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CERTIFICATION REPORT FOR AREA 9, PHASE I

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

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U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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LIST OF ACRONYMS AND ABBREVIATIONS

A1PI	Area 1, Phase I
A1PII	Area 1, Phase II
A9PI	Area 9, Phase I
ASCOC	area-specific constituent of concern
ASL	analytical support level
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
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
FACTS	Fernald Analytical Computerized Tracking System
FRL	final remediation level
GFAA	graphite furnace – atomic absorption
HAMDC	highest allowable minimum detectable concentration
HPGe	high-purity germanium (detector)
ICP-AES	inductively coupled plasma atomic emission spectroscopy
ILCR	incremental lifetime cancer risk
LCS	laboratory control sample
µg/kg	micrograms per kilogram
MDC	minimum detectable concentration
mg/kg	milligrams per kilogram
NaI	sodium iodide
NCR	Non-Conformance Report
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
RCRA	Resource Conservation and Recovery Act
RME	reasonable maximum exposure
ROD	Record of Decision
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
TPU	Total Propagated Uncertainty
UCL	Upper Confidence Level
UMTRCA	Uranium Mill Tailings Radiation Control Act
V&V	verification and validation
V/FCN	Variance/Field Change Notice
WAC	waste acceptance criteria

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EXECUTIVE SUMMARY

Area 9, Phase I (A9PI) underwent the certification process during the winter of 2001/2002. The results of the process indicated that 18 of 20 certification units (CUs) have below-final remediation level (FRL) conditions for all constituents of concern (COCs). The two remaining CUs have surface radium-226 soil concentrations at levels that cannot be statistically differentiated from the FRL. All other COCs are below their respective FRLs. The subsurface conditions in the plowed area for all COCs are consistent with and/or within the background conditions. This Certification Report presents the certification results and the factors considered by the U.S. Department of Energy (DOE) to determine that soils in A9PI do not require remediation. Although one of the certification criteria specified in the Sitewide Excavation Plan (SEP, DOE 1998a) was not met for radium-226, the conditions are still protective of human health and the environment in the two identified CUs.

A9PI is an off-property, 71.9-acre area located adjacent to the northern half (approximately) of the Fernald Environmental Management Project (FEMP) eastern property boundary. The scope of this Certification Report focuses on the 52.9 acres adjacent to on-property areas that were excavated for remediation purposes and therefore require examination.

Consistent with the SEP, this area underwent predesign and precertification activities between 1999 and 2000, including the use of real-time instrumentation as well as physical sampling and analysis. No immediate remediation prior to certification was determined necessary as a result of these investigations.

A Certification Design Letter was submitted in October 2001 to address the final certification approach for A9PI, including the subsurface baseline confirmation and the surface certification (DOE 2001a). Certification sampling was conducted in each CU to verify that the certification criteria set forth in the SEP were achieved. Additionally, composite sampling in the 12 to 36-inch depth interval in the plowed area was performed to confirm that the subsurface concentrations are consistent with and/or within background subsurface conditions and cultivation activities did not result in unacceptable re-distribution of potential surface contamination to deeper depths.

The certification samples collected in Winter 2001/2002 were analyzed at the on-site laboratory and at laboratories on the FEMP Approved Laboratories List per the Sitewide Comprehensive Environmental

Response, Compensation and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ; DOE 1998b).

The results of the subsurface samples in the plowed area confirmed that the levels of all constituents were consistent with the means and/or were less than the 95th percentile of the background levels as required in the SEP with its associated addendum (DOE 2001b).

Out of 20 CUs sampled and 11 COCs analyzed, all CUs passed the SEP surface certification criteria except for one constituent (radium-226) in two CUs (6 and 14) that could not pass one of the SEP certification criteria [95 percent upper confidence limit on the mean is *less* than the Operable Unit (OU) 5 FRL]. Although the radium-226 surface soil concentrations in these two CUs do not satisfy the one criterion, the benefit of remediation cannot be justified.

In the case of these two CUs, statistical analyses indicated that the means for radium-226 could not be differentiated from the FRL. The radium-226 levels are essentially at the off-property FRL, which is only slightly above the background level for surface soil and still within the background subsurface level. None of the radium-226 results exceeds two times the off-property FRL (SEP hot spot criterion), and all results are at a level that is protective of human health at a COC-specific risk on the order of 10^{-5} for an unrestricted land use scenario. If a remedial action were to be completed, the resulting radium-226 levels would only be reduced by a value of less than 10 percent of the current levels, from roughly the FRL to the background level in these two CUs.

As an independent point of reference for radium-226 health risk, the relevant criteria from the Uranium Mill Tailings Radiation Control Act (UMTRCA) were considered for both radium and thorium isotopes. Comparison to this independent point of reference showed that no individual result and/or additive result was greater than the standard specified in the UMTRCA. This independent comparison lends further support to DOE's evaluation as to whether remediation in A9PI is warranted.

As an additional step in the evaluation regarding the need for remediation in these two CUs, the cumulative risk from the presence of multiple COCs was evaluated. When the cumulative effects from multiple COCs were considered, CUs 6 and 14 were found to have cumulative risk levels of 3.7×10^{-5} and 3.5×10^{-5} respectively. These cumulative risk values are well within the acceptable 1×10^{-5} to

1×10^{-4} cumulative risk range objective set in the OU5 Record of Decision (DOE 1996a) for an unrestricted land use scenario.

The benefits of surface soil remediation cannot be justified since the overall surface conditions are adequately protective of human health and the environment. All subsurface constituents are at levels consistent with and/or within background subsurface conditions in the plowed area from 1 foot down to 3 feet below the ground surface. After evaluating all of the information presented, including the independent comparison with the UMTRCA cleanup standard, DOE has determined that no soil remediation needs to be performed in A9PI.

1.0 INTRODUCTION

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1.1 PURPOSE

This Certification Report presents the process and data used by the U.S. Department of Energy (DOE) to determine that soils in Area 9, Phase I (A9PI) do not contain any constituents which exceed established final remediation levels (FRLs) and/or background conditions and therefore do not require remediation. This report presents the final certification results for the certification units (CUs) and subsurface zone identified in the A9PI Certification Design Letter (CDL, DOE 2001a).

1.2 BACKGROUND

In the Operable Unit (OU) 5 Record of Decision (ROD, DOE 1996a), DOE committed to excavating contaminated soil that exceeds health-based FRLs, with final disposal of the excavated material in the On-Site Disposal Facility (OSDF) or an off-site disposal facility if the waste acceptance criteria (WAC) are exceeded. The OU5 Remedial Investigation Report (DOE 1995a) defined the potential extent of soil contamination exceeding the FRLs and, in general, indicated widespread contamination in approximately 430 acres of the 1,050-acre Fernald Environmental Management Project (FEMP). Approximately 1.8 million cubic yards of contaminated soils will be excavated and placed within the OSDF.

In the OU5 Remedial Action Work Plan (RAWP, DOE 1996b), DOE committed to preparing a Sitewide Excavation Plan (SEP, DOE 1998a), defining the overall approach to implementing the soil, and at- and below-grade debris cleanup obligations identified in the OU2 (DOE 1995b), OU3 (DOE 1996c), and OU5 RODs. In the SEP, the FEMP was divided into ten remedial areas; this report addresses A9PI.

1.3 AREA DESCRIPTION

A9PI includes the 71.9-acre off-property area adjacent to the northern half (approximately) of the eastern property boundary of the FEMP, extending a distance of 750 feet from the eastern FEMP property fence (Figure 1-1). Consistent with the SEP, off-site properties require certification if they are immediately adjacent to on-property areas that were remediated.

1.4 SCOPE

A9PI is 71.9 acres; however, only 52.9 acres are addressed in this report since they are adjacent to on-property areas that were excavated for remediation purposes and therefore require certification. Both

Area 1, Phase I (A1PI) and Area 1, Phase II (A1PII) were remediated and certified between 1997 and 2000.

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In the SEP, the FEMP was divided into distinct remedial areas and phases for soil remediation, based on the OUs' remediation schedule. After all necessary remediation is completed within each area/phase, the soil is certified as having attained all cleanup goals (i.e., FRLs). For A9PI, the certification strategy varied slightly from SEP Approach E because much of the soil in this area has been plowed, thus eliminating the original surface layer of soil. Although the SEP defines the general certification requirements, there are some undefined details for off-property certification due to various land-use conditions and potential requests of property owners, which will require regulatory approval in order to complete the certification. In this instance, there was a need to evaluate subsurface soils to ensure that soil cultivation had no impact below the plowed zone. The strategy for subsurface soil certification is outlined in an addendum to the SEP, Section 3.4.8 (DOE 2001b).

1.5 OBJECTIVES

The objectives of this Certification Report are:

- Provide an overview of previous precertification activities conducted in A9PI
- Describe the analytical methods, data validation processes, data reduction and statistical processes used to support the certification process
- Present the statistical analysis of the sampling results for all the CUs within A9PI, which show the certification criteria, including FRL attainment, hot spot criteria, and background conditions, have been met in most of the surface area and the entire subsurface zone in the plowed area
- Present the conclusion regarding the need for soil remediation.

