CERTIFICATION REPORT FOR AREA 8, PHASE III-SOUTH

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT FERNALD, OHIO

AUGUST 2000

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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REVISION A
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LIST OF ACRONYMS AND ABBREVIATIONS

A8PIII-S	Area 8, Phase III-South
ASCOC	area-specific constituent of concern
ASL	analytical support level
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CG&E	Cincinnati Gas and Electric Company
COC	constituent of concern
CRDL	contract required detection limit
CU	certification unit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FRL	final remediation level
HAMDC	highest allowable minimum detectable concentration
HPGe	high-purity germanium detector
LCS	laboratory control sample
MDC	minimum detectable concentration
mg/kg	milligrams per kilogram
NaI	sodium iodide
OEPA	Ohio Environmental Protection Agency
OSDF	On-Site Disposal Facility
OU	Operable Unit
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	Radiation Tracking System
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
TPU	total propagated uncertainty
UCL	upper confidence level
V/FCN	Variance/Field Change Notice
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 area-specific constituents of concern (ASCOCs) concentrations do not exceed the final remediation levels (FRLs) in Area 8, Phase III-South (A8PIII-S) at the Fernald Environmental Management Project (FEMP). On the basis of this reported information and supporting project files, DOE has determined that no remedial actions are required in these areas of the site and, therefore, they can be considered "certified." A8PIII-S will be considered certified when the U.S. Environmental Protection Agency (EPA) and Ohio Environmental Protection Agency (OEPA) agree that the certification criteria have been achieved within all six relevant certification units (CUs) into which the area was divided. Upon approval from the regulatory agencies, DOE will proceed with planning the natural resource restoration activities for A8PIII-S, as outlined in the Natural Resource Restoration Plan (DOE 1998a), and potentially the reburial of Native American remains.

A8PIII-S was divided into six CUs. CU delineation is described in the Certification Design Letter (CDL) for A8PIII-S (DOE 2000a). Certification sampling was conducted in these areas of the site to verify that the certification criteria were achieved. These criteria state that: 1) the mean concentrations or activities of the primary ASCOCs within a CU are less than the FRLs at the 95 percent upper confidence level (UCL); 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, then it can be released for development of the final land use.

Precertification real-time scanning data indicated no above-FRL radiological contamination present. Therefore, certification began without conducting remedial activities. The A8PIII-S certification samples were analyzed at the FEMP on-site 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 Sitewide Excavation Plan (SEP, DOE 1998b). Twelve samples per CU were analyzed and reported at the required analytical support level (ASL). Analytical data packages included sample results with associated quality assurance/quality control (QA/QC) 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 A8PIII-S CUs achieved 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. Since none of the analytical results exceeded the associated FRL, statistical analyses were not necessary to determine if an ASCOC passed certification in any of the CUs. Based on these results, all six CUs under the scope of this certification effort achieved the certification criteria. DOE has restricted access to certified areas in order to maintain their integrity prior to development of the final land use.

1.0 INTRODUCTION

1.1 PURPOSE

This Certification Report presents the information and data used by the DOE to determine that existing area-specific constituents of concern (ASCOC) concentrations do not exceed the final remediation levels (FRLs) within Area 8, Phase III-South (A8PIII-S). As discussed in the Certification Design Letter (CDL, DOE 2000a) for A8PIII-S, this soil is being certified in order to proceed with final land use activities. On the basis of this reported information, the U.S. Department of Energy (DOE) considers remedial goals achieved in this portion of the site.

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 material exceeds OSDF waste acceptance criteria (WAC). 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) 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 remediation is completed within 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. According to the SEP, excavation Approach E was followed in A8PIII-S. Precertification activities were conducted within A8PIII-S during September 1999, and data indicated that no soil excavation activities were required for remediation purposes. As a result, no Integrated Remedial Design Package was submitted. As illustrated in Figure 4-11 of the SEP, following the precertification, a CDL was developed to proceed with the certification process. Because no excavation activities were required prior to certification, there is no discussion relating to construction, or related activities, of any kind in

this certification report as is stated in the Section 7.0 of the SEP. All precertification and certification activities for this area were conducted in compliance with the SEP.

1.3 AREA DESCRIPTION

A8PIII-S includes the southwestern corner of the FEMP site west of Paddys Run and south of Area 8, Phase I (Figure 1-1). The A8PIII-S boundary was modified from that shown in the SEP to exclude the small section of land owned by the Cincinnati Gas and Electric Company (CG&E). Details of the CG&E property are presented in the A8PIII-S Precertification Project Specific Plan (PSP, DOE 2000b). Since this is not DOE property, it will be treated as off-property (Area 9) soil for purposes of certification and, therefore, will not be included in this certification effort.

With the revised boundary, A8PIII-S is a 29.6-acre parcel of land consisting of flat, open fields separated by a steep, wooded ridge. It is unlikely that A8PIII-S has been impacted by former FEMP production activities for several reasons. First, A8PIII-S is located southwest (upwind) of the Former Production Area, and therefore should have minimal impacts from airborne contamination. Secondly, A8PIII-S does not receive drainage from any other part of the FEMP site. Finally, no known disposal or plant related activities were associated with this region of the FEMP except for some surface excavation during plant construction. A 1953 aerial photograph shows that some soil was removed during plant construction from an approximately 1-acre area just south of where a 1998 bioengineering project took place. Also, though unrelated to production operations, the farmer who grazed this property did some grading work on the ridge to make the slope gradual enough to access the lower field with his tractor.

1.4 SCOPE

The scope of this report includes the certification of A8PIII-S. A8PIII-S has been divided into six certification units (CUs). The certification design for these six CUs follows the general Approach E outlined in Section 3.4 of the SEP.

1.5 OBJECTIVES

The objectives of this Certification Report are:

- Describe the precertification results
- Describe the analytical methods, data validation processes, data reduction and statistical processes used to support the certification process
- Present certification sampling results for the six CUs
- Present the statistical analysis showing that all six 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 to sampling and analysis used for certification
Section 3.0	Overview of Field Activities: Precertification scanning, certification sampling 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 Samples, Results and Statistics Tables

1.7 FEMP CERTIFICATION MASTER MAP

In order to track the status of certification at the FEMP, DOE will include a site map showing the status of the soil remediation areas and phased areas with all Certification Reports. This map is included in this Certification Report as Figure 1-2, and has been updated to reflect the status of A8PIII-S.

