINT CUs

ASCOC	FRL	Reason Retained
Total Uranium	82 mg/kg	Retained as a primary ASCOC sitewide
Radium-226	1.7 pCi/g	Retained as a primary ASCOC sitewide
Radium-228	1.8 pCi/g	Retained as a primary ASCOC sitewide
Thorium-228	1.7 pCi/g	Retained as a primary ASCOC sitewide
Thorium-232	1.5 pCi/g	Retained as a primary ASCOC sitewide
Arsenic	12 mg/kg	Retained as a secondary ASCOC sitewide
Beryllium	1.5 mg/kg	Retained as a secondary ASCOC sitewide
Aroclor-1254	.13 mg/kg	Retained as a secondary ASCOC sitewide
Aroclor-1260	.13 mg/kg	Retained as a secondary ASCOC sitewide
Benzo(a)pyrene	2.0 mg/kg	Retained as a secondary ASCOC sitewide
Benzo(b)fluoranthane	20.0 mg/kg	Retained as a secondary ASCOC sitewide
Dibenzo(a,h)anthracene	2.0 mg/kg	Retained as a secondary ASCOC sitewide
Indeno(1,2,3-cd)pyrene	20.0 mg/kg	Retained as a secondary ASCOC sitewide

mg/kg – milligrams per kilogram
pCi/g – picoCuries per gram

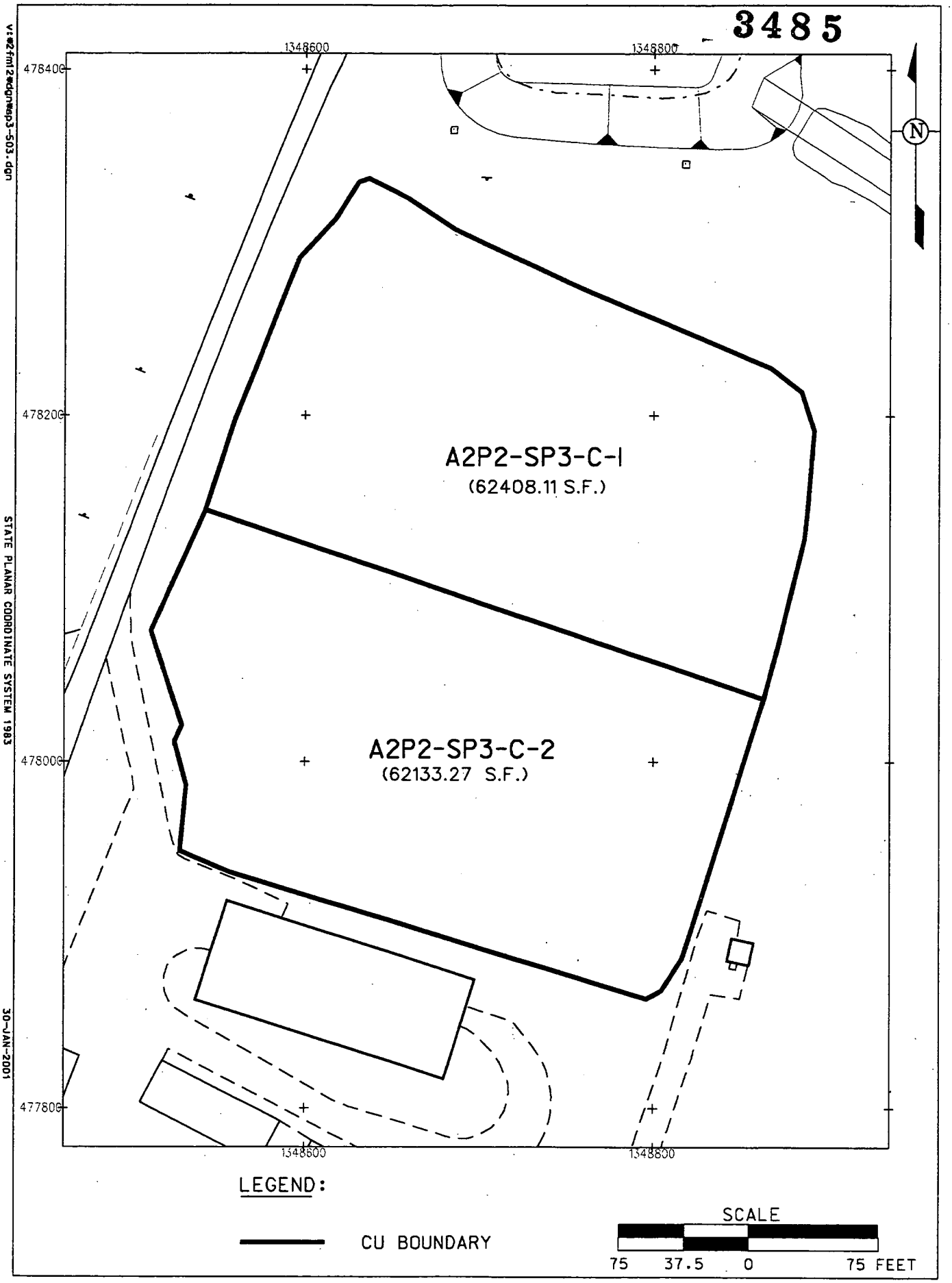


FIGURE 2-1. A2PII SP-3 CERTIFICATION UNITS

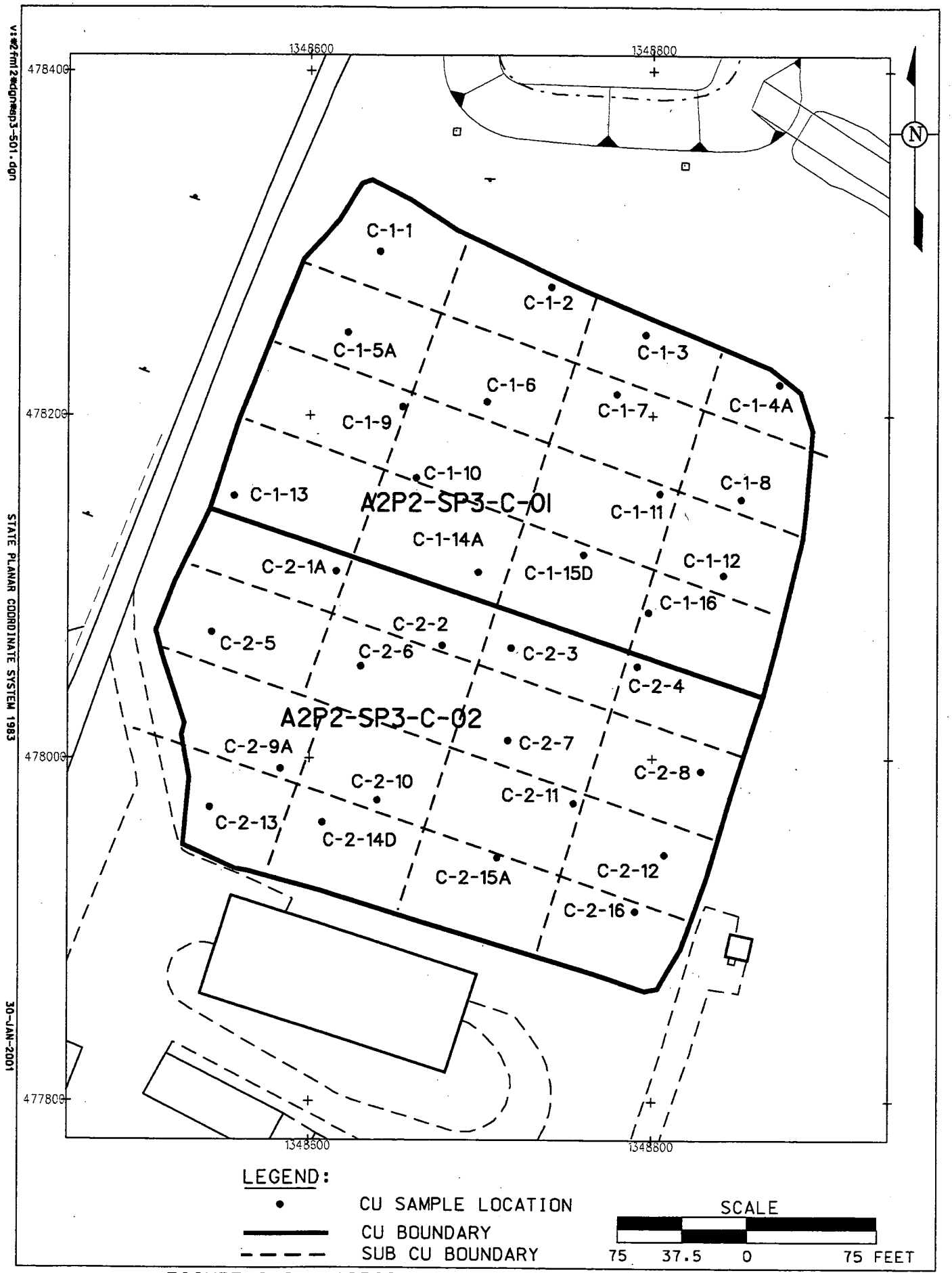


FIGURE 2-2. A2PII SP-3 CU SAMPLE LOCATIONS

3.0 OVERVIEW OF FIELD ACTIVITIES

3.1 AREA PREPARATION, EXCAVATION AND PRECERTIFICATION

The following is a chronological list of events within the A2PII former SP3 certification footprint.

- In March 2000, WAC characterization and predesign sample borings were collected at depth and at the interface of the native soil in the SP3 footprint per the Project Specific Plan (PSP) for Sampling SP3 for OSDF WAC Attainment (DOE 2000b).

- In May 2000, Petro Environmental began excavation of SP3 under the direction of the Fluor Fernald construction team. Per agreement with the regulatory agencies (Variance/Field Change Notice 20450-PSP2-0003), real-time scanning was performed on the surface of the open excavation approximately once every five working days.

- Excavation of SP3 concluded on July 25, 2000, with a total of 56,616 cubic yards of material excavated and hauled to the OSDF. The Waste Acceptance Organization Material Tracking Log number for the material is W800053. Approximately 55,188 cubic yards of Category 1, 1,120 cubic yards of Category 2 and 308 cubic yards of Category 4 material was tracked and hauled to the OSDF. Five Real-Time Radiation Tracking System (RTRAK) and three Radiation Scanning System (RSS) excavation monitoring scans were conducted over the course of the excavation.

- After the stockpile was removed, two RSS real-time scans were conducted over the footprint of the former SP3 prior to an additional 6-inch scrape over the surface of the footprint. In addition, a magnetometer scan was conducted over the SP3 footprint and all identified debris (mostly fence post foundations) was removed. In October 2000, precertification scanning was conducted under the PSP for Predesign Sampling in A2PII Parts Two and Three (DOE 2000c).

- In late October, certification samples were collected, with analysis completed in January 2001.

- The total cost of excavation of SP3 is $522,614. The total cost for the precertification and certification of the A2PII former SP3 footprint area is $39,474.

3.2 CHANGES TO SCOPE OF WORK

The scope of work for the former SP3 footprint certification sampling was documented in the CDL and Certification Sampling PSP of the Former SP3 Footprint (DOE 2000d), and there were no major changes during field implementation. Final certification sampling locations and CU boundaries remained as identified, and all analyses were carried out as planned.

Only minor changes to the scope of work were encountered in the SP3 footprint certification:

- Modified Table 3-1 of PSP as follows:
  - Preservation of arsenic and beryllium for the liquid matrix was corrected to HNO_3 to pH<2
  - The container size for the polychlorinated biphenyl (PCB) and polyaromatic hydrocarbon (PAH) analytes was changed to 250 ml to reduce the headspace
  - The preservation and container type was changed for the radiological container blank analytes. No preservation is required and the container type should be a capped liner.
- Corrected the northing and easting in Appendix B for sample identification A2P2-SP3-C-1-11. The wrong coordinates were entered into the appendix.

4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES AND DATA REDUCTION

4.1 ANALYTICAL METHODOLOGIES