1.6 REPORT FORMAT

This certification report is presented in six sections with supporting documentation and data in Appendix A. The sections of this report are as follows:

Section 1.0	Introduction: Purpose, background, area description and objectives of the report
Section 2.0	Certification Approach: The CU design and approach to sampling and analysis used for certification

Section 3.0	Overview of Field Activities: Area preparation/survey, 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, Analytical Results and Statistics Tables
Appendix B	Variance/Field Change Notices (V/FCNs) for A9PI Certification Project Specific Plan (PSP)
Appendix C	Non-Conformance Report (NCR) #272

1.7 FEMP CONTROLLED CERTIFICATION MAP

In order to track certification and characterization for reuse areas at the FEMP, DOE has included a controlled map (Figure 1-2) showing the status of the soil remediation areas and phased areas with all Certification Reports and CDLs. Note that this figure has been revised to show the certification status of A9PI.

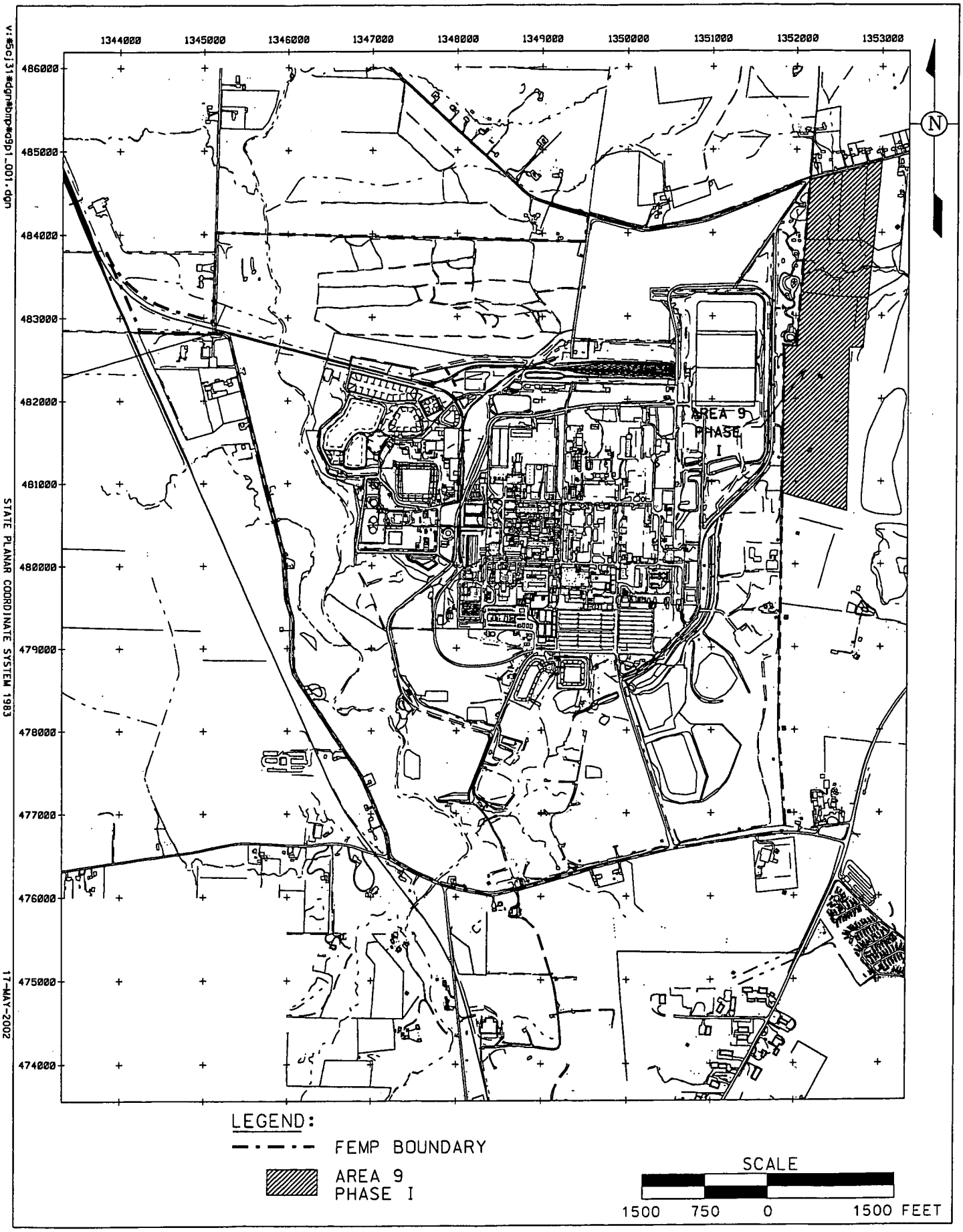
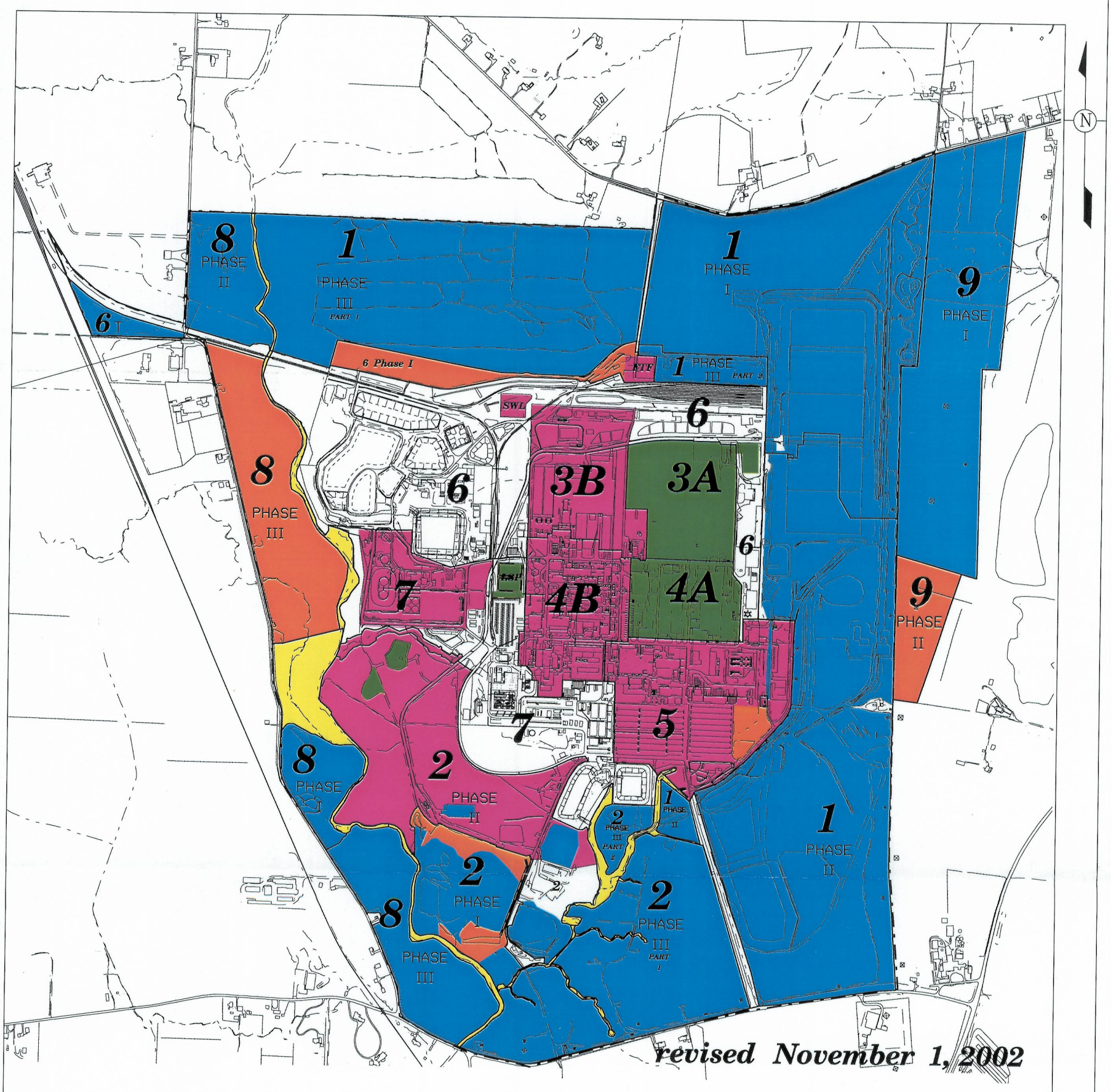


FIGURE 1-1. AREA 9, PHASE I LOCATION MAP



AREAS	TOTAL ACRES	APPROVED CERT. ACRES	CERT. ACRES IN PROGRESS	REMEDIATION ACRES IN PROGRESS	PREDESIGN ACRES IN PROGRESS	REMAINING ACRES
AREA 1	390.7	389.9	0	0	0	* 0.8
AREA 2	173.0	99.3	7.5	2.0	57.9	6.3
AREA 3A/4A	41.5	0	0	41.5	0	0
AREA 3B/4B	47.8	0	0	0	47.8	0
AREA 5	48.2	0	3.2	0	45.0	0
AREA 6	143.7	4.4	10.7	1.2	12.3	115.1
AREA 7	71.1	0	0	0	19.2	51.9
AREA 8	99.2	60.2	39	0	0	0
AREA 10	5.2	0	0	0	0	5.2
PR/SSOD/PPDD	*** 27.9	0	0	0	2.1	25.8
TOTAL ON SITE	1048.3	553.8	60.4	44.7	184.3	205.1
AREA 9	84.5	71.9	12.6	0	0	0
TOTAL OFF SITE	84.5	71.9	0	0	0	0

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

*** PADDYS RUN/STORMSEWER OUTFALL DITCH CORRIDOR IS IDENTIFIED IN .

AIPI ROADS EXCLUDED FROM CERTIFICATION.