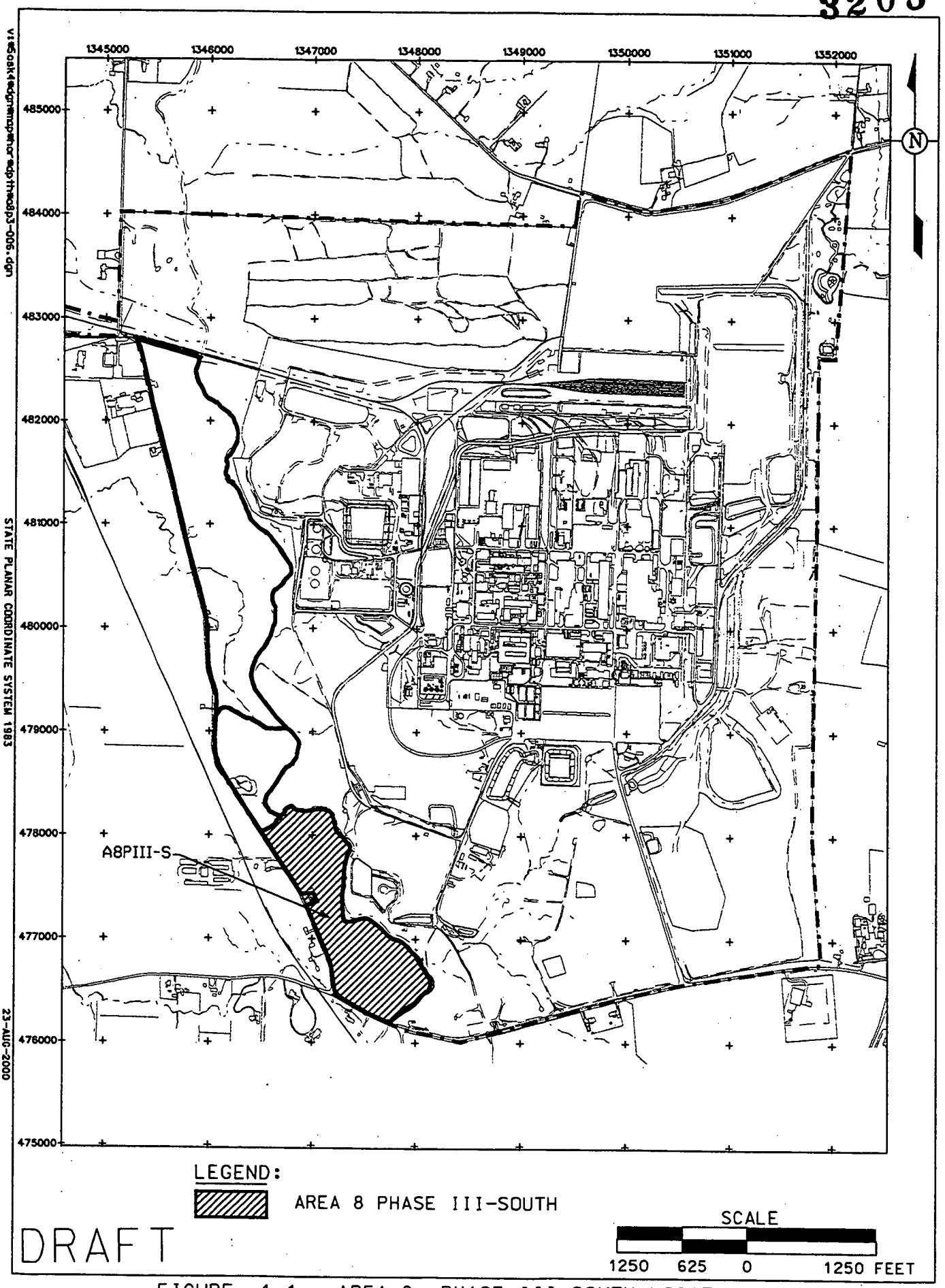

FIGURE 1-1. AREA 8, PHASE III-SOUTH LOCATION MAP

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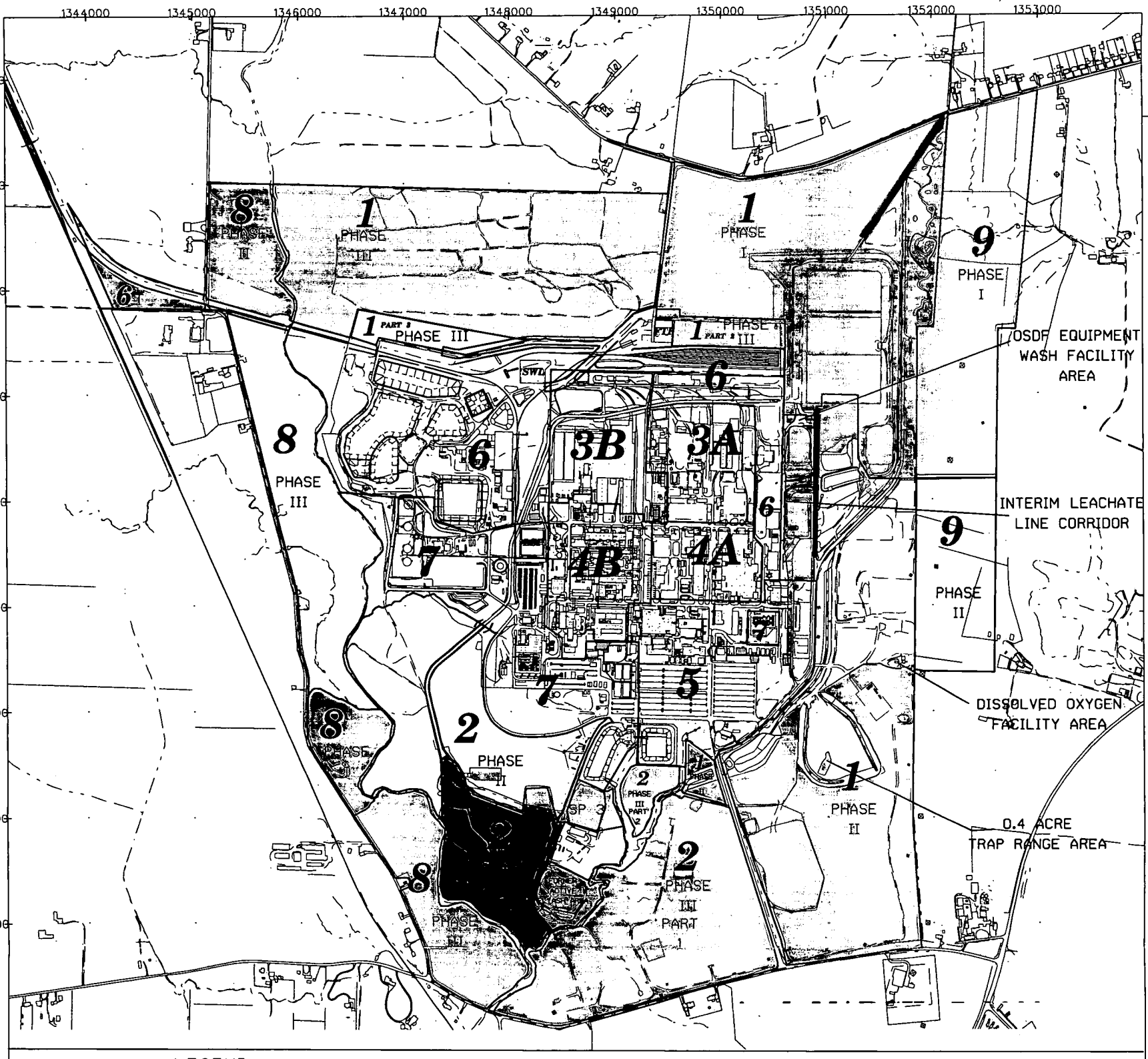

LEGEND:

- APPROVED CERTIFICATION AREAS (320 ACRES TOTAL)
  - A1PI APPROVED CERTIFIED AREAS - 120.5 ACRES
  - A1PI SEDIMENT TRAPS 2 AND 3 APPROVED CERTIFIED AREAS 1.4 ACRES
  - A1PII APPROVED CERTIFIED AREAS - 80.1 ACRES
  - A1PII-S2B APPROVED CERTIFIED AREAS 1.5 ACRES
  - A8PII/A6TA APPROVED CERTIFIED AREA - 22.1 ACRES
  - A8PI APPROVED CERTIFIED AREAS - 12.5 ACRES
  - A2PIII APPROVED CERTIFIED AREA - 70 ACRES
  - A1PII APPROVED CERTIFIED AREAS WEST OF OLD NORTH ACCESS ROAD - 11.9 ACRES
- CERTIFICATION AREA, SEPARATE REPORT PRESENTLY UNDER AGENCY REVIEW - 55.5 ACRES
- A1PI-ROADS EXCLUDED FROM CERTIFICATION
- CERTIFICATION IN PROGRESS
- REMEDIATION IN PROGRESS
- CHARACTERIZATION FOR REUSE AREAS - 2.5 ACRES
- NON CERTIFIED AREAS

NOTE: SUBSURFACE SOIL IN UTILITY CORRIDORS WITHIN THE FORMER ACTIVE FLYASH AREA CERTIFICATION AREA WILL BE CERTIFIED AT A LATER DATE.

SCALE
1200 600 0 1200 FEET
REVISION DATE 7/12/00

STATE PLANAR COORDINATE SYSTEM 1983

25-AUG-2000

000011

FIGURE 1-2. FEMP CONTROLLED CERTIFICATION MAP

8203

2.0 CERTIFICATION APPROACH

2.1 CERTIFICATION STRATEGY

This section summarizes the 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 the 95 percent upper confidence level (UCL), and at the 90 percent UCL for secondary ASCOCs, although none are retained for A8PIII-S. 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 3.4.5 of the SEP. 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 A8PIII-S specific strategy is described in the CDL for A8PIII-S.

2.1.1 Selection of Area-Specific Constituents of Concern

The OU5 ROD lists 80 soil constituents of concern (COCs) with established FRLs. These COCs were retained for further investigation based on a screening process that considered the presence of the constituent in site soil and the potential risk to a receptor exposed to soil containing that contaminant. Many of the COCs with established FRLs have a limited distribution in site soil, or the presence of the COC is based on high contract required detection limits (CRDLs). When FRLs were established for these COCs in the OU5 ROD, they were initially screened against site data presented on spatial maps to establish a picture of potential remediation areas.

By reviewing existing remedial investigation data presented on spatial distribution maps, it was possible to reduce the sitewide list of soil COCs from the 80 listed in the OU5 ROD to 30. This reduction was possible because the majority of the COCs with FRLs listed in the OU5 ROD have no detections on-site above their corresponding FRL, thus eliminating them from further consideration. The 30 remaining sitewide COCs account for over 99 percent of the combined risk to a site receptor model, and they comprise the list from which all of the remediation ASCOCs are drawn.

As stated in the SEP, the primary radiological COCs, i.e., total uranium, radium-226, radium-228, thorium-228, and thorium-232, will be 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:

- It is listed as a soil COC in the OU5 ROD, and it is listed as an ASCOC in Table 2-7 of the SEP for the Remediation Area of interest
- Analytical results show that a contaminant is present above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated CRDLs
- It can be traced to site use, either through process knowledge or known release of the constituent to the environment
- 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

2.1.2 ASCOC Selection Process for A8PIII-S

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary COCs, and will be retained as ASCOCs for this reason. Based on historical data pertinent to A8PIII-S there were two above-FRL results identified for N-nitrosodipropylamine. In both cases, N-nitrosodipropylamine was not detected, however the laboratory minimum CRDL exceeded the FRL. N-nitrosodipropylamine is associated with former FEMP production operations, and based on location and former land uses, there is no reason to believe that this COC should be found in this part of the FEMP site. Historical data show that no other ASCOCs are present above the FRL in A8PIII-S, or meet the above criteria for being retained. Based on this factor and the inability to identify any mechanism for secondary COC contamination of this part of the site, only the sitewide primary COCs will be retained as the A8PIII-S ASCOCs. The selected A8PIII-S ASCOCs are listed on Table 2-1 along with their applicable FRLs.

2.2 CERTIFICATION APPROACH

2.2.1 Certification Design

The certification design for A8PIII-S follows the general approach outlined in Section 3.4 of the SEP. Because A8PIII-S is considered to be a "non-impacted area," Approach E from the SEP will be used as a basis for certification design, as described in Section 4.5 of the SEP. As a result, Group 2 CUs, which can be as large as 250,000 square feet, have been located within A8PIII-S.

Historical land uses, soil COC data, precertification data and topography are used to establish CU boundaries. Because there were no significant production-related land uses, and very few soil COC data were collected in A8PIII-S, the precertification data and the topography of A8PIII-S were the main drivers for CU delineation. As shown in Figure 2-1, six CUs have been established in A8PIII-S based on these factors, as follows:

- **CU A8PIIIS-01** has been established in the southwest portion of A8PIII-S to cover an area of slightly higher activity and the field on top of the ridge
- **CU A8PIIIS-02** has been established in the southeast portion of A8PIII-S to cover an area of lower activity along Paddys Run
- **CU A8PIIIS-03** has been established in the center of A8PIII-S, and contains the small area where excavation took place during plant construction and an area of slightly higher activity
- **CU A8PIIIS-04** has been established in the northwest portion of A8PIII-S to cover an area of slightly higher activity and the field on top of the ridge
- **CU A8PIIIS-05** has been established in the east central portion of A8PIII-S to cover an area of lower activity in the field below the ridge
- **CU A8PIIIS-06** has been established along the northeast corner of A8PIII-S, and contains a pocket of slightly higher activity.

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 an easting and northing coordinate within the boundaries of each sub-CU, then testing those locations against the minimum distance criterion for the CU. If the minimum distance was not achieved, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process continued4 until all 16 random locations met the minimum distance criterion. All CUs in the scope of this report and the selected certification sampling locations for all the CUs are shown in Figure 2-2.

2.2.3 Certification Sampling and Analysis

Each sample was collected from the 0 to 6-inch (surface) soil interval at the designated and surveyed location. Four of the 16 certification locations per CU (one per each quadrant of the CU) were randomly

selected for archiving (identified in the field, but not collected), and the other 12 locations were submitted for analysis. All samples were analyzed at the Fluor Fernald on-site laboratory for the five primary ASCOCs using the gamma spectroscopy method. Additional information regarding the certification sampling and analysis may be obtained from the A8PIII-S Certification PSP.

2.2.4 Statistical Analysis

The statistical analysis of certification samples is discussed in Appendix G of the SEP. Per Section G.2.3 of the SEP, statistical analysis of certification results is not necessary to determine if an ASCOC passed certification in a CU if all of the results for that ASCOC in that CU were below the FRL. If any sample result(s) does exceed the associated FRL, then statistical analyses will be performed and two criteria must be met for the CU to pass certification. If the data distribution is normal or lognormal, the first criterion is to compare the 95 percent UCL on the mean of each primary ASCOC to its FRL, resulting in the pass/fail decision on each individual CU. If the data distribution was not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP was used to evaluate the 95 percent UCL on the mean. The second criterion is related to the hot spot criterion, which states that if a certification sample for a primary radiological ASCOC exceeds two times the FRL, then further action is necessary per Section 3.4.5 and Figure 3-11 of the SEP. When the given UCL on the mean for each COC is less than its FRL and the hot spot criterion is met, the CU will be considered certified.