Samples from the former SP3 footprint were analyzed at the FEMP on-site laboratory and at an off-site FEMP-approved laboratory which meets Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ; Procedure FD-1000) requirements. To be on the FEMP Approved Laboratories List, a laboratory must comply with SCQ requirements and be audited within one year of sample analysis. 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 the following exception. For soil samples, the project-specified minimum detectable concentration (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, 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. Certification analytical results are provided in Appendix B and a summary of the analytical methods follows.

4.1.1 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, and percent recovery for duplicate samples for each analyte. The on-site laboratory was required to meet these specifications using the methodologies described below.

Total Uranium

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

Total uranium (mg/kg) = (2.998544) x uranium-238 gamma spectrometry result (pCi/g)

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

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 ingrowth period before counting. The on-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all SP3 footprint 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 SP3 footprint certification results.

Isotopic Thorium

Isotopic thorium was also quantified by gamma spectrometry. The on-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all SP3 footprint certification results.

4.1.2 Chemical Methods

Metals

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

Polychlorinated Biphenyls

Samples were analyzed for PCBs using gas chromatography (GC).

PolyAromatic Hydrocarbons

Samples were analyzed for PAHs using gas chromatography/mass spectroscopy (GC/MS).

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

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

The V&V process evaluated the following parameters:

- Specific Field Forms for sample collection and handling
- Chain of Custody forms
- Completeness of Laboratory Data Deliverable.

The data validation process examined the analytical data to determine the level of confidence of the results. General areas examined that apply to all the chemical data include:

- Holding Times
- Instrument calibrations
- Calculation of results
- Matrix spike/matrix spike duplicate recoveries
- Laboratory/field duplicate precision
- Field/Laboratory Blank contamination
- Dry weight correction for solid samples
- Correct detection limits reported
- Laboratory control sample (LCS) recoveries and compliance with established limits.

Parameters unique to the evaluation of radiochemical analyses include:

- Calibration data for specific energies
- Background checks
- Relative Error ratios

- Detector efficiencies
- Background count correction.

For this project, all the radiological data were reviewed and validated for all criteria noted above. Per project requirements, a minimum of 10 percent of the certification data must be validated to validation Level D. This validation includes the same review process as for ASL B, but includes a systematic review of the raw data and recalculations. All analytical releases for this certification report were validated to Level D.

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

-	No qualification; the positive result or detection limit is confident as reported
J	Positive result is estimated or imprecise; data point is usable for decision-making purposes. Positive results less than the contract required reporting limit are also qualified in this manner
R	Positive result or detection limit is considered unreliable; data point should NOT be used for decision-making purposes
U	Undetected result at the stated limit of detection
UJ	Undetected result; detection limit is considered estimated or imprecise; the data point is usable for decision-making purposes
N	Positive result is tentatively identified - that is, there is some question regarding the actual identification and quantification of the result. Compound reported is best professional judgement of the interpretation of the supporting data, such as mass spectra. Caution must be exercised with the use of this data
NV	Not Validated. The results for this sample were not validated
Z	This result, or detection limit in this analysis is not the best one to use; another analysis (e.g., the dilution or re-analysis) contains a more confident and usable result.