SCALE

1100 550 0 1100 FEET

FIGURE 1-2. FEMP CONTROLLED CERTIFICATION MAP

STATE PLANAR COORDINATE SYSTEM 1983

v:\5cj31\dgn\bmp\certmap3.dgn

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2.0 CERTIFICATION APPROACH

2.1 CERTIFICATION STRATEGY

This section summarizes the area-specific constituent of concern (ASCOC) selection process and the certification approach, including CU establishment, sampling design, and statistical analysis. The general certification strategy is described in Section 3.4 of the SEP, and the A9PI specific strategy is described in the CDL for A9PI.

2.1.1 Area-Specific Constituents of Concern

As committed in the SEP, the sitewide primary radiological constituents of concern (COCs) (total uranium, radium-226, radium-228, thorium-228, and thorium-232) were retained as ASCOCs for this remediation effort. The secondary COCs were selected as described in Section 2.1.3.

2.1.2 ASCOC Selection Criteria

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

- It was retained as an ASCOC in adjacent FEMP soil remediation areas;
- 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 (Note: Table 2-7 does not include off-property Area 9);
- Analytical results show that a contaminant is present above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated contract-required detection limits (CRDLs);
- It can be traced to site use, either through process knowledge or known release of the constituent to the environment; and
- Physical characteristics of the contaminant, such as degradation rate and volatility, indicate it is likely to persist in the soil between time of release and remediation.

2.1.3 ASCOC Selection Process

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary COCs and were therefore retained as ASCOCs. The remaining suite of ASCOCs was based on the precertification and predesign data. As stated in the SEP, the suite of ASCOCs from the adjacent FEMP soil remediation

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areas were included. Therefore, the ASCOCs for A9PI included the suite of ASCOCs for A1PI and A1PII. All ASCOCs will be certified to the more stringent off-property soil FRLs identified in the OU5 ROD.

Predesign sample data for A9PI indicated elevated levels of arsenic and beryllium. Although excavation was not required, as discussed in the CDL, these constituents will be retained as secondary ASCOCs. In addition, a review of data collected along the FEMP property fence line indicated that concentrations of cesium-137 and strontium-90 existed below the on-property FRLs, but are higher than the off-property FRLs. These two constituents were also added to the list of ASCOCs for the Group 1 CUs along the fence line only. The complete list of ASCOCs identified for A9PI are shown in Table 2-1.

2.2 CERTIFICATION APPROACH

2.2.1 Certification Design

The certification design for A9PI followed the general approach outlined in Section 3.4 of the SEP. Approach E, described in Section 4.5 of the SEP, was used as a basis for certification design. However, the certification strategy varied slightly from SEP Approach E because much of the soil in this area has been plowed, thus eliminating the original surface layer of soil. There was also a need to evaluate subsurface soils to ensure that soil cultivation has had no impact below the plowed zone. In the unplowed areas, the top 6 inches of soil were certified. In the cultivated areas, soil certification was performed at two depths. Surface was certified to a depth of 1 foot. The subsurface was compared to the background levels to a depth of 36 inches, as described in Section 3.4.8 of the SEP Addendum.

Historical land uses, soil COC data, precertification data and topography were used to establish CU boundaries. The CU boundaries are shown in Figure 2-1. Since A9PI is an off-property area, precertification and predesign data and the topography of A9PI were the main drivers for CU delineation. A1PI and A1PII, which are adjacent to A9PI, had been excavated for remediation purposes, so Group 1 CUs were established along the fence line, allowing for more concentrated sampling, to ensure the historical FEMP operation and recent excavation had no effect on the off-property soil. Group 2 CUs were established to the east of the Group 1 CUs.

Twenty CUs were established in A9PI as follows:

- CU A9PI-01 — A Group 1 CU along the FEMP property fence line in northern unplowed portion of the A9PI area that required certification sampling from 0 to 6 inches. An existing drainage is the northern border of CU 1
- CU A9PI-02 – CU A9PI-04 — Group 2 CUs to the east of CU 1 in the northern, unplowed portion of the A9PI area that required certification sampling from 0 to 6 inches. An existing drainage is the southern border of CU 2 and the northern border CU 3.
- CU A9PI-05 – CU A9PI-09 — Group 2 CUs to the east of Group 1 CUs in the southern cultivated portion of the A9PI area that required certification sampling from 0 to 36 inches.
- CU A9PI-10 – CU A9PI-20 — Group 1 CUs along the FEMP property fence line in the southern cultivated portion of the A9PI area that required certification sampling from 0 to 36 inches.

2.2.2 Sample Selection Process

Certification sampling locations were selected 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 criteria for the CU. If the minimum distance criteria were not met, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process continued until the minimum distance criteria were met for all 16 sampling locations. Several sample locations were not subject to random placement but were placed specifically to avoid topography that limited access for sampling purposes. These locations were also tested against the minimum distance criterion. All sub-CUs and planned A9PI certification sampling locations are shown in Figure 2-2. Four of the 16 sample locations in each CU are designated with a "V," indicating archive sample locations. One sample location in each CU is designated with a "D," indicating a duplicate sample collection location. The additional sampling locations shown in Figure 2-2 will be discussed in Section 3.0.

2.2.3 Certification Sampling

CU 01 Through CU 04

Samples were collected from 0 to 6 inches at all 16 locations in each CU. Twelve samples per CU were submitted for analysis. The four samples designated as "archive" were stored in the event they were needed for further analysis.

CU 05 Through CU 20

Composite samples were collected from 0 to 12 inches at all 16 locations in each CU. Twelve samples per CU were submitted for analysis. The four samples designated as "archive" were stored for possible future analysis. At each of the four "archive" locations, a composite sample was collected from 12 to 36 inches. These samples are designated as baseline confirmation samples per Section 3.4.8 of the SEP Addendum. All four 12 to 36-inch interval samples were analyzed for baseline confirmation to provide data for comparisons to background conditions.

2.2.4 Statistical Analysis

Surface Samples (0 to 6-inch and 0 to 12-inch)

Two criteria must be met for the CU to pass certification. If the data distribution is normal or lognormal, the first criterion compares the 95 percent upper confidence limit (UCL) on the mean of each primary COC to its FRL, or the 90 percent UCL on the mean of each secondary ASCOC. On an individual CU basis, any ASCOC with the 95 percent UCL (for primary ASCOCs) or 90 percent UCL (for secondary ASCOCs) above the FRL results in that CU failing certification. If the data distribution is not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP will be used to evaluate the second criterion the *a posteriori* test will be performed to determine whether the sample size is sufficient for a meaningful conclusion of this comparison. The second criterion is the hot spot criterion, which states that all ASCOC results must not exceed two times the FRL. When the given UCL on the mean for each COC is less than its FRL and the hotspot criterion is met, the CU will be considered certified.

In the event that a CU pass *a posteriori* test but fails certification, the following two scenarios will be evaluated: 1) localized contamination, and 2) widespread contamination. Details on the evaluation and responses to these possible outcomes are provided in Section 3.4.5 of the SEP. Section 7.4 of the SEP provides additional details and describes the required content of the Certification Report.

Subsurface Baseline Confirmation Samples (12 to 36-inch)

As described in Section 3.4.8 of the SEP Addendum, statistical analyses for the baseline confirmation samples (subsurface) compare the subsurface soil data to background concentrations. If all of the baseline confirmation data in the entire area to be certified are less than the 95th percentile background concentration for each COC, then the impacted area is not extended and the background area below/outside the impacted zone is considered certified. If any subsurface certification result equals or exceed the 95th percentile background concentration, statistics of the baseline confirmation data set for each COC are evaluated. If any COC-specific baseline confirmation results are less than the corresponding background population based on a population-to-population comparison (i.e., t-test or Wilcoxon tests) or cannot be differentiated at 99 percent UCL, then the original impacted zone is not extended and the zone below/outside the impacted area is considered certified.

If any COC-specific data population is higher than the background population, more statistical evaluations of the data are required. For example, all baseline confirmation data from any CU with concentration(s) higher than the 95th percentile background concentration will be grouped into a subset for evaluation. If the UCL of the mean of this subset of data for each COC is less than the 95th percentile background concentration, then the original impacted area is not extended, and the zone below/outside the impacted surface CU is considered certified.

If the UCL of the mean of this subset of data for any COC is greater than the 95th percentile background concentration, then a portion of the originally designated background zone will be designated as impacted. This newly designated impacted zone will require FRL certification. The reduced background certification area will require re-analyses using the remaining baseline confirmation data to confirm that background conditions exist. Guidelines of the baseline confirmation process are defined in the SEP Addendum, Section 3.4.5, Procedures for Non-Attainment Scenarios.

TABLE 2-1
ASCOC LIST FOR ALL A9PI CERTIFICATION UNITS

ASCOC	Off-Property FRL	Reason Retained
Total Uranium	50 mg/kg	Retained as a primary ASCOC sitewide
Radium-226	1.5 pCi/g	Retained as a primary ASCOC sitewide
Radium-228	1.4 pCi/g	Retained as a primary ASCOC sitewide
Thorium-228	1.5 pCi/g	Retained as a primary ASCOC sitewide
Thorium-232	1.4 pCi/g	Retained as a primary ASCOC sitewide
Arsenic	9.6 mg/kg	ASCOC for A1PI
Aroclor-1260	0.004 mg/kg	ASCOC for A1PI
Beryllium	0.62 mg/kg	ASCOC for A1PI and A1PII
Technetium-99	1.0 pCi/g	ASCOC for A1PII
Cesium-137*	0.82 pCi/g	Above off-property FRLs at fence line
Strontium-90*	0.61 pCi/g	Above off-property FRLs at fence line

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

* Cesium-137 and strontium-90 to be analyzed for in soil from Group 1 CUs along fence line only.