TABLE 2-1
ASCOC LIST FOR ALL A8PIII-S CERTIFICATION UNITS

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

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

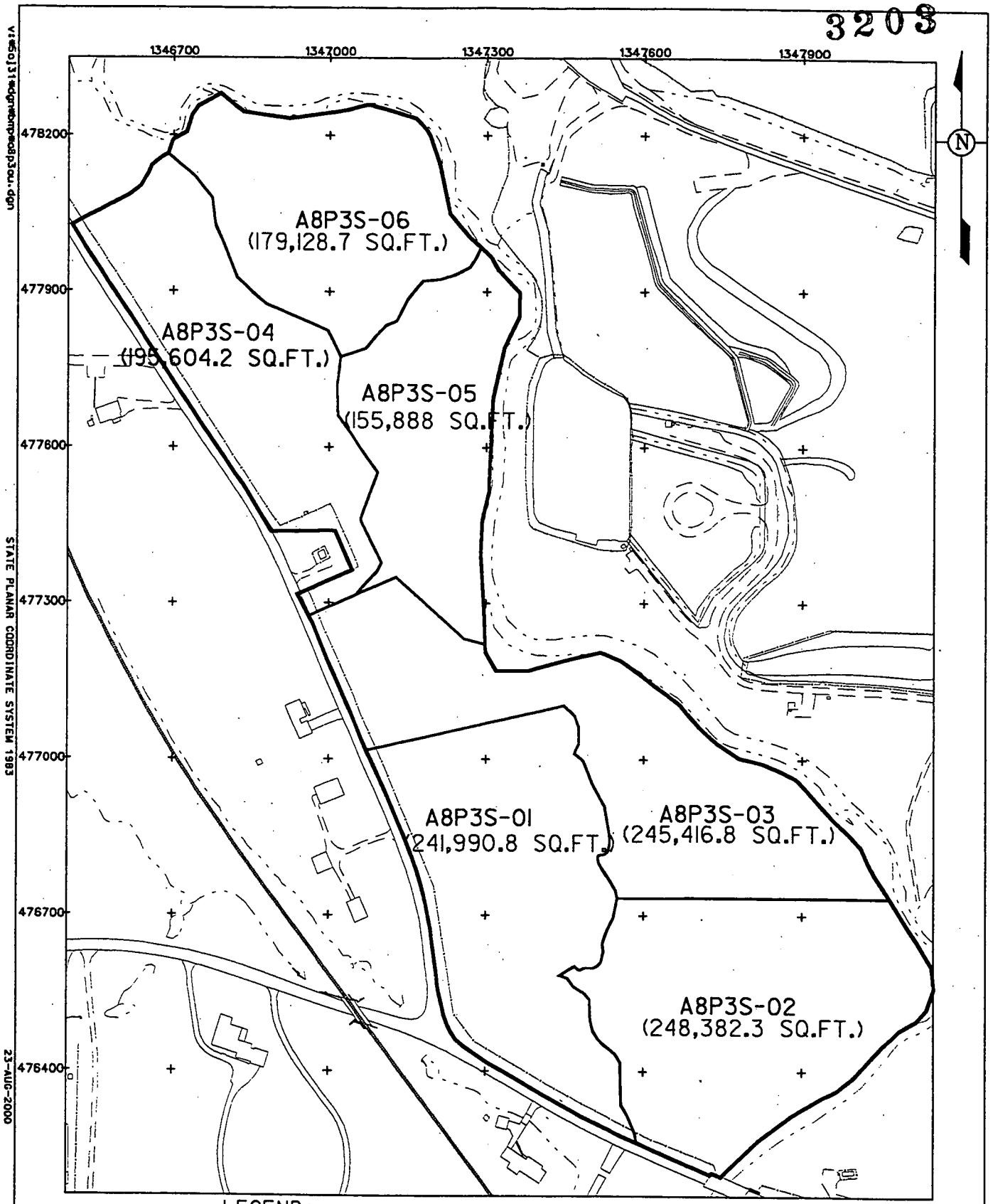

FIGURE 2-1. CERTIFICATION UNITS ESTABLISHED WITHIN A8PIII-S

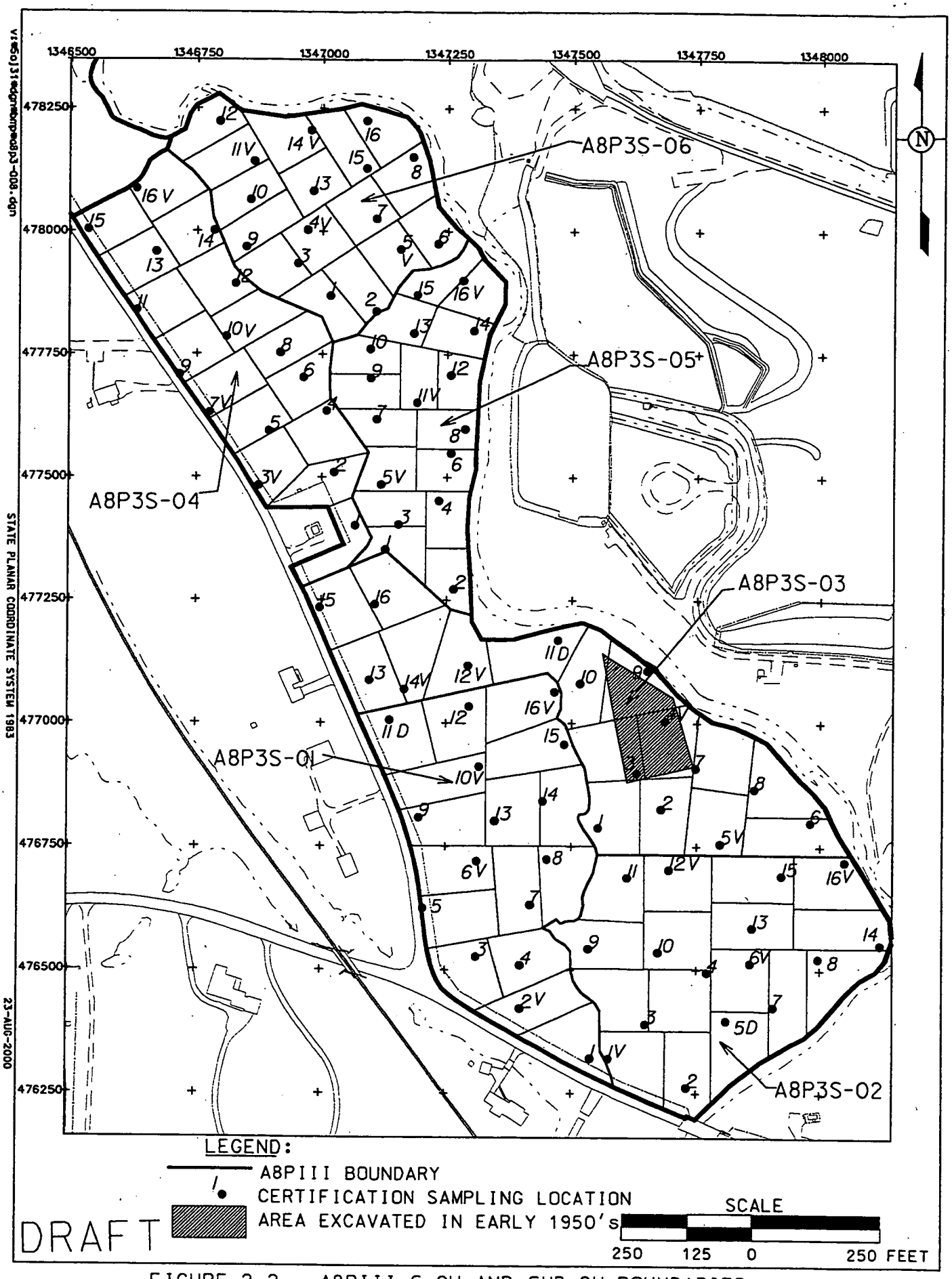

FIGURE 2-2. A8PIII-S CU AND SUB-CU BOUNDARIES AND CERTIFICATION SAMPLING LOCATIONS

3.0 OVERVIEW OF FIELD ACTIVITIES

3.1 DATA EVALUATION AND PRECERTIFICATION

Based on historical data and precertification surveys from A8PIII-S, no soil remediation activities were required prior to certification sampling (see Section 1.2). The historical data from this part of the FEMP site are discussed in detail in the A8PIII-S CDL.

A comprehensive scan of A8PIII-S was conducted using the Radiation Tracking system (RTRAK), the Radiation Scanning System (RSS) and the high-purity germanium (HPGe) detectors. During Phase 1 of precertification, the mobile sodium iodide (NaI) detectors (RTRAK and RSS) were used to scan as much of this land as possible. The HPGe was also used to scan the steep ridges and vegetated areas were the mobile instruments could not access. However, several of the ridges in this area were too steep to safely scan with either detector, and therefore were omitted.

Data collected during this scan were displayed for total gamma activity (as counts per second), total uranium, radium-226, and thorium-232. The total activity results showed several pockets of higher total activity, primarily in the fields on top of the ridge along Paddys Run Road. During Phase 2 of precertification, HPGe readings were obtained at the location of highest gamma activity within each identified CU as added assurance that concentrations were not above the FRL. The results again demonstrate total uranium, thorium-232, and radium-226 to be below their respective FRLs. With regard to the radium-226, thorium-232 and total uranium results, no mobile NaI results exceeded the three times FRL hot spot level, and no HPGe Phase 1 reading exceeded the one times FRL trigger level for additional readings.

3.2 CHANGES TO SCOPE OF WORK

The scope of work for A8PIII-S certification sampling was documented in the final CDL, and there were no significant changes during field implementation. All final certification sampling locations and CU boundaries remained as identified in the CDL, and all analyses were carried out as planned. There was one minor change, as documented on Variance/Field Change Notice (V/FCN) 21110-PSP-0002-1, to the A8PIII-S Certification PSP. Figure 2-1 of the PSP mistakenly showed an archive designation on Location 12 of CU A8P3S-01, thus indicating five archive sample locations. The figure was revised to

show that the sample at Location 12 was to be collected and analyzed, leaving four sample locations designated as archive (see Section 2.2.3).

4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES AND DATA REDUCTION

4.1 ANALYTICAL METHODOLOGIES

The samples for A8PIII-S were analyzed at the FEMP on-site laboratory, which meets requirements of the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ). 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. Because a lower level of detection (10 percent of the FRL) was used for all five target analytes, these analyses are classified as ASL E, though all ASL D analytical requirements were achieved 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 highest allowable minimum detectable concentration (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 were specified for each analyte. Laboratories were 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 as follows:

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 A8PIII-S 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 A8PIII-S 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 A8PIII-S certification results.