The V&V of this data set did not identify any problems with the data set. The majority of the results received no qualifier (-) while some results are qualified as estimated (J) and nondetects (U). No results were qualified as rejected (R).

4.3 DATA REDUCTION

Each sample used to support the SP3 footprint certification decision was entered in the FEMP Sitewide Environmental Database (SED) with the following information:

Field Information

- Sample Identification Number - A unique number assigned to each discrete sample point
- Coordinate Information - Northing and Easting locations
- Certification Unit - Each sample is assigned to a CU based on location.

Laboratory Information

For each sample result the following information is entered:

- Laboratory Result - The reported analytical value from the laboratory
- Laboratory Qualifier - The qualifier reported from the lab. For radiological parameters non-detect values are assigned a U qualifier
- Total Propagated Uncertainty (TPU) - This value represents the uncertainty associated with the reported result. TPU includes the counting error as well as uncertainty from other laboratory measurements and data reduction. (Applicable to radiological parameters only)
- Units - The units in which the Laboratory Result is reported.

Validation Information

- Validation Result - The result based on the validation process. During the validation process, sample results may be adjusted. If the laboratory result is less than the associated MDC, the validation result becomes the MDC value
- Validation TPU - The TPU based on the validation process
- Validation Qualifier - The qualifier assigned as a result of the data validation process
- Validation Units - The units in which the Validation Result is reported.

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

1. All the data for each CU were queried from SED. All the data were used even if the CU had more than the minimum required data points

2. The data from the validation fields were used for statistical calculations

3. Data with a qualifier of R or Z was not used in the statistical calculations

4. The highest of the two duplicate results was used in the statistical calculations

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

A review of the A2PII Part Two certification results indicates all ASCOC concentrations were at or below their respective FRLs except for A2P2-SP3-C-1-8-RM and A2P2-SP3-C-1-15-RM-D. All CUs for the A2PII Part Three SP3 footprint passed the certification criteria relative to the average COC concentration and the two times the FRL hot spot criterion. Both CUs passed on the first round of certification, and no additional corrective actions were necessary. Final certification data are presented in Appendices A and B.

5.2 A2PII PART THREE SP3 FOOTPRINT CERTIFICATION CONCLUSIONS

All of the CUs have passed certification statistical analyses relative to the determination of average residual soil concentrations within applicable confidence bounds of all the ASCOCs and relative to the two times FRL hot spot criterion. Based on these results, DOE has determined that the remedial objectives in the OU5 ROD have been achieved in the A2PII Part Three SP3 footprint, and no remedial actions are required. The subject areas will be released for final land use.

5.3 LESSONS LEARNED

A lessons learned program has been implemented to apply knowledge accumulated during successive remedial and certification efforts conducted under the SEP. Some lessons learned throughout this certification process include:

- Predesign samples were taken during sampling for WAC attainment which required only one PSP and reduced overall cost
- Based on previous WAC sampling data, the agencies agreed to real-time excavation monitoring was minimized to lift scanning every five construction work days instead of in 4-foot lift intervals.

6.0 PROTECTION OF CERTIFIED AREAS

DOE has restricted access to certified areas in order to maintain their integrity prior to transferal for final land use. FEMP procedure EP-0008 has been developed to protect certified areas from becoming recontaminated.

The procedure is summarized as follows:

- At the initiation of certification sampling activities for a remediation area, temporary fencing will be installed to delineate the perimeter of the "certified" area if existing fencing is not already present
- Signs will be posted upon the temporary perimeter fencing to require access approval for entry into the "certified" area from the Soil and Disposal Facility Project (SDFP) Natural Resources Group
- To gain access to conduct work in a "certified" area, the person or project desiring admittance will submit a written request to the responsible project manager
- Any equipment to be used within the "certified" area must have been cleaned in accordance with FEMP certified area access procedure subsequent to any use in an uncertified area or for any work before entering a "certified" area
- FEMP management team representatives must instruct general employees/operators on the entry and exit requirements for a "certified" area.

After DOE, EPA and Ohio Environmental Protection Agency (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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U.S. Environmental Protection Agency, 1994, "National Functional Guidelines for Data Review," U.S. EPA Office of Solid Waste and Emergency Response, Washington, DC.

APPENDIX A

CERTIFICATION STATISTICS

Appendix A: Certification Statistics for A2P2-SP3-C-01

	PRIMARY COCs					SECONDARY COCs	
Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Total Uranium	Arsenic	Beryllium
A2P2-SP3-C-1-1-RM	1.38 -	1.02 -	1.01 -	1.02 -	10.33 -	3.61 U	0.13 -
A2P2-SP3-C-1-2-RM	1.05 -	0.72 -	0.73 -	0.72 -	12.67 -	6.01 -	0.22 -
A2P2-SP3-C-1-3-RM	1.11 -	0.87 -	0.85 -	0.87 -	8.48 -	6.24 -	0.12 -
A2P2-SP3-C-1-6-RM	1.17 -	0.96 -	0.97 -	0.96 -	16.22 -	3.83 U	0.03 U
A2P2-SP3-C-1-7-RM	1.37 -	0.95 -	0.95 -	0.95 -	19.71 -	6.20 -	0.11 -
A2P2-SP3-C-1-8-RM	1.02 -	0.75 -	0.76 -	0.75 -	4.25 J	7.29 -	0.09 -
A2P2-SP3-C-1-10-RM	1.08 -	0.76 -	0.74 -	0.76 -	7.07 -	9.33 -	0.15 -
A2P2-SP3-C-1-11-RM	1.25 -	0.97 -	0.96 -	0.97 -	5.02 -	8.09 -	0.25 -
A2P2-SP3-C-1-12-RM	1.07 -	0.86 -	0.85 -	0.86 -	3.56 J	5.65 -	0.13 -
A2P2-SP3-C-1-13-RM	1.27 -	0.93 -	0.90 -	0.93 -	9.33 -	10.90 -	0.12 -
A2P2-SP3-C-1-15-RM	1.63 -	1.19 -	1.15 -	1.19 -	2.52 U	11.30 -	0.52 -
A2P2-SP3-C-1-15-RM-D	1.64 -	1.14 -	1.12 -	1.14 -	2.93 J	15.60 -	0.55 -
A2P2-SP3-C-1-16-RM	1.28 -	1.05 -	1.04 -	1.05 -	5.35 -	6.46 -	0.06 -
FRL	1.70	1.80	1.70	1.50	82.00	12.00	1.50
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	1.64 @	1.19 @	1.15 @	1.19 @	19.71 @	15.60	0.55 @
Standardized Skewness	--	--	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--	32.9% (N)	--
Test Procedure	--	--	--	--	--	Wilcoxon	--
Sample Size	12	12	12	12	12	12	--
Estimated Mean	--	--	--	--	--	6.35	--
UCL on the Mean**	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	0.12%	--
Est. Mean - Pass / Fail	--	--	--	--	--	Pass	--
2x Rule Pass / Fail	--	--	--	--	--	Pass	--
a posteriori Sample Size calculation	-- --	-- --	-- --	-- --	-- --	5 Pass	-- --

Definition of Qualifiers
J" = estimated result
UJ" = not detected, estimated
U" = not detected
- " = no data qualifier
NV" = not validated
UNV" = not detected, not validated

NOTES:

(1) Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.