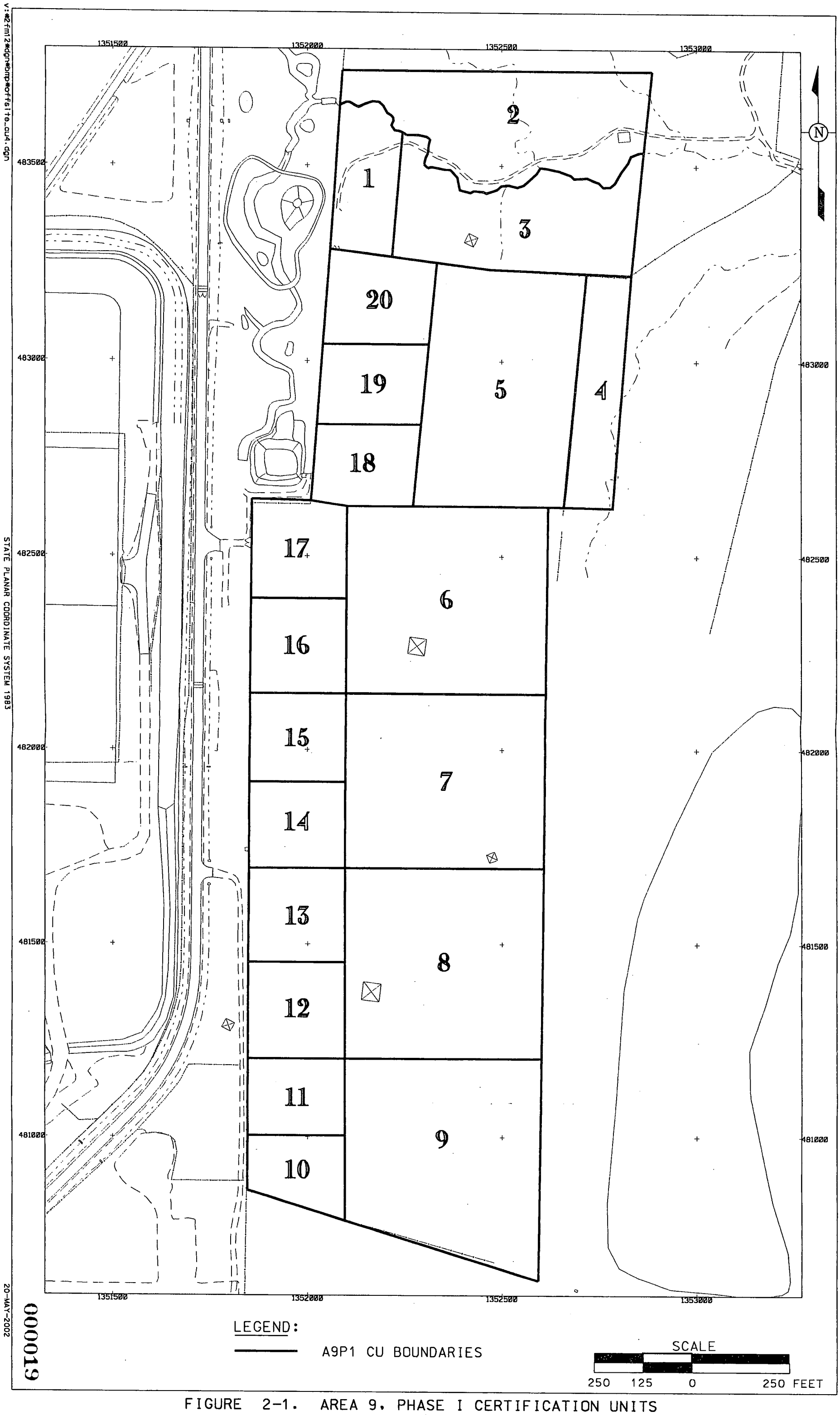

FIGURE 2-1. AREA 9, PHASE I CERTIFICATION UNITS

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FIGURE 2-2. AREA 9, PHASE I CERTIFICATION SAMPLING LOCATIONS

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3.0 OVERVIEW OF FIELD ACTIVITIES

Consistent with the SEP, off-site properties immediately adjacent to on-property areas that were remediated will require certification. As discussed in Section 1.0, 52.9 acres of A9PI are adjacent to on-property areas that were excavated for remediation purposes and therefore required certification sampling.

Of the portion of A9PI addressed in this report, the area encompassed by CUs 1 through 4 was used for cattle grazing. The remaining portion has been plowed and cultivated for growing crops. As a result, subsurface soils were evaluated in this portion to ensure that cultivation of the soil has had no impact below the plowed zone by pushing potential surface contamination deeper.

3.1 PRELIMINARY DATA EVALUATION, PRECERTIFICATION AND AREA PREPARATION

In December 1999, precertification real-time scanning began in the northwestern, unplowed portion of A9PI. The real-time scan was conducted pursuant to the PSP for A9PI Precertification Real-Time Scanning (DOE 1998c). The scan was accomplished using the mobile sodium iodide (NaI) detectors in the open fields and the high-purity germanium (HPGe) detectors in steep or wooded areas. Precertification physical samples for non-radiochemical constituents were taken as well (DOE 1999). Wet field conditions and snow cover prevented scanning after early January 2000. The first access agreement for A9PI obtained by DOE expired at the end of February 2000, with approximately 25 percent of the scanning completed. A second access agreement was obtained starting on June 6, 2000, for a period of 90 days, and real-time scanning was resumed. Real-time scanning was complete in A9PI in late August 2000.

Once initial precertification activities were complete and the data were analyzed, some anomalous, elevated concentrations of beryllium and arsenic were identified. Based on these data, precertification activities were halted and predesign physical samples were collected to assess and/or bound these elevated soil concentrations and to determine if soil excavation would be necessary prior to certification of A9PI. Following review of the predesign sample analyses results, which confirmed widespread elevated results of beryllium and arsenic at the 12 to 36-inch interval, a decision was made to obtain background data from this depth interval. Since no background data were collected from the 12 to 36-inch interval in the 1992 Background Soil Study (DOE 1993), an Addendum to the Comprehensive

Environmental Response, Compensation and Liability Act (CERCLA)/ Resource Conservation and Recovery Act (RCRA) Background Soil Study (DOE 2001c) was conducted to compare A9PI subsurface soil concentrations to those in areas that were not affected by previous FEMP emissions. The sampling was designed to assess the concentrations of the selected ASCOCs in farm fields having soil characteristics and past land uses similar to A9PI. This was necessary to distinguish any FEMP-related contamination from naturally occurring or other anthropogenic sources on crop-producing lands such as A9PI. Selected COCs analyzed for in the 1992 study were analyzed for in the supplemental study to provide a complete set of new data for comparison purposes and a complete analysis of the 12 to 36-inch interval.

Eleven of the 30 properties evaluated under the 1992 study were selected and sampled in this supplemental program. These properties are located approximately three miles northwest of the FEMP. Sampling activities were carried out pursuant to the PSP for Supplemental Background Soil Study (DOE 2000a). A total of 33 borings were collected for laboratory analysis. Samples from each boring were collected in 6-inch intervals from a depth of 0 to 36 inches. The 6 to 12-inch interval from each boring was archived. The total number of samples collected was 264 (165 for analysis and 99 for archive). The collection of the 0 to 6-inch interval was to compare the results of the original background study completed in 1992 to results from the supplemental background study.

In general, the new background surface (0 to 6 inches) concentrations for arsenic, beryllium, radium-226 (the three ASCOCs of concern in A9PI), and total uranium are consistent with the old background surface concentrations. Arsenic, beryllium and radium-226 background subsurface soil concentrations are generally higher than surface concentrations and peak at the 12 to 24-inch depth interval, as also seen in the A9PI data. Based on the Background Soil Study Addendum, average background concentrations of beryllium exceed the off-property FRL. Unlike arsenic, beryllium, and radium-226, background uranium surface soil concentrations are slightly higher than subsurface concentrations. Details and data from the Background Soil Study Addendum are included in the A9PI Precertification Summary Report (DOE 2000b).

Based on the results of all the above sampling events, it was determined that no excavation would be required prior to certification of A9PI.

The first round of certification sampling began in A9PI in December 2001 and continued through February 2002. The sampling approach is described in the PSP and Section 2.2. Sample results as they pertain to field activities are discussed below. The sample results and data evaluation are discussed further in Section 5.0.

For all 20 CUs, the initial sampling results indicated non-detected results for aroclor-1260. However, many of the reported minimum detectable concentrations (MDCs) were above the FRL for aroclor-1260. The selected analytical method could not meet the required MDC. Additional sampling was conducted for this analyte and analyzed by a method that could produce a MDC of 1/10th of the FRL for aroclor-1260, as discussed in Section 3.2, and the sample results are discussed in Section 5.0. Based on the findings, no further field activity was conducted beyond the second sampling round.

The preliminary results from the 16 samples analyzed in CU 1 indicated that some slightly above-FRL concentrations of arsenic were detected. Statistical analysis of the preliminary data indicated through the *a posteriori* test that a sufficient number of samples had been collected to make a certification decision, and no further field activity was conducted.

Sampling in CUs 2, 3, 4 and 5 was completed as originally planned. Statistical analysis of the preliminary data indicated through the *a posteriori* test that a sufficient number of samples had been collected to make a certification decision. No additional field activity was necessary.