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 EPA's National Functional Guidelines for Data Review (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 data to determine the level of confidence of the results. General areas examined include the following:

- Holding Times
- Instrument calibrations
- Calculation of results
- 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
- Tracer yields
- 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 10 percent of the certification data were validated to validation ASL D. This validation included the same review process as for ASL B, but included a systematic review of the raw data and recalculations. To meet this project requirement (as specified in the SEP and Data Quality Objectives SL-052), all analyses from one CU (CU A8P3S-01) were validated to ASL D, and the remaining data were validated to ASL B.

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

-	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. The majority of the results, including all radium-226, radium-228, thorium-228 and thorium-232 results, received no qualification (a - qualifier). Some of the uranium results received a J qualifier due to elevated uncertainty or a U qualifier when the result was reported at the minimum detectable concentration.

4.3 DATA REDUCTION

Each sample used to support the A8PIII-S 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.

000024

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 minimum detectable concentration (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 (though this is not the case for any of the CUs under this scope)
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 was used in the statistical calculations

5.0 CERTIFICATION EVALUATION AND CONCLUSIONS

5.1 CERTIFICATION RESULTS AND EVALUATION

All CUs for A8PIII-S passed the certification criteria. The determination of successful certification or certification failure was based on a review of certification sample data from each CU against criteria discussed in Section 2.2.4. All results for each of the six CUs were below the FRLs. All six CUs passed on the first round of certification. No additional corrective actions were necessary, and the archived samples did not need to be analyzed. Final certification data are presented in Appendix A. Because all of the results were below the FRLs, no statistical analysis of the data was required (as is indicated on Tables A-2 through A-7, Note 1).

5.2 A8PIII-S CERTIFICATION CONCLUSIONS

Based on the results, all of which were below the FRLs, DOE has determined that the remedial objectives in the OU5 ROD have been achieved in A8PIII-S. Therefore, upon U.S. Environmental Protection Agency (EPA) and Ohio Environmental Protection Agency (OEPA) concurrence, these portions the site will be released for final land use.

5.3 LESSONS LEARNED

All field and sampling activities for the certification of A8PIII-S were completed without difficulty. There were no significant lessons learned from the A8PII-S certification process.

5.4 SCHEDULE

The following schedule shows key activities for the completion of the work required for the certification of A8PIII-S.

Activity	Target Date	Completion Date
Submittal of Certification Design Letter	March 24, 2000	May 23, 2000
Start of Certification Sampling	May 23, 2000	May 18, 2000
Complete Field Work	June 30, 2000	June 9, 2000
Complete Analytical Work	August 11, 2000	July 24, 2000
Complete Data Validation and Statistical Analysis	September 8, 2000	July 28, 2000
Submit Certification Report	September 30, 2000[a]	August 25, 2000

[a] Only the date for submittal of the Certification Report is a commitment to the EPA and OEPA.

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, Access to a Certified Area, has been developed to implement a process to protect certified areas.

The procedure is summarized as follows:

- Prior to 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 indicating approval for entry into the "certified" area is required will be posted along the perimeter at all access points.
- Personnel desiring admittance to a "certified area to conduct work will submit a written request to gain access, using Form FS-F-4878, to the Soil and Disposal Facility Project Compliance Section.
- The purpose of the entry, including any proposed chemical applications such as pesticides or herbicides, must be described on the form.
- Any equipment to be used within the "certified" area must be free of contamination. If the equipment is used off-road in an uncertified area, it must be washed and/or decontaminated per applicable requirements prior to entering a certified area.
- Entry team members must be briefed on conditions for entry listed on the approved Form FS-F-4878.

Following approval of this certification report by the EPA and OEPA, DOE will proceed with planning the natural resource restoration and the development of final land use for the area.

REFERENCES

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

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

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U.S. Department of Energy, 2000b, "Project Specific Plan for Area 8, Phase III-South Certification Sampling," Revision 0, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, OH.

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 SAMPLES, ANALYTICAL RESULTS AND STATISTICS TABLES

LIST OF TABLES

Table A-1
Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-01	A8P3S-C-01-11R	5/25/00	0.5	1347137	477006	Radium-226	1.196	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-11R	5/25/00	0.5	1347137	477006	Radium-228	0.966	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-11R	5/25/00	0.5	1347137	477006	Thorium-228	0.985	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-11R	5/25/00	0.5	1347137	477006	Thorium-232	0.966	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-11R	5/25/00	0.5	1347137	477006	Uranium, Total	5.065	mg/kg	-	Normal
A8P3S-C-01	A8P3S-C-01-11R-D	5/25/00	0.5	1347137	477006	Radium-226	1.246	pCi/g	J	Duplicate
A8P3S-C-01	A8P3S-C-01-11R-D	5/25/00	0.5	1347137	477006	Radium-228	0.995	pCi/g	-	Duplicate
A8P3S-C-01	A8P3S-C-01-11R-D	5/25/00	0.5	1347137	477006	Thorium-228	0.987	pCi/g	-	Duplicate
A8P3S-C-01	A8P3S-C-01-11R-D	5/25/00	0.5	1347137	477006	Thorium-232	0.995	pCi/g	-	Duplicate
A8P3S-C-01	A8P3S-C-01-11R-D	5/25/00	0.5	1347137	477006	Uranium, Total	5.438	mg/kg	J	Duplicate
A8P3S-C-01	A8P3S-C-01-12R	5/25/00	0.5	1347295	477034	Radium-226	1.196	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-12R	5/25/00	0.5	1347295	477034	Radium-228	1.058	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-12R	5/25/00	0.5	1347295	477034	Thorium-228	1.056	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-12R	5/25/00	0.5	1347295	477034	Thorium-232	1.058	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-12R	5/25/00	0.5	1347295	477034	Uranium, Total	6.85	mg/kg	-	Normal
A8P3S-C-01	A8P3S-C-01-13R	5/25/00	0.5	1347348	476802	Radium-226	1.238	pCi/g	J	Normal
A8P3S-C-01	A8P3S-C-01-13R	5/25/00	0.5	1347348	476802	Radium-228	1.028	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-13R	5/25/00	0.5	1347348	476802	Thorium-228	0.982	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-13R	5/25/00	0.5	1347348	476802	Thorium-232	1.028	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-13R	5/25/00	0.5	1347348	476802	Uranium, Total	7.959	mg/kg	-	Normal
A8P3S-C-01	A8P3S-C-01-14R	5/25/00	0.5	1347441	476842	Radium-226	1.398	pCi/g	J	Normal
A8P3S-C-01	A8P3S-C-01-14R	5/25/00	0.5	1347441	476842	Radium-228	1.07	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-14R	5/25/00	0.5	1347441	476842	Thorium-228	1.055	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-14R	5/25/00	0.5	1347441	476842	Thorium-232	1.07	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-14R	5/25/00	0.5	1347441	476842	Uranium, Total	7.108	mg/kg	-	Normal
A8P3S-C-01	A8P3S-C-01-15R	5/25/00	0.5	1347486	476956	Radium-226	1.287	pCi/g	J	Normal
A8P3S-C-01	A8P3S-C-01-15R	5/25/00	0.5	1347486	476956	Radium-228	1.066	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-15R	5/25/00	0.5	1347486	476956	Thorium-228	1.025	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-15R	5/25/00	0.5	1347486	476956	Thorium-232	1.066	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-15R	5/25/00	0.5	1347486	476956	Uranium, Total	4.092	mg/kg	J	Normal
A8P3S-C-01	A8P3S-C-01-1R	5/25/00	0.5	1347539	476321	Radium-226	1.082	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-1R	5/25/00	0.5	1347539	476321	Radium-228	0.74	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-1R	5/25/00	0.5	1347539	476321	Thorium-228	0.721	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-1R	5/25/00	0.5	1347539	476321	Thorium-232	0.74	pCi/g	-	Normal

Table A-1
Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-01	A8P3S-C-01-1R	5/25/00	0.5	1347539	476321	Uranium, Total	2.979	mg/kg	J	Normal
A8P3S-C-01	A8P3S-C-01-3R	5/25/00	0.5	1347311	476527	Radium-226	1.246	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-3R	5/25/00	0.5	1347311	476527	Radium-228	1.032	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-3R	5/25/00	0.5	1347311	476527	Thorium-228	1.036	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-3R	5/25/00	0.5	1347311	476527	Thorium-232	1.032	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-3R	5/25/00	0.5	1347311	476527	Uranium, Total	3.597	mg/kg	U	Normal
A8P3S-C-01	A8P3S-C-01-4R	5/25/00	0.5	1347398	476510	Radium-226	1.192	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-4R	5/25/00	0.5	1347398	476510	Radium-228	0.956	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-4R	5/25/00	0.5	1347398	476510	Thorium-228	0.943	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-4R	5/25/00	0.5	1347398	476510	Thorium-232	0.956	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-4R	5/25/00	0.5	1347398	476510	Uranium, Total	4.782	mg/kg	J	Normal
A8P3S-C-01	A8P3S-C-01-5R	5/25/00	0.5	1347205	476625	Radium-226	0.882	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-5R	5/25/00	0.5	1347205	476625	Radium-228	0.659	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-5R	5/25/00	0.5	1347205	476625	Thorium-228	0.645	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-5R	5/25/00	0.5	1347205	476625	Thorium-232	0.659	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-5R	5/25/00	0.5	1347205	476625	Uranium, Total	2.952	mg/kg	U	Normal
A8P3S-C-01	A8P3S-C-01-7R	5/25/00	0.5	1347417	476632	Radium-226	1.277	pCi/g	J	Normal
A8P3S-C-01	A8P3S-C-01-7R	5/25/00	0.5	1347417	476632	Radium-228	1.059	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-7R	5/25/00	0.5	1347417	476632	Thorium-228	1.049	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-7R	5/25/00	0.5	1347417	476632	Thorium-232	1.059	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-7R	5/25/00	0.5	1347417	476632	Uranium, Total	4.538	mg/kg	J	Normal
A8P3S-C-01	A8P3S-C-01-8R	5/25/00	0.5	1347450	476724	Radium-226	1.178	pCi/g	J	Normal
A8P3S-C-01	A8P3S-C-01-8R	5/25/00	0.5	1347450	476724	Radium-228	0.987	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-8R	5/25/00	0.5	1347450	476724	Thorium-228	0.949	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-8R	5/25/00	0.5	1347450	476724	Thorium-232	0.987	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-8R	5/25/00	0.5	1347450	476724	Uranium, Total	5.313	mg/kg	J	Normal
A8P3S-C-01	A8P3S-C-01-9R	5/25/00	0.5	1347196	476809	Radium-226	1.22	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-9R	5/25/00	0.5	1347196	476809	Radium-228	1.008	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-9R	5/25/00	0.5	1347196	476809	Thorium-228	0.987	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-9R	5/25/00	0.5	1347196	476809	Thorium-232	1.008	pCi/g	-	Normal
A8P3S-C-01	A8P3S-C-01-9R	5/25/00	0.5	1347196	476809	Uranium, Total	4.685	mg/kg	J	Normal
A8P3S-C-02	A8P3S-C-02-10R	5/30/00	0.5	1347674	476535	Radium-226	1.101	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-10R	5/30/00	0.5	1347674	476535	Radium-228	0.86	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-10R	5/30/00	0.5	1347674	476535	Thorium-228	0.85	pCi/g	-	Normal