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

(3) * W-Statistic Probability is the highest calculated 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 (Normal) and the log-transformed data (LogNormal) to test for lognormality.

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

Appendix A: Certification Statistics for A2P2-SP3-C-01

	SECONDARY COCs					
Sample ID	**Aroclor-1254**	**Aroclor-1260**	**Benzo(a)pyrene**	**Benzo(b)fluoranthene**	**Dibenzo(a,h)anthracene**	**Indeno(1,2,3-cd)pyrene**
A2P2-SP3-C-1-1-RM	22.00 J	36.00 U	28.00 J	37.00 J	360.00 U	20.00 J
A2P2-SP3-C-1-2-RM	34.00 J	38.00 U	150.00 J	170.00 J	390.00 U	120.00 J
A2P2-SP3-C-1-3-RM	25.00 J	37.00 U	34.00 J	49.00 J	370.00 U	25.00 J
A2P2-SP3-C-1-7-RM	28.00 J	45.00 U	36.00 J	84.00 J	460.00 U	30.00 J
A2P2-SP3-C-1-8-RM	150.00 -	40.00 U	24.00 J	31.00 J	410.00 U	410.00 U
A2P2-SP3-C-1-10-RM	39.00 -	37.00 U	370.00 U	370.00 U	370.00 U	370.00 U
A2P2-SP3-C-1-15-RM	38.00 U	38.00 U	370.00 U	370.00 U	370.00 U	370.00 U
A2P2-SP3-C-1-15-RM-D	40.00 U	40.00 U	400.00 U	400.00 U	400.00 U	400.00 U
A2P2-SP3-C-1-16-RM	11.00 J	37.00 U	370.00 U	370.00 U	370.00 U	370.00 U
FRL	130.00	130.00	2000.00	20000.00	2000.00	20000.00
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Confidence Level	90%	90%	90%	90%	90%	90%
Max Result	150.00	45.00 @	400.00 @	400.00 @	400.00 @	410.00 @
Standardized Skewness	--	--	--	--	--	--
W-Statistic Probability*	25.9% (LN)	--	--	--	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--
Sample Size	8	8	8	8	8	8
Estimated Mean	40	--	--	--	--	--
UCL on the Mean**	70.16	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--
2x Rule Pass / Fail	Pass	--	--	--	--	--
a posteriori Sample Size calculation	3 Pass	-- --	-- --	-- --	-- --	-- --

Definition of Qualifiers
J" = estimated result
UJ" = not detected, estimated
U" = not detected
- " = no data qualifier
NV" = not validated
UNV" = not detected, not validated

NOTES:

(1) Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.

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

(3) * W-Statistic Probability is the highest calculated 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 (Normal) and the log-transformed data (LogNormal) to test for lognormality.

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

Appendix A: Certification Statistics for A2P2-SP3-C-02

	PRIMARY COCs					SECONDARY COCs	
Sample ID	**Radium-226**	**Radium-228**	**Thorium-228**	**Thorium-232**	**Total Uranium**	**Arsenic**	**Beryllium**
A2P2-SP3-C-2-2-RM	0.73 -	0.44 -	0.42 -	0.44 -	2.96 J	3.54 U	0.04 -
A2P2-SP3-C-2-3-RM	1.08 -	1.04 -	1.02 -	1.04 -	4.00 J	7.39 -	0.20 -
A2P2-SP3-C-2-4-RM	1.11 -	0.87 -	0.84 -	0.87 -	6.10 -	4.10 -	0.04 U
A2P2-SP3-C-2-5-RM	1.32 -	1.06 -	1.03 -	1.06 -	3.63 J	9.63 -	0.32 -
A2P2-SP3-C-2-7-RM	1.19 -	0.91 -	0.88 -	0.91 -	4.92 J	6.83 -	0.25 -
A2P2-SP3-C-2-8-RM	1.13 -	0.84 -	0.80 -	0.84 -	9.86 -	5.11 -	0.25 -
A2P2-SP3-C-2-10-RM	0.73 -	0.54 -	0.53 -	0.54 -	1.60 U	3.44 U	0.14 -
A2P2-SP3-C-2-11-RM	1.19 -	0.97 -	0.94 -	0.97 -	3.52 J	6.67 -	0.20 -
A2P2-SP3-C-2-12-RM	1.35 -	1.07 -	1.04 -	1.07 -	3.07 J	6.78 -	0.25 -
A2P2-SP3-C-2-13-RM	1.06 -	0.71 -	0.71 -	0.71 -	5.76 -	3.85 U	0.09 -
A2P2-SP3-C-2-14-RM	0.88 -	0.68 -	0.66 -	0.68 -	3.95 J	3.77 U	0.09 -
A2P2-SP3-C-2-14-RM-D	0.83 -	0.66 -	0.64 -	0.66 -	3.04 J	4.49 -	0.12 -
A2P2-SP3-C-2-16-RM	1.30 -	1.13 -	1.10 -	1.13 -	4.34 J	3.80 -	0.04 -
FRL	1.70	1.80	1.70	1.50	82.00	12.00	1.50
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	1.35 @	1.13 @	1.10 @	1.13 @	9.86 @	9.63 @	0.55 @
Standardized Skewness	--	--	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12
Estimated Mean	--	--	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--
2x Rule Pass / Fail	--	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--	--

Definition of Qualifiers
J" = estimated result
UJ" = not detected, estimated
U" = not detected
- " = no data qualifier
NV" = not validated
UNV" = not detected, not validated

NOTES:

(1) Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.

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

(3) * W-Statistic Probability is the highest calculated 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 (Normal) and the log-transformed data (LogNormal) to test for lognormality.

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

Appendix A: Certification Statistics for A3P2-SP3C-02

	SECONDARY COCs					
Sample ID	**Aroclor-1254**	**Aroclor-1260**	**Benzo(a)pyrene**	**Benzo(b)fluoranthene**	**Dibenzo(a,h)anthracene**	**Indeno(1,2,3-cd)pyrene**
A2P2-SP3-C-2-2-PS	80.00 -	39.00 U	390.00 U	390.00 U	390.00 U	390.00 U
A2P2-SP3-C-2-3-PS	37.00 U	37.00 U	360.00 U	360.00 U	360.00 U	360.00 U
A2P2-SP3-C-2-4-PS	39.00 U	39.00 U	390.00 U	390.00 U	390.00 U	390.00 U
A2P2-SP3-C-2-8-PS	35.00 U	35.00 U	350.00 U	350.00 U	350.00 U	350.00 U
A2P2-SP3-C-2-11-PS	38.00 U	38.00 U	380.00 U	380.00 U	380.00 U	380.00 U
A2P2-SP3-C-2-12-PS	38.00 U	38.00 U	380.00 U	380.00 U	380.00 U	380.00 U
A2P2-SP3-C-2-13-PS	9.70 J	39.00 U	390.00 U	20.00 J	20.00 U	390.00 U
A2P2-SP3-C-2-14-PS	36.00 U	36.00 U	360.00 U	360.00 U	360.00 U	360.00 U
A2P2-SP3-C-2-14-PS-D	36.00 U	36.00 U	360.00 U	360.00 U	360.00 U	360.00 U
FRL	130.00	130.00	2000.00	20000.00	2000.00	20000.00
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Confidence Level	90%	90%	90%	90%	90%	90%
Max Result	80.00 @	39.00 @	390.00 @	390.00 @	390.00 @	390.00 @
Standardized Skewness	--	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	8	8	8	8	8	8
Estimated Mean	--	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--
2x Rule Pass / Fail	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--

Definition of Qualifiers
J" = estimated result
UJ" = not detected, estimated
U" = not detected
- " = no data qualifier
NV" = not validated
UNV" = not detected, not validated

NOTES:

(1) Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.