The preliminary results from CU 6 indicated that some slightly above-FRL concentrations of radium-226 were detected. Statistical analysis of the preliminary data indicated through the *a posteriori* test that there were not enough data points to differentiate the mean from the FRL. A second round of sampling was initiated in CU 6 to collect additional data and is discussed in Section 3.2. All of the sample results are discussed in Section 5.1.

The preliminary results from CU 7 indicated that some slightly above-FRL concentrations of beryllium were detected. The beryllium results from CU 7 were compared to those from the other A9PI CUs and were found to be unusually high. The laboratory was contacted to confirm the results. The laboratory subsequently identified an instrument issue that adversely affected the data. As a result of their investigation, the lab re-analyzed the original digestates using the correct instrument settings and yielded

reliable results. This issue is discussed further in Section 5.1, but the end result was that no additional field activity was necessary.

The preliminary results from CU 8 indicated that some slightly above-FRL concentrations of radium-226 were detected. Statistical analysis of the preliminary data indicated through the *a posteriori* test that there were not enough data points to differentiate the mean from the FRL. In accordance with SEP requirements, archive samples were submitted for radium-226 analysis. The *a posteriori* test was subsequently performed on the original data plus the archive data. The results of this test indicated that additional sampling was necessary. A second round of sampling in CU 8 was conducted, and the sample results are discussed in Section 5.1. Based on the findings, no further field activity was conducted beyond the second sampling round.

Sampling in CU 9 was completed as originally planned. Statistical analysis of the preliminary data indicated through the *a posteriori* test that a sufficient number of samples had been collected to make a certification decision. No additional field activity was necessary.

The preliminary results from CU 10 indicated that some slightly above-FRL concentrations of radium-226 were detected. Statistical analysis of the preliminary data indicated through the *a posteriori* test that there were not enough data points to differentiate the mean from the FRL. In accordance with SEP requirements, archive samples were submitted for radium-226 analysis. The *a posteriori* test was subsequently performed on the original data plus the archive data. The results of this test indicated additional sampling was necessary. A second round of sampling in CU 10 was conducted, and the sample results are discussed in Section 5.1. Based on the findings, no further field activity was conducted beyond the second sampling round.

The preliminary data for CU 11 was made available at the same time that the decision was made to collect another round of physical samples in other CUs. The preliminary data for CU 11 indicated through the *a posteriori* test there were not enough data points to differentiate the mean from the FRL. Because an additional round of samples were already planned to be taken in other CUs, it was decided to include CU 11 in this second round to consolidate the sampling efforts. Including CU 11 into the second round of sampling produced 16 additional samples instead of just the four from archive. It was determined that the analyses of the archived samples were not necessary prior to the second round of

sampling. Therefore, the archive samples from CU 11 were not analyzed. The sample results are discussed in Section 5.1. Based on the findings, no further field activity was conducted beyond the second round of sampling.

detected. Statistical analysis of the preliminary data indicated through the *a posteriori* test that there were not enough data points to differentiate the mean from the FRL. In accordance with SEP requirements, archive samples were submitted for arsenic analysis. The *a posteriori* test was subsequently performed on the original data plus the archive data. The results of this test indicated additional sampling was necessary. A second round of sampling was initiated in CU 12 to collect additional data, and the sample results are discussed in Section 5.1. Based on the findings, no further field activity was conducted beyond the second sampling round.

Sampling in CU 13 was completed as originally planned. Statistical analysis of the preliminary data indicated through the *a posteriori* test that a sufficient number of samples had been collected to make a certification decision. No additional field activity was necessary.

The preliminary results from the 16 samples analyzed in CU 14 indicated that some slightly above-FRL concentrations of radium-226 were detected. Statistical analysis of the preliminary data indicated through the *a posteriori* test that there were not enough data points to differentiate the mean from the FRL. A second round of sampling was initiated in CU 14 to collect additional data, and all of the sample results are discussed in Section 5.1.

The preliminary results from the 16 samples analyzed in CU 15 indicated that some slightly above-FRL concentrations of radium-226 were detected. Statistical analysis of the preliminary data indicated through the *a posteriori* test that a sufficient number of samples had been collected to make a certification decision, and no further field activity was conducted.

Sampling in CUs 16, 17, 18, 19 and 20 was completed as originally planned. Statistical analysis of the preliminary data indicated through the *a posteriori* test that a sufficient number of samples had been collected to make a certification decision. No additional field activity was necessary.

In accordance with guidelines in the SEP and its associated addendum, the subsurface assessment of radium-226 indicated that subsurface soil underlying CU 14 was potentially impacted. Sixteen new samples were added to the subsurface data set in CU 14 during the second sampling round for further evaluation.

3.2 CHANGES TO SCOPE OF WORK

The scope of work for A9PI certification sampling was documented in the final CDL. There were additions and changes to the scope as documented in V/FCNs 20400-PSP-0004-01 through -04 and -06 through -12; eleven of the twelve documents are included in this report as Appendix B. V/FCN 20400-PSP-0004-05 was cancelled.

V/FCNs 21120-PSP-0003-01 and -02 addressed revisions to sampling and analytical requirements. These documents are included in Appendix B.

V/FCN 21120-PSP-0003-11 documents the relocation of four sample points greater than 3 feet from their original locations. Per the SEP, relocation of any sample point beyond 3 feet requires documentation in a V/FCN.

V/FCN 21120-PSP-0003-12 documents the clarification of the use of duplicate analyses and duplicate samples for the gamma spectroscopy method to satisfy the Analytical Support Level (ASL) D precision requirements as stated in the Sitewide CERCLA Quality Assurance Project Plan (SCQ).

For all 20 CUs, preliminary results indicated non-detectable results for aroclor-1260, with many MDCs being reported above the off-property FRL, and none of the MDCs met the 1/10th of the FRL requirement. An investigation indicated that the selected analytical method, Contract Laboratory Program (CLP), had CRDL that was greater than the off-property FRL and that the results were therefore inconclusive. As a result, surface samples from the center point of all 20 CUs were collected in accordance with the PSP and V/FCN 21120-PSP-0003-10 and analyzed for aroclor-1260. The method of analysis was changed from CLP to SW846 8082 with an MDC of 0.004 mg/kg, which is 1/10th of the FRL.

For CU 1, archive samples were submitted for arsenic analysis under V/FCN 21120-PSP-0003-03.

CU 6 was re-sampled for radium-226 under V/FCN 21120-PSP-0003-10. Archive samples were not submitted because the sample results from the initial round were received subsequent to some above-FRL results in CUs 8 and 10, which indicated the need for re-sampling those CUs in addition to CUs 11 and 14. Therefore, it was determined to directly increase the sample number by re-sampling in this CU also.

For CU 7, archive samples were submitted for beryllium analysis, as documented in V/FCN 21120-PSP-0003-09.

For CU 8, archive samples were submitted for radium-226 analysis, as documented in V/FCN 21120-PSP-0003-06. The results indicated that additional sampling was required. The second round of sampling was completed under V/FCN 21120-PSP-0003-10.

For CU 10, archive samples were submitted for radium-226 analysis, as documented in V/FCN 21120-PSP-0003-08. The results indicated that additional sampling was required. The second round of sampling was completed under V/FCN 21120-PSP-0003-10.

For CU 11, archive samples were not submitted because the sample results from the initial round indicated an average radium-226 concentration just below the FRL. However, following statistical analysis of validated data from CU 11, and in light of above-FRL results detected in CUs 8, 10 and 14, CU 11 was also re-sampled to obtain the sufficient number of samples.

For CU 12, archive samples were submitted for arsenic analysis, as documented in V/FCN 21120-PSP-0003-08. The results indicated that additional sampling was required. The second round of sampling was completed under V/FCN 21120-PSP-0003-10.

For CU 14, archive samples were submitted for radium-226 analysis, as documented in V/FCN 21120-PSP-0003-04. The results indicated that additional sampling was required, not only at the surface but also at a 12 to 36-inch interval below the surface in this CU. The second round of sampling was completed under V/FCN 21120-PSP-0003-10. Sample results are discussed in Section 5.1.

4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES AND DATA REDUCTION

4.1 ANALYTICAL METHODOLOGIES

Radiological (except strontium-90) and metal samples were analyzed at the FEMP on-site laboratory. Strontium and organic samples were sent off-site. The laboratories complied with Sitewide CERCLA Quality Assurance Project Plan (SCQ) requirements. The SCQ is the source for analytical methodologies (Appendix G), data verification and validation, and analytical and field quality assurance/quality control (QA/QC) requirements.

Laboratory analysis of certification samples was conducted using an approved analytical method, as discussed in Appendix H of the SEP. Analyses were conducted to ASL D or E, where the minimum detection level of 10 percent of the FRL is above the SCQ ASL detection level, but the analyses meet all other SCQ ASL D criteria. An ASL D data package was provided for a minimum of 10 percent of the data, with an ASL B package for the remaining 90 percent. All data were validated. Any samples rejected during this validation would be re-analyzed, or an archive sample would have been substituted if there were insufficient material available from the initial sample. Once data were validated as required, results were entered into the FEMP Sitewide Environmental Database (SED).

4.1.1 Chemical Methods

Metals

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

Strontium-90

Samples were analyzed for strontium-90 at an off-site location using gas proportional counting.

Aroclor

Samples were initially analyzed for aroclor-1260 at an off-site location using gas chromatography. At the time the samples were submitted for analysis, the only method of analysis that was approved for ASL D was the CLP. However, as discussed in Section 3.1, this analytical method had a CRDL that was higher than the off-site FRLs. During certification, SW846 was also approved for analyzing aroclor-1260 at ASL D. Therefore, the additional samples were submitted for analysis using SW846.