Table A-1
Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-02	A8P3S-C-02-10R	5/30/00	0.5	1347674	476535	Thorium-232	0.86	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-10R	5/30/00	0.5	1347674	476535	Uranium, Total	5.109	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-11R	5/30/00	0.5	1347612	476687	Radium-226	1.151	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-11R	5/30/00	0.5	1347612	476687	Radium-228	0.822	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-11R	5/30/00	0.5	1347612	476687	Thorium-228	0.789	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-11R	5/30/00	0.5	1347612	476687	Thorium-232	0.822	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-11R	5/30/00	0.5	1347612	476687	Uranium, Total	6.066	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-13R	5/30/00	0.5	1347863	476586	Radium-226	1.01	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-13R	5/30/00	0.5	1347863	476586	Radium-228	0.699	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-13R	5/30/00	0.5	1347863	476586	Thorium-228	0.685	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-13R	5/30/00	0.5	1347863	476586	Thorium-232	0.699	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-13R	5/30/00	0.5	1347863	476586	Uranium, Total	3.237	mg/kg	J	Normal
A8P3S-C-02	A8P3S-C-02-14R	5/30/00	0.5	1348123	476552	Radium-226	0.905	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-14R	5/30/00	0.5	1348123	476552	Radium-228	0.648	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-14R	5/30/00	0.5	1348123	476552	Thorium-228	0.629	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-14R	5/30/00	0.5	1348123	476552	Thorium-232	0.648	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-14R	5/30/00	0.5	1348123	476552	Uranium, Total	4.577	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-15R	5/30/00	0.5	1347922	476692	Radium-226	1.094	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-15R	5/30/00	0.5	1347922	476692	Radium-228	0.839	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-15R	5/30/00	0.5	1347922	476692	Thorium-228	0.837	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-15R	5/30/00	0.5	1347922	476692	Thorium-232	0.839	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-15R	5/30/00	0.5	1347922	476692	Uranium, Total	3.699	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-2R	5/30/00	0.5	1347731	476262	Radium-226	0.916	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-2R	5/30/00	0.5	1347731	476262	Radium-228	0.679	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-2R	5/30/00	0.5	1347731	476262	Thorium-228	0.689	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-2R	5/30/00	0.5	1347731	476262	Thorium-232	0.679	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-2R	5/30/00	0.5	1347731	476262	Uranium, Total	4.938	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-3R	5/30/00	0.5	1347649	476390	Radium-226	1.09	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-3R	5/30/00	0.5	1347649	476390	Radium-228	0.783	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-3R	5/30/00	0.5	1347649	476390	Thorium-228	0.762	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-3R	5/30/00	0.5	1347649	476390	Thorium-232	0.783	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-3R	5/30/00	0.5	1347649	476390	Uranium, Total	4.637	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-4R	5/30/00	0.5	1347772	476495	Radium-226	0.969	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-4R	5/30/00	0.5	1347772	476495	Radium-228	0.818	pCi/g	-	Normal

Table A-1
Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-02	A8P3S-C-02-4R	5/30/00	0.5	1347772	476495	Thorium-228	0.782	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-4R	5/30/00	0.5	1347772	476495	Thorium-232	0.818	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-4R	5/30/00	0.5	1347772	476495	Uranium, Total	4.306	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-5R	5/30/00	0.5	1347811	476397	Radium-226	0.998	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-5R	5/30/00	0.5	1347811	476397	Radium-228	0.769	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-5R	5/30/00	0.5	1347811	476397	Thorium-228	0.74	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-5R	5/30/00	0.5	1347811	476397	Thorium-232	0.769	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-5R	5/30/00	0.5	1347811	476397	Uranium, Total	5.894	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-5R-D	5/30/00	0.5	1347811	476397	Radium-226	1.021	pCi/g	-	Duplicate
A8P3S-C-02	A8P3S-C-02-5R-D	5/30/00	0.5	1347811	476397	Radium-228	0.853	pCi/g	-	Duplicate
A8P3S-C-02	A8P3S-C-02-5R-D	5/30/00	0.5	1347811	476397	Thorium-228	0.845	pCi/g	-	Duplicate
A8P3S-C-02	A8P3S-C-02-5R-D	5/30/00	0.5	1347811	476397	Thorium-232	0.853	pCi/g	-	Duplicate
A8P3S-C-02	A8P3S-C-02-5R-D	5/30/00	0.5	1347811	476397	Uranium, Total	3.213	mg/kg	J	Duplicate
A8P3S-C-02	A8P3S-C-02-7R	5/30/00	0.5	1347906	476425	Radium-226	0.946	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-7R	5/30/00	0.5	1347906	476425	Radium-228	0.729	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-7R	5/30/00	0.5	1347906	476425	Thorium-228	0.726	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-7R	5/30/00	0.5	1347906	476425	Thorium-232	0.729	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-7R	5/30/00	0.5	1347906	476425	Uranium, Total	5.154	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-8R	5/30/00	0.5	1347997	476524	Radium-226	1.022	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-8R	5/30/00	0.5	1347997	476524	Radium-228	0.847	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-8R	5/30/00	0.5	1347997	476524	Thorium-228	0.84	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-8R	5/30/00	0.5	1347997	476524	Thorium-232	0.847	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-8R	5/30/00	0.5	1347997	476524	Uranium, Total	6.123	mg/kg	-	Normal
A8P3S-C-02	A8P3S-C-02-9R	5/30/00	0.5	1347543	476538	Radium-226	1.092	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-9R	5/30/00	0.5	1347543	476538	Radium-228	0.749	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-9R	5/30/00	0.5	1347543	476538	Thorium-228	0.749	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-9R	5/30/00	0.5	1347543	476538	Thorium-232	0.749	pCi/g	-	Normal
A8P3S-C-02	A8P3S-C-02-9R	5/30/00	0.5	1347543	476538	Uranium, Total	11.322	mg/kg	-	Normal
A8P3S-C-03	A8P3S-C-03-10R	5/30/00	0.5	1347517	477081	Radium-226	1.283	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-10R	5/30/00	0.5	1347517	477081	Radium-228	0.868	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-10R	5/30/00	0.5	1347517	477081	Thorium-228	0.865	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-10R	5/30/00	0.5	1347517	477081	Thorium-232	0.868	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-10R	5/30/00	0.5	1347517	477081	Uranium, Total	13.987	mg/kg	-	Normal
A8P3S-C-03	A8P3S-C-03-11R	5/30/00	0.5	1347471	477169	Radium-226	1.562	pCi/g	J	Normal

Table A-1
Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-03	A8P3S-C-03-11R	5/30/00	0.5	1347471	477169	Radium-228	1.022	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-11R	5/30/00	0.5	1347471	477169	Thorium-228	1.004	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-11R	5/30/00	0.5	1347471	477169	Thorium-232	1.022	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-11R	5/30/00	0.5	1347471	477169	Uranium, Total	3.686	mg/kg	U	Normal
A8P3S-C-03	A8P3S-C-03-11R-D	5/30/00	0.5	1347471	477169	Radium-226	1.369	pCi/g	J	Duplicate
A8P3S-C-03	A8P3S-C-03-11R-D	5/30/00	0.5	1347471	477169	Radium-228	0.974	pCi/g	-	Duplicate
A8P3S-C-03	A8P3S-C-03-11R-D	5/30/00	0.5	1347471	477169	Thorium-228	0.939	pCi/g	-	Duplicate
A8P3S-C-03	A8P3S-C-03-11R-D	5/30/00	0.5	1347471	477169	Thorium-232	0.974	pCi/g	-	Duplicate
A8P3S-C-03	A8P3S-C-03-11R-D	5/30/00	0.5	1347471	477169	Uranium, Total	4.598	mg/kg	U	Duplicate
A8P3S-C-03	A8P3S-C-03-13R	5/30/00	0.5	1347097	477087	Radium-226	1.32	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-13R	5/30/00	0.5	1347097	477087	Radium-228	0.983	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-13R	5/30/00	0.5	1347097	477087	Thorium-228	0.977	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-13R	5/30/00	0.5	1347097	477087	Thorium-232	0.983	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-13R	5/30/00	0.5	1347097	477087	Uranium, Total	5.557	mg/kg	-	Normal
A8P3S-C-03	A8P3S-C-03-15R	5/30/00	0.5	1346998	477235	Radium-226	1.119	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-15R	5/30/00	0.5	1346998	477235	Radium-228	0.912	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-15R	5/30/00	0.5	1346998	477235	Thorium-228	0.884	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-15R	5/30/00	0.5	1346998	477235	Thorium-232	0.912	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-15R	5/30/00	0.5	1346998	477235	Uranium, Total	3.186	mg/kg	J	Normal
A8P3S-C-03	A8P3S-C-03-16R	5/30/00	0.5	1347107	477241	Radium-226	1.191	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-16R	5/30/00	0.5	1347107	477241	Radium-228	1.062	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-16R	5/30/00	0:5	1347107	477241	Thorium-228	1.054	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-16R	5/30/00	0.5	1347107	477241	Thorium-232	1.062	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-16R	5/30/00	0.5	1347107	477241	Uranium, Total	7.682	mg/kg	-	Normal
A8P3S-C-03	A8P3S-C-03-1R	5/30/00	0.5	1347551	476784	Radium-226	1.123	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-1R	5/30/00	0.5	1347551	476784	Radium-228	0.971	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-1R	5/30/00	0.5	1347551	476784	Thorium-228	0.94	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-1R	5/30/00	0.5	1347551	476784	Thorium-232	0.971	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-1R	5/30/00	0.5	1347551	476784	Uranium, Total	11.503	mg/kg	J	Normal
A8P3S-C-03	A8P3S-C-03-2R	5/30/00	0.5	1347679	476826	Radium-226	1.266	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-2R	5/30/00	0.5	1347679	476826	Radium-228	0.973	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-2R	5/30/00	0.5	1347679	476826	Thorium-228	0.974	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-2R	5/30/00	0.5	1347679	476826	Thorium-232	0.973	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-2R	5/30/00	0.5	1347679	476826	Uranium, Total	5.132	mg/kg	-	Normal