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

(3) * W-Statistic Probability is the highest calculated 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 (Normal) and the log-transformed data (LogNormal) to test for lognormality.

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

APPENDIX B

CERTIFICATION SAMPLE RESULTS

APPENDIX B
SP3 CERTIFICATION SAMPLE RESULTS

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Sample ID	Parameter	Result	Qualifier	Units
A2P2-SP3-C-1-1-PS	Aroclor-1254	22	J	ug/kg
A2P2-SP3-C-1-1-PS	Aroclor-1260	36	U	ug/kg
A2P2-SP3-C-1-1-PS	Benzo(a)pyrene	28	J	ug/kg
A2P2-SP3-C-1-1-PS	Benzo(b)fluoranthene	37	J	ug/kg
A2P2-SP3-C-1-1-PS	Dibenzo(a,h)anthracene	360	U	ug/kg
A2P2-SP3-C-1-1-PS	Indeno(1,2,3-cd)pyrene	20	J	ug/kg
A2P2-SP3-C-1-1-RM	Arsenic	3.61	U	mg/kg dry
A2P2-SP3-C-1-1-RM	Beryllium	0.13	-	mg/kg dry
A2P2-SP3-C-1-1-RM	Radium-226	1.385	-	pCi/g dry
A2P2-SP3-C-1-1-RM	Radium-228	1.019	-	pCi/g dry
A2P2-SP3-C-1-1-RM	Thorium-228	1.012	-	pCi/g dry
A2P2-SP3-C-1-1-RM	Thorium-232	1.019	-	pCi/g dry
A2P2-SP3-C-1-1-RM	Uranium, Total	10.334	-	ug/g dry
A2P2-SP3-C-1-2-PS	Aroclor-1254	34	J	ug/kg
A2P2-SP3-C-1-2-PS	Aroclor-1260	38	U	ug/kg
A2P2-SP3-C-1-2-PS	Benzo(a)pyrene	150	J	ug/kg
A2P2-SP3-C-1-2-PS	Benzo(b)fluoranthene	170	J	ug/kg
A2P2-SP3-C-1-2-PS	Dibenzo(a,h)anthracene	390	U	ug/kg
A2P2-SP3-C-1-2-PS	Indeno(1,2,3-cd)pyrene	120	J	ug/kg
A2P2-SP3-C-1-2-RM	Arsenic	6.01	-	mg/kg dry
A2P2-SP3-C-1-2-RM	Beryllium	0.22	-	mg/kg dry
A2P2-SP3-C-1-2-RM	Radium-226	1.054	-	pCi/g dry
A2P2-SP3-C-1-2-RM	Radium-228	0.718	-	pCi/g dry
A2P2-SP3-C-1-2-RM	Thorium-228	0.73	-	pCi/g dry
A2P2-SP3-C-1-2-RM	Thorium-232	0.718	-	pCi/g dry
A2P2-SP3-C-1-2-RM	Uranium, Total	12.671	-	ug/g dry
A2P2-SP3-C-1-3-PS	Aroclor-1254	25	J	ug/kg
A2P2-SP3-C-1-3-PS	Aroclor-1260	37	U	ug/kg
A2P2-SP3-C-1-3-PS	Benzo(a)pyrene	34	J	ug/kg
A2P2-SP3-C-1-3-PS	Benzo(b)fluoranthene	49	J	ug/kg
A2P2-SP3-C-1-3-PS	Dibenzo(a,h)anthracene	370	U	ug/kg
A2P2-SP3-C-1-3-PS	Indeno(1,2,3-cd)pyrene	25	J	ug/kg
A2P2-SP3-C-1-3-RM	Arsenic	6.24	-	mg/kg dry
A2P2-SP3-C-1-3-RM	Beryllium	0.12	-	mg/kg dry
A2P2-SP3-C-1-3-RM	Radium-226	1.114	-	pCi/g dry
A2P2-SP3-C-1-3-RM	Radium-228	0.872	-	pCi/g dry
A2P2-SP3-C-1-3-RM	Thorium-228	0.853	-	pCi/g dry
A2P2-SP3-C-1-3-RM	Thorium-232	0.872	-	pCi/g dry
A2P2-SP3-C-1-3-RM	Uranium, Total	8.482	-	ug/g dry
A2P2-SP3-C-1-6-RM	Arsenic	3.83	U	mg/kg dry
A2P2-SP3-C-1-6-RM	Beryllium	0.03	U	mg/kg dry
A2P2-SP3-C-1-6-RM	Radium-226	1.168	-	pCi/g dry
A2P2-SP3-C-1-6-RM	Radium-228	0.964	-	pCi/g dry
A2P2-SP3-C-1-6-RM	Thorium-228	0.972	-	pCi/g dry
A2P2-SP3-C-1-6-RM	Thorium-232	0.964	-	pCi/g dry
A2P2-SP3-C-1-6-RM	Uranium, Total	16.218	-	ug/g dry
A2P2-SP3-C-1-7-PS	Aroclor-1254	28	J	ug/kg
A2P2-SP3-C-1-7-PS	Aroclor-1260	45	U	ug/kg
A2P2-SP3-C-1-7-PS	Benzo(a)pyrene	36	J	ug/kg