4.1.2 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 relative error ration 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 spectroscopy, 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 spectroscopy, and radium-226 was quantified by measuring gamma rays emitted by members of its decay chain. This method does not require chemical separation, but the samples must be allowed a 20-day progeny in-growth period before counting. The on-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all A9PI certification results.

Radium-228

Following gamma spectroscopy 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 A9PI CUs.

Isotopic Thorium

Isotopic thorium (thorium-228 and thorium-232) was quantified by measuring gamma rays emitted by members of its decay chain by gamma spectroscopy. The on-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all A9PI CUs.

Cesium-137

Cesium-137 was quantified by measuring gamma rays emitted by members of its decay chain by gamma spectrometry.

Technetium-99

Technetium-99 was quantified by using a gas proportional counter.

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 (EPA) National Functional Guidelines for Data Review (Inorganic Data) (EPA 1994), as adapted and approved by EPA Region V, as well as the Section 11.2 and Appendix D of the SCQ, 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 QA parameters (i.e., precision, accuracy, completeness, comparability, and representativeness) were addressed during V&V. Field sampling and handling, laboratory analysis and reporting, and non-conformances 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 validation qualifier of the results. General areas examined that apply to all the chemical data include the following:

- 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 were validated to Level D. This validation included the same review process as for Level B, but included a systematic review of the raw data and recalculations. Two of the analytical releases was validated to Level D, while all remaining 18 data were validated to Level B.

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. All the results were either not qualified, qualified as a redundant analysis (Z), or qualified as estimated (J) and/or nondetects (U). No results were qualified as rejected (R).

4.3 DATA REDUCTION

Each sample used to support the A9PI area certification decision was entered in the SED with the following information:

Field Information

- Sample Identification Number - A unique number assigned to each discrete sample point. This number contains an indicator value that depicts the sample depth from surface. For example:

  A9P1-C-17-5-2-RM

  where:

  A9P1 = Area 9, Phase I
  C = Certification
  17 = CU number
  5 = Sample location within the CU
  2 = Depth indicator (1 = surface for CUs 1 through 4, 2 = surface for CUs 5 through 20, and 3 = subsurface for CUs 5 through 20)
  RM = "R" indicates radiological analysis; "M" indicates metals analysis

- Coordinate Information - Northing and Easting locations.

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.

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) - The TPU is an estimate of the overall uncertainty associated with a measured or calculated result that has been derived from an evaluation of all factors that can influence a result, including both systematic and random sources of uncertainty. For both *in situ* and laboratory-based radioactivity measurements, factors such as the random nature of the radioactive decay process (i.e., counting uncertainty), the mass or volume of the "sample" being analyzed, the variation in radiation detection efficiency with the energy of the emitted radiation and the density and chemical composition of the sample, uncertainty in nuclear decay parameters used to convert counts to activity, and attenuation of the radiation must be considered to properly asses the overall uncertainty of the measured result.
- 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 (applicable to radiological parameters only). The Data Validation Section evaluates the reported TPU as described in the SCQ in Section 11.2 and Appendix D to assess the impact on the data quality and will qualify the data as estimated if the uncertainty is excessive
- Validation Qualifier - The qualifier assigned as a result of the data validation process
- Validation Units - The units in which the Validation Result is reported.

5.0 CERTIFICATION EVALUATION AND CONCLUSIONS

Certification success or failure was based on sample data from each CU against criteria discussed in Section 2.2.4. Subsequent to any evaluation of preliminary data, full statistical analysis and evaluation was performed on all validated data. Final certification data are presented in Appendix A.

5.1 CERTIFICATION RESULTS, ISSUES AND EVALUATION

By following SCQ protocols, an issue was created with the aroclor-1260 data set for every CU. At the onset of this certification project, the only SCQ approved ASL D method for the analysis of aroclor-1260 was the CLP OLM 4.2 method. This method offers a CRDL of 33 micrograms per kilogram (µg/kg) for aroclor-1260. The off-property FRL for this constituent is 40 µg/kg. Taking into consideration the moisture correction, the final MDC for this analyte fell within the range of 36.9 to 47.8 µg/kg, which is at the off-property FRL and not at the conservative MDC of 1/10th of the FRL. The SW846 method for the determination of aroclor-1260 in soils was subsequently approved for ASL D, which offers an MDC of at least 1/10th of the off-property FRL. Therefore, the center point of each CU was re-sampled for aroclor-1260 and analyzed by the SW846 method. The results of this analysis once again were non-detects but at the much lower MDC of 1/10th of the off-property FRL. Appendix A.6 contains the re-sampling results. These results were for verification purposes only and were not included with the statistical analysis of the original data.

The following discussion addresses surface certification results in A9PI. Subsurface results for baseline confirmation purposes are addressed in Section 5.1.2.

5.1.1 Surface Certification Results

The validated results from surface CUs were subjected to statistical analysis described in the SEP. In those instances where submittal of archive samples was required, and where re-sampling was conducted, the additional results were evaluated along with those from the initial sampling round. Appendix A contains the statistical results for both the first and second rounds of sampling. It should be noted that the analyses for each CU and, more importantly, the results of the analyses from each CU were not completed in numerical progression consistent with the numbering of the CUs in A9PI. To the contrary, the analyses were performed roughly in the order in which the CUs were sampled. The sampling progression depended on many factors, including weather and daily field conditions.

Except for the aforementioned issue with aroclor-1260, CUs 1, 2, 3, 4, 5, 9, 13, 15, 16, 17, 18, 19, and 20 had no issues throughout the entire sampling, analytical, and validation process, and have passed all requirements necessary for certification (see Appendix A.1). No individual result in all of A9PI was greater than two times its associated FRL. Therefore, all of the data pass the hot spot criterion.

The following discussion addresses, on a constituent basis, the original results, applicable archive results, and any second round sampling results related to each CU. This discussion includes CUs 6, 7, 8, 10, 11, 12, and 14. Only one constituent per CU presented an issue. The CUs and their respective constituent issues are as follows: CU 12 - arsenic, CU 7 - beryllium, CUs 6, 8, 10, 11, and 14 - radium-226.

Arsenic

The arsenic data for CU 12 underwent the *a posteriori* test after the preliminary data evaluation were received. The *a posteriori* test indicated that potentially an additional 44 samples were needed to differentiate between the mean and the FRL (see Appendix A.1). The four archives, as well as 16 additional round 2 samples, were submitted for analysis. The *a posteriori* test was performed on the resulting combined data set whereby indicating that only 23 samples were truly needed. At this time, 32 samples had been analyzed. Since enough samples had been collected to statistically differentiate the mean from the FRL, final statistics were performed and indicated that the combined data set passed certification (see Appendix A.3). It should be noted that the laboratory was also contacted after the second round sampling results were received to investigate the disparity between the first round results and the second round results. The laboratory confirmed that each set was treated identically within the laboratory and followed the exact same procedures and protocols as required in the SCQ.

Beryllium

For CU 7, beryllium was identified as a failing constituent based on the preliminary data available in the Fernald Analytical Computerized Tracking System (FACTS) database. However, the results from this CU were noticeably higher than those from any of the surrounding CUs. Beryllium data from this CU were then compared to results from all other CUs in A9PI and it appeared to be a truly anomalous condition. The laboratory was contacted and asked to investigate the integrity of these results. To aid in the investigation, archive samples were submitted for beryllium analysis. Resulting from this investigation, the laboratory identified an instrumental issue whereby uranium and thorium correction factors were 'turned on' for this sample release only. This was the last set of samples that were analyzed

for beryllium as a result of the sampling sequence. These correction factors unduly biased the results high. The original sample digestates were then re-analyzed in accordance to the laboratory procedure and consistent with the rest of the A9PI samples. The resulting data for this CU fell in line with the rest of A9PI and passed the certification requirements (see Appendix A.3). This chain of events was documented in NCR #272 (see Appendix C).

Radium-226

The radium-226 results for CUs 6, 8, 10, 11, and 14 indicated an issue. One or more result in each of these CUs indicated above-FRL radium-226 in the first round of sampling and insufficient numbers of samples were available to reach any conclusions for these CUs. As noted before, after the first few releases of data came in, an initial statistical evaluation was performed on these CUs as more data became available. Based on these preliminary results, the archive samples were immediately submitted for CUs 8, 10, and 14 for radium-226 analysis only. As the archive sample analysis was being completed, the formal *a posteriori* test was performed on all CUs with any single elevated radium-226 result above the FRL. Archives for CUs 6 and 11 were not submitted because the timing of the statistical analysis of the first round of sampling was such that the plan was already being developed to perform a second round of sampling for all CUs that failed the *a posteriori* test. Based on the *a posteriori* test, additional samples were required for these CUs (see Appendix A.1). The magnitude of potential additional samples needed to support statistical comparison between the mean and FRL in each CU ranged from 31 to 193. This led to the request for a second round of sampling in CUs 6, 8, 10, 11, and 14.

The statistical evaluation of the radium-226 results, inclusive of first round, archives, and second round results for CUs 8, 10, and 11, showed that these CUs passed all the certification requirements (see Appendix A.3).