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Table A-1
Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-03	A8P3S-C-03-3R	5/30/00	0.5	1347630	476898	Radium-226	1.13	pCi/g	J	Normal
A8P3S-C-03	A8P3S-C-03-3R	5/30/00	0.5	1347630	476898	Radium-228	0.869	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-3R	5/30/00	0.5	1347630	476898	Thorium-228	0.862	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-3R	5/30/00	0.5	1347630	476898	Thorium-232	0.869	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-3R	5/30/00	0.5	1347630	476898	Uranium, Total	4.151	mg/kg	J	Normal
A8P3S-C-03	A8P3S-C-03-6R	5/30/00	0.5	1347980	476800	Radium-226	1.231	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-6R	5/30/00	0.5	1347980	476800	Radium-228	0.631	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-6R	5/30/00	0.5	1347980	476800	Thorium-228	0.596	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-6R	5/30/00	0.5	1347980	476800	Thorium-232	0.631	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-6R	5/30/00	0.5	1347980	476800	Uranium, Total	3.206	mg/kg	J	Normal
A8P3S-C-03	A8P3S-C-03-7R	5/30/00	0.5	1347748	476909	Radium-226	0.954	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-7R	5/30/00	0.5	1347748	476909	Radium-228	0.744	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-7R	5/30/00	0.5	1347748	476909	Thorium-228	0.724	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-7R	5/30/00	0.5	1347748	476909	Thorium-232	0.744	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-7R	5/30/00	0.5	1347748	476909	Uranium, Total	3.534	mg/kg	J	Normal
A8P3S-C-03	A8P3S-C-03-8R	5/30/00	0.5	1347867	476867	Radium-226	1.134	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-8R	5/30/00	0.5	1347867	476867	Radium-228	0.704	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-8R	5/30/00	0.5	1347867	476867	Thorium-228	0.684	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-8R	5/30/00	0.5	1347867	476867	Thorium-232	0.704	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-8R	5/30/00	0.5	1347867	476867	Uranium, Total	3.728	mg/kg	J	Normal
A8P3S-C-03	A8P3S-C-03-9R	5/30/00	0.5	1347652	477107	Radium-226	1.063	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-9R	5/30/00	0.5	1347652	477107	Radium-228	0.573	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-9R	5/30/00	0.5	1347652	477107	Thorium-228	0.566	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-9R	5/30/00	0.5	1347652	477107	Thorium-232	0.573	pCi/g	-	Normal
A8P3S-C-03	A8P3S-C-03-9R	5/30/00	0.5	1347652	477107	Uranium, Total	7.336	mg/kg	UJ	Normal
A8P3S-C-04	A8P3S-C-04-11R	5/25/00	0.5	1346634	477839	Radium-226	1.294	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-11R	5/25/00	0.5	1346634	477839	Radium-228	0.983	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-11R	5/25/00	0.5	1346634	477839	Thorium-228	0.975	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-11R	5/25/00	0.5	1346634	477839	Thorium-232	0.983	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-11R	5/25/00	0.5	1346634	477839	Uranium, Total	6.704	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-12R	5/25/00	0.5	1346827	477895	Radium-226	0.926	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-12R	5/25/00	0.5	1346827	477895	Radium-228	0.691	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-12R	5/25/00	0.5	1346827	477895	Thorium-228	0.695	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-12R	5/25/00	0.5	1346827	477895	Thorium-232	0.691	pCi/g	-	Normal

Table A-1
Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-04	A8P3S-C-04-12R	5/25/00	0.5	1346827	477895	Uranium, Total	3.99	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-13R	5/25/00	0.5	1346671	477958	Radium-226	1.293	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-13R	5/25/00	0.5	1346671	477958	Radium-228	0.957	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-13R	5/25/00	0.5	1346671	477958	Thorium-228	0.939	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-13R	5/25/00	0.5	1346671	477958	Thorium-232	0.957	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-13R	5/25/00	0.5	1346671	477958	Uranium, Total	9.474	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-14R	5/25/00	0.5	1346784	478001	Radium-226	1.256	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-14R	5/25/00	0.5	1346784	478001	Radium-228	0.968	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-14R	5/25/00	0.5	1346784	478001	Thorium-228	0.98	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-14R	5/25/00	0.5	1346784	478001	Thorium-232	0.968	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-14R	5/25/00	0.5	1346784	478001	Uranium, Total	12.282	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-15R	5/25/00	0.5	1346536	478004	Radium-226	1.278	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-15R	5/25/00	0.5	1346536	478004	Radium-228	1.004	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-15R	5/25/00	0.5	1346536	478004	Thorium-228	1.004	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-15R	5/25/00	0.5	1346536	478004	Thorium-232	1.004	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-15R	5/25/00	0.5	1346536	478004	Uranium, Total	10.472	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-1R	5/25/00	0.5	1347067	477402	Radium-226	1.105	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-1R	5/25/00	0.5	1347067	477402	Radium-228	0.922	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-1R	5/25/00	0.5	1347067	477402	Thorium-228	0.898	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-1R	5/25/00	0.5	1347067	477402	Thorium-232	0.922	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-1R	5/25/00	0.5	1347067	477402	Uranium, Total	4.143	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-2R	5/25/00	0.5	1347025	477510	Radium-226	1.268	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-2R	5/25/00	0.5	1347025	477510	Radium-228	0.913	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-2R	5/25/00	0.5	1347025	477510	Thorium-228	0.932	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-2R	5/25/00	0.5	1347025	477510	Thorium-232	0.913	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-2R	5/25/00	0.5	1347025	477510	Uranium, Total	8.803	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-4R	5/25/00	0.5	1347009	477636	Radium-226	1.237	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-4R	5/25/00	0.5	1347009	477636	Radium-228	0.902	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-4R	5/25/00	0.5	1347009	477636	Thorium-228	0.887	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-4R	5/25/00	0.5	1347009	477636	Thorium-232	0.902	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-4R	5/25/00	0.5	1347009	477636	Uranium, Total	6.934	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-5R	5/25/00	0.5	1346893	477593	Radium-226	1.14	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-5R	5/25/00	0.5	1346893	477593	Radium-228	0.882	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-5R	5/25/00	0.5	1346893	477593	Thorium-228	0.88	pCi/g	-	Normal

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Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-04	A8P3S-C-04-5R	5/25/00	0.5	1346893	477593	Thorium-232	0.882	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-5R	5/25/00	0.5	1346893	477593	Uranium, Total	12.832	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-6R	5/25/00	0.5	1346960	477702	Radium-226	1.178	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-6R	5/25/00	0.5	1346960	477702	Radium-228	0.883	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-6R	5/25/00	0.5	1346960	477702	Thorium-228	0.88	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-6R	5/25/00	0.5	1346960	477702	Thorium-232	0.883	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-6R	5/25/00	0.5	1346960	477702	Uranium, Total	8.436	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-6R-D	5/25/00	0.5	1346960	477702	Radium-226	1.254	pCi/g	-	Duplicate
A8P3S-C-04	A8P3S-C-04-6R-D	5/25/00	0.5	1346960	477702	Radium-228	0.891	pCi/g	-	Duplicate
A8P3S-C-04	A8P3S-C-04-6R-D	5/25/00	0.5	1346960	477702	Thorium-228	0.881	pCi/g	-	Duplicate
A8P3S-C-04	A8P3S-C-04-6R-D	5/25/00	0.5	1346960	477702	Thorium-232	0.891	pCi/g	-	Duplicate
A8P3S-C-04	A8P3S-C-04-6R-D	5/25/00	0.5	1346960	477702	Uranium, Total	9.239	mg/kg	-	Duplicate
A8P3S-C-04	A8P3S-C-04-8R	5/25/00	0.5	1346916	477753	Radium-226	1.377	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-8R	5/25/00	0.5	1346916	477753	Radium-228	0.996	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-8R	5/25/00	0.5	1346916	477753	Thorium-228	0.962	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-8R	5/25/00	0.5	1346916	477753	Thorium-232	0.996	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-8R	5/25/00	0.5	1346916	477753	Uranium, Total	9.292	mg/kg	-	Normal
A8P3S-C-04	A8P3S-C-04-9R	5/25/00	0.5	1346717	477708	Radium-226	1.242	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-9R	5/25/00	0.5	1346717	477708	Radium-228	0.743	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-9R	5/25/00	0.5	1346717	477708	Thorium-228	0.718	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-9R	5/25/00	0.5	1346717	477708	Thorium-232	0.743	pCi/g	-	Normal
A8P3S-C-04	A8P3S-C-04-9R	5/25/00	0.5	1346717	477708	Uranium, Total	13.18	mg/kg	-	Normal
A8P3S-C-05	A8P3S-C-05-10R	5/30/00	0.5	1347096	477761	Radium-226	1.19	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-10R	5/30/00	0.5	1347096	477761	Radium-228	0.834	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-10R	5/30/00	0.5	1347096	477761	Thorium-228	0.829	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-10R	5/30/00	0.5	1347096	477761	Thorium-232	0.834	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-10R	5/30/00	0.5	1347096	477761	Uranium, Total	8.499	mg/kg	-	Normal
A8P3S-C-05	A8P3S-C-05-12R	5/30/00	0.5	1347256	477707	Radium-226	1.2	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-12R	5/30/00	0.5	1347256	477707	Radium-228	0.768	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-12R	5/30/00	0.5	1347256	477707	Thorium-228	0.769	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-12R	5/30/00	0.5	1347256	477707	Thorium-232	0.768	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-12R	5/30/00	0.5	1347256	477707	Uranium, Total	6.188	mg/kg	-	Normal
A8P3S-C-05	A8P3S-C-05-13R	5/30/00	0.5	1347182	477793	Radium-226	1.181	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-13R	5/30/00	0.5	1347182	477793	Radium-228	0.859	pCi/g	-	Normal