APPENDIX B
SP3 CERTIFICATION SAMPLE RESULTS

Sample ID	Parameter	Result	Qualifier	Units
A2P2-SP3-C-1-7-PS	Benzo(b)fluoranthene	84	J	ug/kg
A2P2-SP3-C-1-7-PS	Dibenzo(a,h)anthracene	460	U	ug/kg
A2P2-SP3-C-1-7-PS	Indeno(1,2,3-cd)pyrene	30	J	ug/kg
A2P2-SP3-C-1-7-RM	Arsenic	6.2	-	mg/kg dry
A2P2-SP3-C-1-7-RM	Beryllium	0.11	-	mg/kg dry
A2P2-SP3-C-1-7-RM	Radium-226	1.367	-	pCi/g dry
A2P2-SP3-C-1-7-RM	Radium-228	0.952	-	pCi/g dry
A2P2-SP3-C-1-7-RM	Thorium-228	0.948	-	pCi/g dry
A2P2-SP3-C-1-7-RM	Thorium-232	0.952	-	pCi/g dry
A2P2-SP3-C-1-7-RM	Uranium, Total	19.706	-	ug/g dry
A2P2-SP3-C-1-8-PS	Aroclor-1254	150	-	ug/kg
A2P2-SP3-C-1-8-PS	Aroclor-1260	40	U	ug/kg
A2P2-SP3-C-1-8-PS	Benzo(a)pyrene	24	J	ug/kg
A2P2-SP3-C-1-8-PS	Benzo(b)fluoranthene	31	J	ug/kg
A2P2-SP3-C-1-8-PS	Dibenzo(a,h)anthracene	410	U	ug/kg
A2P2-SP3-C-1-8-PS	Indeno(1,2,3-cd)pyrene	410	U	ug/kg
A2P2-SP3-C-1-8-RM	Arsenic	7.29	-	mg/kg dry
A2P2-SP3-C-1-8-RM	Beryllium	0.09	-	mg/kg dry
A2P2-SP3-C-1-8-RM	Radium-226	1.015	-	pCi/g dry
A2P2-SP3-C-1-8-RM	Radium-228	0.747	-	pCi/g dry
A2P2-SP3-C-1-8-RM	Thorium-228	0.764	-	pCi/g dry
A2P2-SP3-C-1-8-RM	Thorium-232	0.747	-	pCi/g dry
A2P2-SP3-C-1-8-RM	Uranium, Total	4.254	J	ug/g dry
A2P2-SP3-C-1-10-PS	Aroclor-1254	39	-	ug/kg
A2P2-SP3-C-1-10-PS	Aroclor-1260	37	U	ug/kg
A2P2-SP3-C-1-10-PS	Benzo(a)pyrene	370	U	ug/kg
A2P2-SP3-C-1-10-PS	Benzo(b)fluoranthene	370	U	ug/kg
A2P2-SP3-C-1-10-PS	Dibenzo(a,h)anthracene	370	U	ug/kg
A2P2-SP3-C-1-10-PS	Indeno(1,2,3-cd)pyrene	370	U	ug/kg
A2P2-SP3-C-1-10-RM	Arsenic	9.33	-	mg/kg dry
A2P2-SP3-C-1-10-RM	Beryllium	0.15	-	mg/kg dry
A2P2-SP3-C-1-10-RM	Radium-226	1.076	-	pCi/g dry
A2P2-SP3-C-1-10-RM	Radium-228	0.756	-	pCi/g dry
A2P2-SP3-C-1-10-RM	Thorium-228	0.736	-	pCi/g dry
A2P2-SP3-C-1-10-RM	Thorium-232	0.756	-	pCi/g dry
A2P2-SP3-C-1-10-RM	Uranium, Total	7.068	-	ug/g dry
A2P2-SP3-C-1-11-RM	Arsenic	8.09	-	mg/kg dry
A2P2-SP3-C-1-11-RM	Beryllium	0.25	-	mg/kg dry
A2P2-SP3-C-1-11-RM	Radium-226	1.251	-	pCi/g dry
A2P2-SP3-C-1-11-RM	Radium-228	0.968	-	pCi/g dry
A2P2-SP3-C-1-11-RM	Thorium-228	0.958	-	pCi/g dry
A2P2-SP3-C-1-11-RM	Thorium-232	0.968	-	pCi/g dry
A2P2-SP3-C-1-11-RM	Uranium, Total	5.025	-	ug/g dry
A2P2-SP3-C-1-12-RM	Arsenic	5.65	-	mg/kg dry
A2P2-SP3-C-1-12-RM	Beryllium	0.13	-	mg/kg dry
A2P2-SP3-C-1-12-RM	Radium-226	1.072	-	pCi/g dry
A2P2-SP3-C-1-12-RM	Radium-228	0.864	-	pCi/g dry
A2P2-SP3-C-1-12-RM	Thorium-228	0.846	-	pCi/g dry
A2P2-SP3-C-1-12-RM	Thorium-232	0.864	-	pCi/g dry

APPENDIX B
SP3 CERTIFICATION SAMPLE RESULTS **3485**

Sample ID	Parameter	Result	Qualifier	Units
A2P2-SP3-C-1-12-RM	Uranium, Total	3.564	J	ug/g dry
A2P2-SP3-C-1-13-RM	Arsenic	10.9	-	mg/kg dry
A2P2-SP3-C-1-13-RM	Beryllium	0.12	-	mg/kg dry
A2P2-SP3-C-1-13-RM	Radium-226	1.266	-	pCi/g dry
A2P2-SP3-C-1-13-RM	Radium-228	0.934	-	pCi/g dry
A2P2-SP3-C-1-13-RM	Thorium-228	0.899	-	pCi/g dry
A2P2-SP3-C-1-13-RM	Thorium-232	0.934	-	pCi/g dry
A2P2-SP3-C-1-13-RM	Uranium, Total	9.326	-	ug/g dry
A2P2-SP3-C-1-15-PS	Aroclor-1254	38	U	ug/kg
A2P2-SP3-C-1-15-PS	Aroclor-1260	38	U	ug/kg
A2P2-SP3-C-1-15-PS	Benzo(a)pyrene	370	U	ug/kg
A2P2-SP3-C-1-15-PS	Benzo(b)fluoranthene	370	U	ug/kg
A2P2-SP3-C-1-15-PS	Dibenzo(a,h)anthracene	370	U	ug/kg
A2P2-SP3-C-1-15-PS	Indeno(1,2,3-cd)pyrene	370	U	ug/kg
A2P2-SP3-C-1-15-PS-D	Aroclor-1254	40	U	ug/kg
A2P2-SP3-C-1-15-PS-D	Aroclor-1260	40	U	ug/kg
A2P2-SP3-C-1-15-PS-D	Benzo(a)pyrene	400	U	ug/kg
A2P2-SP3-C-1-15-PS-D	Benzo(b)fluoranthene	400	U	ug/kg
A2P2-SP3-C-1-15-PS-D	Dibenzo(a,h)anthracene	400	U	ug/kg
A2P2-SP3-C-1-15-PS-D	Indeno(1,2,3-cd)pyrene	400	U	ug/kg
A2P2-SP3-C-1-15-RM	Arsenic	11.3	-	mg/kg dry
A2P2-SP3-C-1-15-RM	Beryllium	0.52	-	mg/kg dry
A2P2-SP3-C-1-15-RM	Radium-226	1.631	-	pCi/g dry
A2P2-SP3-C-1-15-RM	Radium-228	1.189	-	pCi/g dry
A2P2-SP3-C-1-15-RM	Thorium-228	1.146	-	pCi/g dry
A2P2-SP3-C-1-15-RM	Thorium-232	1.189	-	pCi/g dry
A2P2-SP3-C-1-15-RM	Uranium, Total	2.523	U	ug/g dry
A2P2-SP3-C-1-15-RM-D	Arsenic	15.6	-	mg/kg dry
A2P2-SP3-C-1-15-RM-D	Beryllium	0.55	-	mg/kg dry
A2P2-SP3-C-1-15-RM-D	Radium-226	1.635	-	pCi/g dry
A2P2-SP3-C-1-15-RM-D	Radium-228	1.14	-	pCi/g dry
A2P2-SP3-C-1-15-RM-D	Thorium-228	1.116	-	pCi/g dry
A2P2-SP3-C-1-15-RM-D	Thorium-232	1.14	-	pCi/g dry
A2P2-SP3-C-1-15-RM-D	Uranium, Total	2.928	J	ug/g dry
A2P2-SP3-C-1-16-PS	Aroclor-1254	11	J	ug/kg
A2P2-SP3-C-1-16-PS	Aroclor-1260	37	U	ug/kg
A2P2-SP3-C-1-16-PS	Benzo(a)pyrene	370	U	ug/kg
A2P2-SP3-C-1-16-PS	Benzo(b)fluoranthene	370	U	ug/kg
A2P2-SP3-C-1-16-PS	Dibenzo(a,h)anthracene	370	U	ug/kg
A2P2-SP3-C-1-16-PS	Indeno(1,2,3-cd)pyrene	370	U	ug/kg
A2P2-SP3-C-1-16-RM	Arsenic	6.46	-	mg/kg dry
A2P2-SP3-C-1-16-RM	Beryllium	0.06	-	mg/kg dry
A2P2-SP3-C-1-16-RM	Radium-226	1.281	-	pCi/g dry
A2P2-SP3-C-1-16-RM	Radium-228	1.05	-	pCi/g dry
A2P2-SP3-C-1-16-RM	Thorium-228	1.039	-	pCi/g dry
A2P2-SP3-C-1-16-RM	Thorium-232	1.05	-	pCi/g dry
A2P2-SP3-C-1-16-RM	Uranium, Total	5.351	-	ug/g dry
A2P2-SP3-C-2-2-PS	Aroclor-1254	80	-	ug/kg
A2P2-SP3-C-2-2-PS	Aroclor-1260	39	U	ug/kg