For CUs 6 and 14, the *a posteriori* test, when performed on the first round data plus the second round data plus the archives, where applicable, indicates increasing numbers of samples needed because the updated sample means were even closer to the FRL. For CU 6, the number of additional samples required increased from 39 samples needed after the first round results to 4,306 samples potentially needed after the second round was included. For CU 14, the number of additional samples required increased from 193 samples potentially needed after the first round results to 739 samples potentially

needed after the second round and archive results were included (see Appendix A.3). The trend of additional sample collection indicates an ever-increasing number of samples would be needed after each additional round is completed and that the actual means may be equal to the FRL. A null hypothesis test was conducted to see whether the mean could be differentiated from the FRL (see Appendix A.5). The result of the null hypothesis test indicates that the mean cannot be differentiated from the FRL. Based on this hypothesis test, as also suggested by the *a posteriori* tests, no number of additional samples will ever change this conclusion. However, the preclusion of adhering to the *a posteriori* test and the "less than" FRL requirements disallows these two CUs to pass certification as defined by the requirements outlined in the SEP. This is actually a situation that was unexpected and therefore not considered during the development of the SEP.

5.1.2 Baseline Confirmation

Baseline confirmation samples were collected from the 12 to 36-inch depth interval at four locations per CU in the plowed zone (the southern 16 CUs), which resulted in 64 samples being analyzed. Consistent with the SEP Addendum, which requires at least 40 samples per property, the samples were homogenized in the field and the required mass was sent to the appropriate laboratories for analysis. Where applicable, each constituent was then compared to the 95th percentile of the subsurface background concentration.

Aroclor-1260, strontium-90 and technetium-99 were not included in the baseline confirmation process because these analytes were not included in the Background Soil Study Addendum, and thus the 95th percentile background concentrations have not been established for these constituents. Therefore, there is no basis for comparison. However, each certification result for these constituents was well below the established off-property FRLs.

For cesium-137, all but one of the results were non-detects. Therefore, statistics could not be performed on the cesium-137 data set. The one detected result was 0.12 pCi/g which is well below the established off-property FRL of 0.82 pCi/g. Cesium-137, therefore, is not a concern in this area.

The following discussion addresses, on a constituent basis, the baseline confirmation results and statistical analyses for the remaining COCs. This discussion includes arsenic, beryllium, radium-226, radium-228, thorium-228, thorium-232, and total uranium.

Arsenic

The arsenic results indicated that some of the baseline confirmation data exceeded the 95th percentile background concentration of 12.4 mg/kg. In accordance with the SEP addendum, the baseline data set was statistically evaluated. It was determined that the mean baseline confirmation results were not statistically significantly above the mean corresponding background concentration based on a population-to-population comparison. Therefore, the results for arsenic were concluded to be statistically consistent with the background concentrations, thus satisfying the baseline confirmation requirement.

Beryllium

The beryllium results indicated some of the baseline confirmation data exceeded the 95th percentile background concentration of 1.44 mg/kg. In accordance with the SEP addendum, the baseline data set was statistically evaluated. It was determined that the mean baseline confirmation results were less than the mean corresponding background concentration based on a population-to-population comparison. Therefore, the results for beryllium were concluded to be statistically less than the background concentrations, thus satisfying the baseline confirmation requirement.

Radium-226

The radium-226 results indicated that some of the baseline confirmation data exceeded the 95th percentile subsurface background concentration of 1.56 pCi/g. In accordance with the SEP Addendum, the baseline data set was statistically evaluated. It was determined that, based on a comparison of the mean baseline confirmation results with the mean corresponding background concentration, the results for radium-226 exceeded background concentrations. Further statistical analyses were conducted. The data for each CU, relative to radium-226, was compared to the 95th percentile of the background concentration and any CU that did not have a single result above the 95th percentile was eliminated from any subsequent statistical analyses and was considered as passing certification. CUs 5, 9, 12, 13, and 19 passed this criterion (see Appendix A.2). The remaining 11 CUs (44 samples) were then considered as a distinct data set, where the 95 percent UCL on the mean of this set was compared to the 95th percentile of the background concentration. According to the SEP addendum, if the 95 percent UCL on the mean of this subset was greater than the 95th percentile of the subsurface background concentration then the highest CU was removed and considered to be potentially impacted. This was the case with this subset of the

data. CU14 was consequently removed from this subset and considered potentially impacted (see Appendix A.2).

CU 14 was re-sampled at 16 random locations in the subsurface interval for radium-226, consistent with surface certification requirements for potentially impacted areas. The resulting data was evaluated against the *a posteriori* test, which demonstrated that potentially 141 additional samples would need to be collected in order to support statistical comparison with the FRL (see Appendix A.4). This result indicated that the subsurface condition of CU 14 is close to the FRL and the subsurface background condition and may not be impacted as originally determined. The FRL of 1.5 pCi/g was developed based on surface soil conditions and is within the subsurface background condition of 1.56 pCi/g. Therefore, the previous step of the baseline confirmation approach was re-applied with these additional subsurface data from CU 14. CU 14 with the additional 16 sample results was included with the 10 remaining CUs (60 samples) for evaluation. Since CU 14 now had 20 subsurface samples and all other CUs had only 4, CU 14 was weighted such that it is consistent with standard statistical practice, however this does not affect the result of the subsequent comparison. The 95 percent UCL on the mean of this 60 sample data set was compared to the 95th percentile of the subsurface background concentration for radium-226 and passed the requirement for baseline confirmation (see Appendix A.4). The radium-226 levels are statistically within the subsurface background conditions.

Radium-228

The radium-228 results indicated that some of the baseline confirmation data exceeded the 95th percentile subsurface background concentration of 1.27 pCi/g. In accordance with the SEP Addendum, the baseline data set was statistically evaluated. It was determined that, based on a comparison of the mean baseline confirmation results with the mean corresponding background concentration, the results for radium-228 exceeded the mean background concentrations. Further statistical analyses were conducted. Any CU that did not contain a result that was greater then the 95th percentile of background concentration for radium-228 was excluded from further statistical analysis. CUs 6, 7, 9, 12, and 13 were excluded. The 95 percent UCL on the mean for the remaining data set, relative to radium-228, was compared to the 95th percentile of the background concentration. It was determined that the 95 percent UCL of the mean for this data set was less than the 95th percentile of the background concentration and therefore passed baseline confirmation for radium-228 (see Appendix A.2). The radium-228 levels are statistically within the subsurface background conditions.

Thorium-228

The thorium-228 results indicated that some of the baseline confirmation data exceeded the 95th percentile subsurface background concentration of 1.25 pCi/g. In accordance with the SEP Addendum, the baseline data set was statistically evaluated. It was determined that, based on a comparison of the mean baseline confirmation results with the mean corresponding background concentration, the results for thorium-228 exceeded the mean background concentrations. Further statistical analyses were conducted. Any CU that did not contain a result that was greater then the 95th percentile of background concentration for thorium-228 was excluded from further statistical analysis. CUs 6, 7, 9, 12, and 13 were excluded. The 95 percent UCL on the mean for the remaining data set, relative to thorium-228, was compared to the 95th percentile of the background concentration. It was determined that the 95 percent UCL of the mean for this data set was less than the 95th percentile of the background concentration and therefore passed baseline confirmation for thorium-228 (see Appendix A.2). The thorium-228 levels are statistically within the subsurface background condition.

Thorium-232

The thorium-232 results indicated that some of the baseline confirmation data exceeded the 95th percentile subsurface background concentration of 1.27 pCi/g. In accordance with the SEP Addendum, the baseline data set was statistically evaluated. It was determined that, based on a comparison of the mean baseline confirmation results with the mean corresponding background concentration, the results for thorium-232 exceeded the mean background concentrations. Further statistical analyses were conducted. Any CU that did not contain a result that was greater then the 95th percentile of background concentration for thorium-232 was excluded from further statistical analysis. CUs 6, 7, 9, 12, and 13 were excluded. The 95 percent UCL on the mean for the remaining data set, relative to thorium-232, was compared to the 95th percentile of the background concentration. It was determined that the 95 percent UCL of the mean for this data set was less than the 95th percentile of the background concentration and therefore passed baseline confirmation for thorium-232 (see Appendix A.2). The thorium-232 levels are statistically within the subsurface background conditions.

Total Uranium

The total uranium results indicated that some of the baseline confirmation data exceeded the 95th percentile subsurface background concentration of 4.56 mg/kg. In accordance with the SEP Addendum, the baseline data set was statistically evaluated. It was determined that, based on a

comparison of the mean baseline confirmation results with the mean corresponding background concentration, the results for total uranium exceeded background concentrations. Further statistical analyses were conducted. Any CU that did not contain a result that was greater then the 95th percentile of background concentration for total uranium was excluded from further statistical analysis. CUs 15, 17, and 19 were excluded. The 95 percent UCL on the mean for the remaining data set, relative to total uranium, was compared to the 95th percentile of the background concentration. It was determined that the 95 percent UCL of the mean for this data set was less than the 95th percentile of the background concentration and therefore passed baseline confirmation for total uranium (see Appendix A.2). The total uranium levels are statistically within the subsurface background conditions.

5.2 A9PI CERTIFICATION CONCLUSIONS

Based on all the sampling results presented in this report, DOE has determined that no remedial actions are required in A9PI.

DOE recognizes that CUs 6 and 14 have not passed all of the criteria for certification set forth in the SEP for radium-226. However, based on the available data, the null hypothesis of mean CU concentration equals the FRL cannot be disproved. This hypothesis is assumed to be true until proven otherwise. Therefore, DOE understands that the levels at which radium-226 is present in these CUs cannot be statistically differentiated from the FRL of 1.5 pCi/g. More importantly, there is no single result that is greater than two times the FRL of 1.5 pCi/g, which would require remediation consistent with SEP hot spot criteria.