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Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-05	A8P3S-C-05-13R	5/30/00	0.5	1347182	477793	Thorium-228	0.859	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-13R	5/30/00	0.5	1347182	477793	Thorium-232	0.859	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-13R	5/30/00	0.5	1347182	477793	Uranium, Total	4.652	mg/kg	J	Normal
A8P3S-C-05	A8P3S-C-05-14R	5/30/00	0.5	1347302	477798	Radium-226	0.931	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-14R	5/30/00	0.5	1347302	477798	Radium-228	0.534	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-14R	5/30/00	0.5	1347302	477798	Thorium-228	0.518	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-14R	5/30/00	0.5	1347302	477798	Thorium-232	0.534	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-14R	5/30/00	0.5	1347302	477798	Uranium, Total	2.55	mg/kg	J	Normal
A8P3S-C-05	A8P3S-C-05-14R-D	5/30/00	0.5	1347302	477798	Radium-226	0.918	pCi/g	-	Duplicate
A8P3S-C-05	A8P3S-C-05-14R-D	5/30/00	0.5	1347302	477798	Radium-228	0.468	pCi/g	-	Duplicate
A8P3S-C-05	A8P3S-C-05-14R-D	5/30/00	0.5	1347302	477798	Thorium-228	0.443	pCi/g	-	Duplicate
A8P3S-C-05	A8P3S-C-05-14R-D	5/30/00	0.5	1347302	477798	Thorium-232	0.468	pCi/g	-	Duplicate
A8P3S-C-05	A8P3S-C-05-14R-D	5/30/00	0.5	1347302	477798	Uranium, Total	2.768	mg/kg	U	Duplicate
A8P3S-C-05	A8P3S-C-05-15R	5/30/00	0.5	1347189	477871	Radium-226	1.152	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-15R	5/30/00	0.5	1347189	477871	Radium-228	0.871	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-15R	5/30/00	0.5	1347189	477871	Thorium-228	0.88	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-15R	5/30/00	0.5	1347189	477871	Thorium-232	0.871	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-15R	5/30/00	0.5	1347189	477871	Uranium, Total	5.679	mg/kg	-	Normal
A8P3S-C-05	A8P3S-C-05-2R	5/30/00	0.5	1347264	477271	Radium-226	1.308	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-2R	5/30/00	0.5	1347264	477271	Radium-228	0.792	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-2R	5/30/00	0.5	1347264	477271	Thorium-228	0.787	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-2R	5/30/00	0.5	1347264	477271	Thorium-232	0.792	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-2R	5/30/00	0.5	1347264	477271	Uranium, Total	5.955	mg/kg	-	Normal
A8P3S-C-05	A8P3S-C-05-3R	5/30/00	0.5	1347153	477404	Radium-226	0.984	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-3R	5/30/00	0.5	1347153	477404	Radium-228	0.761	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-3R	5/30/00	0.5	1347153	477404	Thorium-228	0.737	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-3R	5/30/00	0.5	1347153	477404	Thorium-232	0.761	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-3R	5/30/00	0.5	1347153	477404	Uranium, Total	5.78	mg/kg	J	Normal
A8P3S-C-05	A8P3S-C-05-4R	5/30/00	0.5	1347234	477452	Radium-226	1.227	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-4R	5/30/00	0.5	1347234	477452	Radium-228	0.929	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-4R	5/30/00	0.5	1347234	477452	Thorium-228	0.919	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-4R	5/30/00	0.5	1347234	477452	Thorium-232	0.929	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-4R	5/30/00	0.5	1347234	477452	Uranium, Total	4.545	mg/kg	J	Normal
A8P3S-C-05	A8P3S-C-05-6R	5/30/00	0.5	1347258	477549	Radium-226	1.229	pCi/g	-	Normal

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CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-05	A8P3S-C-05-6R	5/30/00	0.5	1347258	477549	Radium-228	0.774	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-6R	5/30/00	0.5	1347258	477549	Thorium-228	0.754	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-6R	5/30/00	0.5	1347258	477549	Thorium-232	0.774	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-6R	5/30/00	0.5	1347258	477549	Uranium, Total	4.188	mg/kg	J	Normal
A8P3S-C-05	A8P3S-C-05-7R	5/30/00	0.5	1347109	477620	Radium-226	1.12	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-7R	5/30/00	0.5	1347109	477620	Radium-228	0.869	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-7R	5/30/00	0.5	1347109	477620	Thorium-228	0.857	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-7R	5/30/00	0.5	1347109	477620	Thorium-232	0.869	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-7R	5/30/00	0.5	1347109	477620	Uranium, Total	6.946	mg/kg	-	Normal
A8P3S-C-05	A8P3S-C-05-8R	5/30/00	0.5	1347284	477598	Radium-226	1.076	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-8R	5/30/00	0.5	1347284	477598	Radium-228	0.781	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-8R	5/30/00	0.5	1347284	477598	Thorium-228	0.751	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-8R	5/30/00	0.5	1347284	477598	Thorium-232	0.781	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-8R	5/30/00	0.5	1347284	477598	Uranium, Total	6.986	mg/kg	-	Normal
A8P3S-C-05	A8P3S-C-05-9R	5/30/00	0.5	1347097	477702	Radium-226	0.955	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-9R	5/30/00	0.5	1347097	477702	Radium-228	0.812	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-9R	5/30/00	0.5	1347097	477702	Thorium-228	0.782	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-9R	5/30/00	0.5	1347097	477702	Thorium-232	0.812	pCi/g	-	Normal
A8P3S-C-05	A8P3S-C-05-9R	5/30/00	0.5	1347097	477702	Uranium, Total	3.28	mg/kg	U	Normal
A8P3S-C-06	A8P3S-C-06-10R	5/30/00	0.5	1346857	478064	Radium-226	1.014	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-10R	5/30/00	0.5	1346857	478064	Radium-228	0.796	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-10R	5/30/00	0.5	1346857	478064	Thorium-228	0.795	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-10R	5/30/00	0.5	1346857	478064	Thorium-232	0.796	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-10R	5/30/00	0.5	1346857	478064	Uranium, Total	9.574	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-12R	5/30/00	0.5	1346794	478223	Radium-226	0.976	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-12R	5/30/00	0.5	1346794	478223	Radium-228	0.369	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-12R	5/30/00	0.5	1346794	478223	Thorium-228	0.371	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-12R	5/30/00	0.5	1346794	478223	Thorium-232	0.369	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-12R	5/30/00	0.5	1346794	478223	Uranium, Total	2.405	mg/kg	U	Normal
A8P3S-C-06	A8P3S-C-06-13R	5/30/00	0.5	1346981	478081	Radium-226	1.08	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-13R	5/30/00	0.5	1346981	478081	Radium-228	0.853	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-13R	5/30/00	0.5	1346981	478081	Thorium-228	0.842	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-13R	5/30/00	0.5	1346981	478081	Thorium-232	0.853	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-13R	5/30/00	0.5	1346981	478081	Uranium, Total	10.945	mg/kg	-	Normal

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CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-06	A8P3S-C-06-15R	5/30/00	0.5	1347087	478128	Radium-226	1.149	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-15R	5/30/00	0.5	1347087	478128	Radium-228	0.865	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-15R	5/30/00	0.5	1347087	478128	Thorium-228	0.866	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-15R	5/30/00	0.5	1347087	478128	Thorium-232	0.865	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-15R	5/30/00	0.5	1347087	478128	Uranium, Total	7.287	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-16R	5/30/00	0.5	1347097	478232	Radium-226	0.795	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-16R	5/30/00	0.5	1347097	478232	Radium-228	0.493	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-16R	5/30/00	0.5	1347097	478232	Thorium-228	0.484	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-16R	5/30/00	0.5	1347097	478232	Thorium-232	0.493	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-16R	5/30/00	0.5	1347097	478232	Uranium, Total	3.674	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-1R	5/30/00	0.5	1347016	477869	Radium-226	1.142	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-1R	5/30/00	0.5	1347016	477869	Radium-228	0.824	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-1R	5/30/00	0.5	1347016	477869	Thorium-228	0.828	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-1R	5/30/00	0.5	1347016	477869	Thorium-232	0.824	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-1R	5/30/00	0.5	1347016	477869	Uranium, Total	9.709	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-1R-D	5/30/00	0.5	1347016	477869	Radium-226	1.149	pCi/g	-	Duplicate
A8P3S-C-06	A8P3S-C-06-1R-D	5/30/00	0.5	1347016	477869	Radium-228	0.883	pCi/g	-	Duplicate
A8P3S-C-06	A8P3S-C-06-1R-D	5/30/00	0.5	1347016	477869	Thorium-228	0.881	pCi/g	-	Duplicate
A8P3S-C-06	A8P3S-C-06-1R-D	5/30/00	0.5	1347016	477869	Thorium-232	0.883	pCi/g	-	Duplicate
A8P3S-C-06	A8P3S-C-06-1R-D	5/30/00	0.5	1347016	477869	Uranium, Total	8.035	mg/kg	-	Duplicate
A8P3S-C-06	A8P3S-C-06-2R	5/30/00	0.5	1347107	477838	Radium-226	1.086	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-2R	5/30/00	0.5	1347107	477838	Radium-228	0.916	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-2R	5/30/00	0.5	1347107	477838	Thorium-228	0.91	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-2R	5/30/00	0.5	1347107	477838	Thorium-232	0.916	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-2R	5/30/00	0.5	1347107	477838	Uranium, Total	7.396	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-3R	5/30/00	0.5	1346951	477935	Radium-226	1.007	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-3R	5/30/00	0.5	1346951	477935	Radium-228	0.827	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-3R	5/30/00	0.5	1346951	477935	Thorium-228	0.799	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-3R	5/30/00	0.5	1346951	477935	Thorium-232	0.827	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-3R	5/30/00	0.5	1346951	477935	Uranium, Total	9.672	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-6R	5/30/00	0.5	1347229	477974	Radium-226	1.053	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-6R	5/30/00	0.5	1347229	477974	Radium-228	0.6	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-6R	5/30/00	0.5	1347229	477974	Thorium-228	0.595	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-6R	5/30/00	0.5	1347229	477974	Thorium-232	0.6	pCi/g	-	Normal

Table A-1
Area 8, Phase III-South Certification Data

CU	Sample ID	Sample Date	Depth	East 83	North 83	Parameter	Result	Units	Val. Qual.	QA Type
A8P3S-C-06	A8P3S-C-06-6R	5/30/00	0.5	1347229	477974	Uranium, Total	5.911	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-7R	5/30/00	0.5	1347108	478026	Radium-226	1.028	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-7R	5/30/00	0.5	1347108	478026	Radium-228	0.803	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-7R	5/30/00	0.5	1347108	478026	Thorium-228	0.778	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-7R	5/30/00	0.5	1347108	478026	Thorium-232	0.803	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-7R	5/30/00	0.5	1347108	478026	Uranium, Total	9.681	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-8R	5/30/00	0.5	1347178	478150	Radium-226	0.975	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-8R	5/30/00	0.5	1347178	478150	Radium-228	0.698	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-8R	5/30/00	0.5	1347178	478150	Thorium-228	0.705	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-8R	5/30/00	0.5	1347178	478150	Thorium-232	0.698	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-8R	5/30/00	0.5	1347178	478150	Uranium, Total	7.848	mg/kg	-	Normal
A8P3S-C-06	A8P3S-C-06-9R	5/30/00	0.5	1346849	477967	Radium-226	0.939	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-9R	5/30/00	0.5	1346849	477967	Radium-228	0.625	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-9R	5/30/00	0.5	1346849	477967	Thorium-228	0.619	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-9R	5/30/00	0.5	1346849	477967	Thorium-232	0.625	pCi/g	-	Normal
A8P3S-C-06	A8P3S-C-06-9R	5/30/00	0.5	1346849	477967	Uranium, Total	2.257	mg/kg	U	Normal

Table A-2: Certification Statistics for A8P3S-C-01

	Primary COCs				
Sample ID	**Radium-226**	**Radium-228**	**Thorium-228**	**Thorium-232**	**Uranium, Total**
A8P3S-C-01-01R	1.08 -	0.74 -	0.72 -	0.74 -	2.98 J
A8P3S-C-01-03R	1.25 -	1.03 -	1.04 -	1.03 -	3.60 U
A8P3S-C-01-04R	1.19 -	0.96 -	0.94 -	0.96 -	4.78 J
A8P3S-C-01-05R	0.88 -	0.66 -	0.65 -	0.66 -	2.95 U
A8P3S-C-01-07R	1.28 J	1.06 -	1.05 -	1.06 -	4.54 J
A8P3S-C-01-08R	1.18 J	0.99 -	0.95 -	0.99 -	5.31 J
A8P3S-C-01-09R	1.22 -	1.01 -	0.99 -	1.01 -	4.69 J
A8P3S-C-01-11R	1.20 -	0.97 -	0.99 -	0.97 -	5.07 -
A8P3S-C-01-11R-D	1.25 J	1.00 -	0.99 -	1.00 -	5.44 J
A8P3S-C-01-12R	1.20 -	1.06 -	1.06 -	1.06 -	6.85 -
A8P3S-C-01-13R	1.24 J	1.03 -	0.98 -	1.03 -	7.96 -
A8P3S-C-01-14R	1.40 J	1.07 -	1.06 -	1.07 -	7.11 -
A8P3S-C-01-15R	1.29 J	1.07 -	1.03 -	1.07 -	4.09 J
FRL	1.70	1.80	1.70	1.50	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g
Confidence Level	95%	95%	95%	95%	95%
Max Result	1.40 @	1.07 @	1.06 @	1.07 @	7.96 @
Standardized Skewness	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Estimated Mean	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass
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).