APPENDIX B
SP3 CERTIFICATION SAMPLE RESULTS

Sample ID	Parameter	Result	Qualifier	Units
A2P2-SP3-C-2-2-PS	Benzo(a)pyrene	390	U	ug/kg
A2P2-SP3-C-2-2-PS	Benzo(b)fluoranthene	390	U	ug/kg
A2P2-SP3-C-2-2-PS	Dibenzo(a,h)anthracene	390	U	ug/kg
A2P2-SP3-C-2-2-PS	Indeno(1,2,3-cd)pyrene	390	U	ug/kg
A2P2-SP3-C-2-2-RM	Arsenic	3.54	U	mg/kg dry
A2P2-SP3-C-2-2-RM	Beryllium	0.04	-	mg/kg dry
A2P2-SP3-C-2-2-RM	Radium-226	0.728	-	pCi/g dry
A2P2-SP3-C-2-2-RM	Radium-228	0.443	-	pCi/g dry
A2P2-SP3-C-2-2-RM	Thorium-228	0.421	-	pCi/g dry
A2P2-SP3-C-2-2-RM	Thorium-232	0.443	-	pCi/g dry
A2P2-SP3-C-2-2-RM	Uranium, Total	2.958	J	ug/g dry
A2P2-SP3-C-2-3-PS	Aroclor-1254	37	U	ug/kg
A2P2-SP3-C-2-3-PS	Aroclor-1260	37	U	ug/kg
A2P2-SP3-C-2-3-PS	Benzo(a)pyrene	360	U	ug/kg
A2P2-SP3-C-2-3-PS	Benzo(b)fluoranthene	360	U	ug/kg
A2P2-SP3-C-2-3-PS	Dibenzo(a,h)anthracene	360	U	ug/kg
A2P2-SP3-C-2-3-PS	Indeno(1,2,3-cd)pyrene	360	U	ug/kg
A2P2-SP3-C-2-3-RM	Arsenic	7.39	-	mg/kg dry
A2P2-SP3-C-2-3-RM	Beryllium	0.2	-	mg/kg dry
A2P2-SP3-C-2-3-RM	Radium-226	1.083	-	pCi/g dry
A2P2-SP3-C-2-3-RM	Radium-228	1.041	-	pCi/g dry
A2P2-SP3-C-2-3-RM	Thorium-228	1.023	-	pCi/g dry
A2P2-SP3-C-2-3-RM	Thorium-232	1.041	-	pCi/g dry
A2P2-SP3-C-2-3-RM	Uranium, Total	4.002	J	ug/g dry
A2P2-SP3-C-2-4-PS	Aroclor-1254	39	U	ug/kg
A2P2-SP3-C-2-4-PS	Aroclor-1260	39	U	ug/kg
A2P2-SP3-C-2-4-PS	Benzo(a)pyrene	390	U	ug/kg
A2P2-SP3-C-2-4-PS	Benzo(b)fluoranthene	390	U	ug/kg
A2P2-SP3-C-2-4-PS	Dibenzo(a,h)anthracene	390	U	ug/kg
A2P2-SP3-C-2-4-PS	Indeno(1,2,3-cd)pyrene	390	U	ug/kg
A2P2-SP3-C-2-4-RM	Arsenic	4.1	-	mg/kg dry
A2P2-SP3-C-2-4-RM	Beryllium	0.035	U	mg/kg dry
A2P2-SP3-C-2-4-RM	Radium-226	1.111	-	pCi/g dry
A2P2-SP3-C-2-4-RM	Radium-228	0.867	-	pCi/g dry
A2P2-SP3-C-2-4-RM	Thorium-228	0.836	-	pCi/g dry
A2P2-SP3-C-2-4-RM	Thorium-232	0.867	-	pCi/g dry
A2P2-SP3-C-2-4-RM	Uranium, Total	6.099	-	ug/g dry
A2P2-SP3-C-2-5-RM	Arsenic	9.63	-	mg/kg dry
A2P2-SP3-C-2-5-RM	Beryllium	0.32	-	mg/kg dry
A2P2-SP3-C-2-5-RM	Radium-226	1.325	-	pCi/g dry
A2P2-SP3-C-2-5-RM	Radium-228	1.055	-	pCi/g dry
A2P2-SP3-C-2-5-RM	Thorium-228	1.031	-	pCi/g dry
A2P2-SP3-C-2-5-RM	Thorium-232	1.055	-	pCi/g dry
A2P2-SP3-C-2-5-RM	Uranium, Total	3.629	J	ug/g dry
A2P2-SP3-C-2-7-RM	Arsenic	6.83	-	mg/kg dry
A2P2-SP3-C-2-7-RM	Beryllium	0.25	-	mg/kg dry
A2P2-SP3-C-2-7-RM	Radium-226	1.189	-	pCi/g dry
A2P2-SP3-C-2-7-RM	Radium-228	0.91	-	pCi/g dry
A2P2-SP3-C-2-7-RM	Thorium-228	0.88	-	pCi/g dry

APPENDIX B
SP3 CERTIFICATION SAMPLE RESULTS

Sample ID	Parameter	Result	Qualifier	Units
A2P2-SP3-C-2-7-RM	Thorium-232	0.91	-	pCi/g dry
A2P2-SP3-C-2-7-RM	Uranium, Total	4.919	J	ug/g dry
A2P2-SP3-C-2-8-PS	Aroclor-1254	35	U	ug/kg
A2P2-SP3-C-2-8-PS	Aroclor-1260	35	U	ug/kg
A2P2-SP3-C-2-8-PS	Benzo(a)pyrene	350	U	ug/kg
A2P2-SP3-C-2-8-PS	Benzo(b)fluoranthene	350	U	ug/kg
A2P2-SP3-C-2-8-PS	Dibenzo(a,h)anthracene	350	U	ug/kg
A2P2-SP3-C-2-8-PS	Indeno(1,2,3-cd)pyrene	350	U	ug/kg
A2P2-SP3-C-2-8-RM	Arsenic	5.11	-	mg/kg dry
A2P2-SP3-C-2-8-RM	Beryllium	0.25	-	mg/kg dry
A2P2-SP3-C-2-8-RM	Radium-226	1.134	-	pCi/g dry
A2P2-SP3-C-2-8-RM	Radium-228	0.842	-	pCi/g dry
A2P2-SP3-C-2-8-RM	Thorium-228	0.804	-	pCi/g dry
A2P2-SP3-C-2-8-RM	Thorium-232	0.842	-	pCi/g dry
A2P2-SP3-C-2-8-RM	Uranium, Total	9.859	-	ug/g dry
A2P2-SP3-C-2-10-RM	Arsenic	3.44	U	mg/kg dry
A2P2-SP3-C-2-10-RM	Beryllium	0.14	-	mg/kg dry
A2P2-SP3-C-2-10-RM	Radium-226	0.733	-	pCi/g dry
A2P2-SP3-C-2-10-RM	Radium-228	0.544	-	pCi/g dry
A2P2-SP3-C-2-10-RM	Thorium-228	0.534	-	pCi/g dry
A2P2-SP3-C-2-10-RM	Thorium-232	0.544	-	pCi/g dry
A2P2-SP3-C-2-10-RM	Uranium, Total	1.598	U	ug/g dry
A2P2-SP3-C-2-11-PS	Aroclor-1254	38	U	ug/kg
A2P2-SP3-C-2-11-PS	Aroclor-1260	38	U	ug/kg
A2P2-SP3-C-2-11-PS	Benzo(a)pyrene	380	U	ug/kg
A2P2-SP3-C-2-11-PS	Benzo(b)fluoranthene	380	U	ug/kg
A2P2-SP3-C-2-11-PS	Dibenzo(a,h)anthracene	380	U	ug/kg
A2P2-SP3-C-2-11-PS	Indeno(1,2,3-cd)pyrene	380	U	ug/kg
A2P2-SP3-C-2-11-RM	Arsenic	6.67	-	mg/kg dry
A2P2-SP3-C-2-11-RM	Beryllium	0.2	-	mg/kg dry
A2P2-SP3-C-2-11-RM	Radium-226	1.191	-	pCi/g dry
A2P2-SP3-C-2-11-RM	Radium-228	0.966	-	pCi/g dry
A2P2-SP3-C-2-11-RM	Thorium-228	0.943	-	pCi/g dry
A2P2-SP3-C-2-11-RM	Thorium-232	0.966	-	pCi/g dry
A2P2-SP3-C-2-11-RM	Uranium, Total	3.523	J	ug/g dry
A2P2-SP3-C-2-12-PS	Aroclor-1254	38	U	ug/kg
A2P2-SP3-C-2-12-PS	Aroclor-1260	38	U	ug/kg
A2P2-SP3-C-2-12-PS	Benzo(a)pyrene	380	U	ug/kg
A2P2-SP3-C-2-12-PS	Benzo(b)fluoranthene	380	U	ug/kg
A2P2-SP3-C-2-12-PS	Dibenzo(a,h)anthracene	380	U	ug/kg
A2P2-SP3-C-2-12-PS	Indeno(1,2,3-cd)pyrene	380	U	ug/kg
A2P2-SP3-C-2-12-RM	Arsenic	6.78	-	mg/kg dry
A2P2-SP3-C-2-12-RM	Beryllium	0.25	-	mg/kg dry
A2P2-SP3-C-2-12-RM	Radium-226	1.35	-	pCi/g dry
A2P2-SP3-C-2-12-RM	Radium-228	1.067	-	pCi/g dry
A2P2-SP3-C-2-12-RM	Thorium-228	1.043	-	pCi/g dry
A2P2-SP3-C-2-12-RM	Thorium-232	1.067	-	pCi/g dry
A2P2-SP3-C-2-12-RM	Uranium, Total	3.073	J	ug/g dry
A2P2-SP3-C-2-13-PS	Aroclor-1254	9.7	J	ug/kg

APPENDIX B
SP3 CERTIFICATION SAMPLE RESULTS

Sample ID	Parameter	Result	Qualifier	Units
A2P2-SP3-C-2-13-PS	Aroclor-1260	39	U	ug/kg
A2P2-SP3-C-2-13-PS	Benzo(a)pyrene	390	U	ug/kg
A2P2-SP3-C-2-13-PS	Benzo(b)fluoranthene	20	J	ug/kg
A2P2-SP3-C-2-13-PS	Dibenzo(a,h)anthracene	390	U	ug/kg
A2P2-SP3-C-2-13-PS	Indeno(1,2,3-cd)pyrene	390	U	ug/kg
A2P2-SP3-C-2-13-RM	Arsenic	3.85	U	mg/kg dry
A2P2-SP3-C-2-13-RM	Beryllium	0.087	-	mg/kg dry
A2P2-SP3-C-2-13-RM	Radium-226	1.058	-	pCi/g dry
A2P2-SP3-C-2-13-RM	Radium-228	0.714	-	pCi/g dry
A2P2-SP3-C-2-13-RM	Thorium-228	0.714	-	pCi/g dry
A2P2-SP3-C-2-13-RM	Thorium-232	0.714	-	pCi/g dry
A2P2-SP3-C-2-13-RM	Uranium, Total	5.757	-	ug/g dry
A2P2-SP3-C-2-14-PS	Aroclor-1254	36	U	ug/kg
A2P2-SP3-C-2-14-PS	Aroclor-1260	36	U	ug/kg
A2P2-SP3-C-2-14-PS	Benzo(a)pyrene	360	U	ug/kg
A2P2-SP3-C-2-14-PS	Benzo(b)fluoranthene	360	U	ug/kg
A2P2-SP3-C-2-14-PS	Dibenzo(a,h)anthracene	360	U	ug/kg
A2P2-SP3-C-2-14-PS	Indeno(1,2,3-cd)pyrene	360	U	ug/kg
A2P2-SP3-C-2-14-PS-D	Aroclor-1254	36	U	ug/kg
A2P2-SP3-C-2-14-PS-D	Aroclor-1260	36	U	ug/kg
A2P2-SP3-C-2-14-PS-D	Benzo(a)pyrene	360	U	ug/kg
A2P2-SP3-C-2-14-PS-D	Benzo(b)fluoranthene	360	U	ug/kg
A2P2-SP3-C-2-14-PS-D	Dibenzo(a,h)anthracene	360	U	ug/kg
A2P2-SP3-C-2-14-PS-D	Indeno(1,2,3-cd)pyrene	360	U	ug/kg
A2P2-SP3-C-2-14-RM	Arsenic	3.77	U	mg/kg dry
A2P2-SP3-C-2-14-RM	Beryllium	0.088	-	mg/kg dry
A2P2-SP3-C-2-14-RM	Radium-226	0.881	-	pCi/g dry
A2P2-SP3-C-2-14-RM	Radium-228	0.684	-	pCi/g dry
A2P2-SP3-C-2-14-RM	Thorium-228	0.656	-	pCi/g dry
A2P2-SP3-C-2-14-RM	Thorium-232	0.684	-	pCi/g dry
A2P2-SP3-C-2-14-RM	Uranium, Total	3.95	J	ug/g dry
A2P2-SP3-C-2-14-RM-D	Arsenic	4.49	-	mg/kg dry
A2P2-SP3-C-2-14-RM-D	Beryllium	0.12	-	mg/kg dry
A2P2-SP3-C-2-14-RM-D	Radium-226	0.828	-	pCi/g dry
A2P2-SP3-C-2-14-RM-D	Radium-228	0.66	-	pCi/g dry
A2P2-SP3-C-2-14-RM-D	Thorium-228	0.642	-	pCi/g dry
A2P2-SP3-C-2-14-RM-D	Thorium-232	0.66	-	pCi/g dry
A2P2-SP3-C-2-14-RM-D	Uranium, Total	3.035	J	ug/g dry
A2P2-SP3-C-2-16-RM	Arsenic	3.8	U	mg/kg dry
A2P2-SP3-C-2-16-RM	Beryllium	0.036	-	mg/kg dry
A2P2-SP3-C-2-16-RM	Radium-226	1.304	-	pCi/g dry
A2P2-SP3-C-2-16-RM	Radium-228	1.127	-	pCi/g dry
A2P2-SP3-C-2-16-RM	Thorium-228	1.103	-	pCi/g dry
A2P2-SP3-C-2-16-RM	Thorium-232	1.127	-	pCi/g dry
A2P2-SP3-C-2-16-RM	Uranium, Total	4.343	J	ug/g dry