Table A-3: Certification Statistics for A8P3S-C-02

	Primary COCs				
Sample ID	**Radium-226**	**Radium-228**	**Thorium-228**	**Thorium-232**	**Uranium, Total**
A8P3S-C-02-02R	0.92 -	0.68 -	0.69 -	0.68 -	4.94 -
A8P3S-C-02-03R	1.09 -	0.78 -	0.76 -	0.78 -	4.64 -
A8P3S-C-02-04R	0.97 -	0.82 -	0.78 -	0.82 -	4.31 -
A8P3S-C-02-05R	1.00 -	0.77 -	0.74 -	0.77 -	5.89 -
A8P3S-C-02-05R-D	1.02 -	0.85 -	0.85 -	0.85 -	3.21 J
A8P3S-C-02-07R	0.95 -	0.73 -	0.73 -	0.73 -	5.15 -
A8P3S-C-02-08R	1.02 -	0.85 -	0.84 -	0.85 -	6.12 -
A8P3S-C-02-09R	1.09 -	0.75 -	0.75 -	0.75 -	11.32 -
A8P3S-C-02-10R	1.10 -	0.86 -	0.85 -	0.86 -	5.11 -
A8P3S-C-02-11R	1.15 -	0.82 -	0.79 -	0.82 -	6.07 -
A8P3S-C-02-13R	1.01 -	0.70 -	0.69 -	0.70 -	3.24 J
A8P3S-C-02-14R	0.91 -	0.65 -	0.63 -	0.65 -	4.58 -
A8P3S-C-02-15R	1.09 -	0.84 -	0.84 -	0.84 -	3.70 -
FRL	1.70	1.80	1.70	1.50	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g
Confidence Level	95%	95%	95%	95%	95%
Max Result	1.15 @	0.86 @	0.85 @	0.86 @	11.32 @
Standardized Skewness	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Estimated Mean	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass
a posteriori Sample Size calculation	--	--	--	--	--

Definition of Qualifiers
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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).

Table A-4: Certification Statistics for A8P3S-C-03

	Primary COCs				
Sample ID	**Radium-226**	**Radium-228**	**Thorium-228**	**Thorium-232**	**Uranium, Total**
A8P3S-C-03-01R	1.12 -	0.97 -	0.94 -	0.97 -	11.50 J
A8P3S-C-03-02R	1.27 -	0.97 -	0.97 -	0.97 -	5.13 -
A8P3S-C-03-03R	1.13 J	0.87 -	0.86 -	0.87 -	4.15 J
A8P3S-C-03-06R	1.23 -	0.63 -	0.60 -	0.63 -	3.21 J
A8P3S-C-03-07R	0.95 -	0.74 -	0.72 -	0.74 -	3.53 J
A8P3S-C-03-08R	1.13 -	0.70 -	0.68 -	0.70 -	3.73 J
A8P3S-C-03-09R	1.06 -	0.57 -	0.57 -	0.57 -	7.34 UJ
A8P3S-C-03-10R	1.28 -	0.87 -	0.87 -	0.87 -	13.99 -
A8P3S-C-03-11R	1.56 J	1.02 -	1.00 -	1.02 -	3.69 U
A8P3S-C-03-11R-D	1.37 J	0.97 -	0.94 -	0.97 -	4.60 U
A8P3S-C-03-13R	1.32 -	0.98 -	0.98 -	0.98 -	5.56 -
A8P3S-C-03-15R	1.12 -	0.91 -	0.88 -	0.91 -	3.19 J
A8P3S-C-03-16R	1.19 -	1.06 -	1.05 -	1.06 -	7.68 -
FRL	1.70	1.80	1.70	1.50	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g
Confidence Level	95%	95%	95%	95%	95%
Max Result	1.56 @	1.06 @	1.05 @	1.06 @	13.99 @
Standardized Skewness	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Estimated Mean	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass
a posteriori Sample Size calculation	--	--	--	--	--
	--	--	--	--	--

Definition of Qualifiers
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U" = not detected
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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).

Table A-5: Certification Statistics for A8P3S-C-04

	Primary COCs				
Sample ID	**Radium-226**	**Radium-228**	**Thorium-228**	**Thorium-232**	**Uranium, Total**
A8P3S-C-04-01R	1.11 -	0.92 -	0.90 -	0.92 -	4.14 -
A8P3S-C-04-02R	1.27 -	0.91 -	0.93 -	0.91 -	8.80 -
A8P3S-C-04-04R	1.24 -	0.90 -	0.89 -	0.90 -	6.93 -
A8P3S-C-04-05R	1.14 -	0.88 -	0.88 -	0.88 -	12.83 -
A8P3S-C-04-06R	1.18 -	0.88 -	0.88 -	0.88 -	8.44 -
A8P3S-C-04-06R-D	1.25 -	0.89 -	0.88 -	0.89 -	9.24 -
A8P3S-C-04-08R	1.38 -	1.00 -	0.96 -	1.00 -	9.29 -
A8P3S-C-04-09R	1.24 -	0.74 -	0.72 -	0.74 -	13.18 -
A8P3S-C-04-11R	1.29 -	0.98 -	0.98 -	0.98 -	6.70 -
A8P3S-C-04-12R	0.93 -	0.69 -	0.70 -	0.69 -	3.99 -
A8P3S-C-04-13R	1.29 -	0.96 -	0.94 -	0.96 -	9.47 -
A8P3S-C-04-14R	1.26 -	0.97 -	0.98 -	0.97 -	12.28 -
A8P3S-C-04-15R	1.28 -	1.00 -	1.00 -	1.00 -	10.47 -
FRL	1.70	1.80	1.70	1.50	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g
Confidence Level	95%	95%	95%	95%	95%
Max Result	1.38 @	1.00 @	1.00 @	1.00 @	13.18 @
Standardized Skewness	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Estimated Mean	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass
a posteriori Sample Size calculation	--	--	--	--	--
	--	--	--	--	--

Definition of Qualifiers
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U" = not detected
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UNV" = not detected, not validated

NOTES:

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(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).

Table A-6: Certification Statistics for A8P3S-C-05

	Primary COCs				
Sample ID	**Radium-226**	**Radium-228**	**Thorium-228**	**Thorium-232**	**Uranium, Total**
A8P3S-C-05-02R	1.31 -	0.79 -	0.79 -	0.79 -	5.96 -
A8P3S-C-05-03R	0.98 -	0.76 -	0.74 -	0.76 -	5.78 J
A8P3S-C-05-04R	1.23 -	0.93 -	0.92 -	0.93 -	4.55 J
A8P3S-C-05-06R	1.23 -	0.77 -	0.75 -	0.77 -	4.19 J
A8P3S-C-05-07R	1.12 -	0.87 -	0.86 -	0.87 -	6.95 -
A8P3S-C-05-08R	1.08 -	0.78 -	0.75 -	0.78 -	6.99 -
A8P3S-C-05-09R	0.96 -	0.81 -	0.78 -	0.81 -	3.28 U
A8P3S-C-05-10R	1.19 -	0.83 -	0.83 -	0.83 -	8.50 -
A8P3S-C-05-12R	1.20 -	0.77 -	0.77 -	0.77 -	6.19 -
A8P3S-C-05-13R	1.18 -	0.86 -	0.86 -	0.86 -	4.65 J
A8P3S-C-05-14R	0.93 -	0.53 -	0.52 -	0.53 -	2.55 J
A8P3S-C-05-14R-D	0.92 -	0.47 -	0.44 -	0.47 -	2.77 U
A8P3S-C-05-15R	1.15 -	0.87 -	0.88 -	0.87 -	5.68 -
FRL	1.70	1.80	1.70	1.50	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g
Confidence Level	95%	95%	95%	95%	95%
Max Result	1.31 @	0.93 @	0.92 @	0.93 @	8.50 @
Standardized Skewness	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Estimated Mean	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass
a posteriori Sample Size calculation	--	--	--	--	--
	--	--	--	--	--

Definition of Qualifiers
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U" = not detected
- " = no data qualifier
NV" = not validated
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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).

Table A-7: Certification Statistics for A8P3S-C-06

	Primary COCs				
Sample ID	**Radium-226**	**Radium-228**	**Thorium-228**	**Thorium-232**	**Uranium, Total**
A8P3S-C-06-01R	1.14 -	0.82 -	0.83 -	0.82 -	9.71 -
A8P3S-C-06-01R-D	1.15 -	0.88 -	0.88 -	0.88 -	8.04 -
A8P3S-C-06-02R	1.09 -	0.92 -	0.91 -	0.92 -	7.40 -
A8P3S-C-06-03R	1.01 -	0.83 -	0.80 -	0.83 -	9.67 -
A8P3S-C-06-06R	1.05 -	0.60 -	0.60 -	0.60 -	5.91 -
A8P3S-C-06-07R	1.03 -	0.80 -	0.78 -	0.80 -	9.68 -
A8P3S-C-06-08R	0.98 -	0.70 -	0.71 -	0.70 -	7.85 -
A8P3S-C-06-09R	0.94 -	0.63 -	0.62 -	0.63 -	2.26 U
A8P3S-C-06-10R	1.01 -	0.80 -	0.80 -	0.80 -	9.57 -
A8P3S-C-06-12R	0.98 -	0.37 -	0.37 -	0.37 -	2.41 U
A8P3S-C-06-13R	1.08 -	0.85 -	0.84 -	0.85 -	10.95 -
A8P3S-C-06-15R	1.15 -	0.87 -	0.87 -	0.87 -	7.29 -
A8P3S-C-06-16R	0.80 -	0.49 -	0.48 -	0.49 -	3.67 -
FRL	1.70	1.80	1.70	1.50	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g
Confidence Level	95%	95%	95%	95%	95%
Max Result	1.15 @	0.92 @	0.91 @	0.92 @	10.95 @
Standardized Skewness	--	--	--	--	--
W-Statistic Probability*	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Estimated Mean	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass
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).