A risk evaluation was performed (see Table 5-1) to assess the cumulative residual risk contribution from each COC for both CU 6 and CU 14. It was determined that the risk levels were 3.5E-05 and 3.71E-05 for CU 14 and CU 6 respectively. These levels are consistent with the acceptable total residual risk of up to 10^{-4} incremental lifetime cancer risk (ILCR) in the OU5 ROD for multiple COCs. The acceptable risk levels defined in the OU5 ROD were based on a resident farmer as the reasonable maximum exposure (RME) receptor living in the affected area for the entirety of his/her life. DOE recognizes that it is highly unlikely that person will live within the confines of either CU 6 or CU 14 for their entire life, whereby further reducing the already acceptable calculated risk.

The FRL was established to be at a level that is health protective for the unrestricted land use at a COC-specific risk level of 1×10^{-5}, as a means to help ensure that the potential cumulative impact from the presence of multiple COCs falls within the OU5 ROD risk range objective of 1×10^{-5} to 1×10^{-4}. Based on SEP criteria, the UCL on the mean at a 95 percent confidence level has to be below the FRL, for each primary COC. Insufficient data exist to draw conclusions regarding this certification criterion other than that the radium-226 levels are likely at the FRL. Although the *a posteriori* test failed for CUs 6 and 14 even with additional samples, the current UCLs on the mean based on all the sampling results are only 0.05 pCi/g and 0.03 pCi/g respectively above the FRL (Appendix A.3). These levels cannot be statistically differentiated from the FRL according to the SEP guidance, as shown by the hypothesis tests and *a posteriori* tests, and are within the range of subsurface background conditions of 1.56 pCi/g. In a plowed area where CUs 6 and 14 are located, there is no clear delineation between surface and subsurface soils. Regardless of these inconclusive comparisons against the FRL and background conditions, these levels still support health protectiveness at a risk level consistent with the overall intended target objective of 1×10^{-5} to 1×10^{-4} in the OU5 ROD.

Another independent point of reference that is pertinent to this evaluation of radium-226 health risk is described in the Uranium Mill Tailings Radiation Control Act (UMTRCA), which is an applicable or relevant and appropriate requirement to the OU5 ROD. This criterion, which is further clarified in a 1998 EPA memorandum (EPA 1998), states that at any point the additive value for radium-226 and radium-228, as well as the additive value for thorium-230 and thorium-232, must be less than 5 pCi/g, which is a health-based standard for unrestricted land use. For radium, this criterion was easily met for all the individual sampling locations throughout the 52.9-acre A9PI study area (highest individual additive value for radium-226 and radium-228 was 3.207 pCi/g). Since thorium-230 was not a COC for A9PI, this criterion check had to be done slightly differently. The average validated thorium-230 value from the OU5 Remedial Investigation/Feasibility Study (DOE 1995a and 1995c) at the FEMP fence line was used conservatively as the value for thorium-230, which in turn was added to each thorium-232 result in A9PI. The highest value obtained at any location was 3.690 pCi/g, also well below the UMTRCA criterion of 5 pCi/g. This independent comparison lends further support to DOE's evaluation as to whether remediation in A9PI is warranted.

As the next step in the evaluation regarding remediation in these two CUs, the cumulative risk from the presence of multiple COCs was evaluated. Each of the COCs in CUs 6 and 14 that was detected and has

UCL on the mean above the representative surface soil background level was included in the evaluation. The contribution from each COC within a CU can be determined by comparing/scaling the COC-specific UCL on the mean against the FRL, which was developed at a 3.5×10^{-5} risk level for uranium and a 1×10^{-5} risk level for each of the other individual COCs. For radiological COCs the background level was subtracted from the UCL on the mean and the FRL before the scaling calculations consistent with the original FRL development methodology. The cumulative risk in a CU is the sum of the calculated COC-specific risk levels within the CU. As presented in Table 5-1, CUs 6 and 14 have cumulative risk levels of 3.7×10^{-5} and 3.5×10^{-5}, respectively, well within the acceptable 1×10^{-5} to 1×10^{-4} cumulative risk range objective set in the OU5 ROD.

Any remedial action that could be implemented for A9PI would involve removing 1 foot of topsoil associated with CUs 6 and 14 and then back filling with clean soil. The overall excavation and fill volumes are about 12,000 cubic yards, respectively. However, the benefit of replacing soil that contains radium-226 at a representative level (i.e., estimated mean) of 1.51 pCi/g in CU 6 and 1.49 pCi/g in CU 14 with clean surface soil that can have a level of 1.42 pCi/g radium-226, which is the 95th percentile background surface level of radium-226, cannot be justified. This type of remediation approach would result in decreasing the radium-226 concentration by only 0.09 pCi/g (6 percent) in CU 6 and by 0.07 pCi/g (5 percent) in CU 14, with no significant reduction of an already-low health risk.

In summary, DOE has determined that no remedial activity in A9PI is warranted for the following reasons:

- All surface CUs pass certification for all the ASCOCs except radium-226 in CUs 6 and 14
- Subsurface conditions in the plowed area are consistent with and/or within background levels for all ASCOCs
- Surface concentrations of radium-226 in CUs 6 and 14 are essentially at the FRL, have no hot spots, and are still protective of human health and the environment
- Any soil remediation will have insignificant benefit
- This decision is consistent with the OU5 ROD and UMTRCA as an independent point of reference, because the representative levels of radium-226 found cannot be differentiated or do not exceed health-based clean up and/or action levels and the cumulative risks in CUs 6 and 14 are well within the acceptable 1×10^{-5} to 1×10^{-4} risk range objective.

TABLE 5-1
CUMULATIVE RISK LEVEL IN CUs 6 AND 14

Certification Unit 6

Analyte List for Surface Samples	Max Result	Background Surface	UCL of the Mean	FRL	Residual Risk Contribution
Radium-226 (pCi/g)	1.789	1.42	1.550	1.50	1.62E-05
Radium-228 (pCi/g)	1.298	1.25	1.223	1.40	0**
Thorium-228 (pCi/g)	1.239	1.43	1.182	1.50	0*
Thorium-232 (pCi/g)	1.298	1.36	1.223	1.40	0*
Uranium, Total (mg/kg)	12.214	3.73	9.982	50.0	4.73E-06
Technetium-99 (pCi/g)	ND	NA	0.139	1.00	0***
Arsenic (mg/kg)	11.900	8.20	9.392	9.60	9.78E-06
Beryllium (mg/kg)	0.730	0.60	0.395	0.62	6.37E-06
Aroclor-1260 (µg/kg)	ND	NA	20.50	40.0	0***
				TOTAL	**3.71E-05**

Certification Unit 14

Analyte List for Surface Samples	Max Result	Background Surface	UCL of the Mean	FRL	Residual Risk Contribution
Radium-226 (pCi/g)	1.813	1.42	1.530	1.50	1.38E-05
Radium-228 (pCi/g)	1.394	1.25	1.298	1.40	3.20E-06
Thorium-228 (pCi/g)	1.386	1.43	1.289	1.50	0*
Thorium-232 (pCi/g)	1.394	1.36	1.298	1.40	0**
Uranium, Total (mg/kg)	17.243	3.73	13.717	50.0	7.55E-06
Cesium-137 (pCi/g)	0.285	0.71	0.186	0.82	0*
Strontium-90 (pCi/g)	0.051	0.42	0.035	0.61	0*
Technetium-99 (pCi/g)	0.213	NA	0.174	1.00	1.74E-06
Arsenic (mg/kg)	9.810	8.20	8.389	9.60	8.74E-06
Beryllium (mg/kg)	0.400	0.60	0.213	0.62	0*
Aroclor-1260 (µg/kg)	ND	NA	20.95	40.0	0***
				TOTAL	**3.50E-05**

*Max Result < Background Surface
**UCL of the Mean < Background Surface
***Max Result is ND

6.0 PROTECTION OF CERTIFIED AREAS

The area of certification is located outside the FEMP boundaries. Therefore, FEMP Procedure EP-0008 does not apply. The intent of protecting certified areas is to prevent recontamination by routine remedial work in adjacent areas. There is no future plan for remedial work near A9PI that could potentially impact the certification status. No formal procedures will be implemented to protect A9PI from recontamination other than the procedures that already exist, which cover fugitive dust emissions from the entire FEMP boundary. No land use restrictions will be required.

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APPENDIX A

CERTIFICATION SAMPLES, ANALYTICAL RESULTS AND STATISTICS TABLES

APPENDIX A
STATISTICAL ABBREVIATIONS AND SYMBOLS

The procedure used to determine if the data are to be assumed to be either normally distributed or lognormally distributed is outlined in Section G.2.3 of Appendix G to the SEP. The second paragraph under "Step 3: Perform the Shapiro-Wilk Test to evaluate if the data are normally or lognormally distributed" states that "If the Shapiro-Wilk Test indicates both normal and lognormal distributions fit the data, the distribution with the highest p-value will be used in the Student's t-Test (Section G.2.2.2) to make the certification decision." Therefore, the distribution testing procedure is not a matter of transforming the data and then testing for lognormality only when the normality assumption fails as the comment seems to imply. The method is to test both normality and lognormality and select the distribution that "best" fits the data as defined by the test yielding the higher p-value above a minimum acceptable value. The minimum acceptable p-value for acceptance of a distribution was set at 0.05.

Abbreviations:

W-Statistic Probability – Shapiro-Wilk probability of the "better" fit – either normal or lognormal (note: a value less than 0.05 indicates that neither normality nor lognormality could be accepted, but the highest p-value is still shown.)

t-Test (N) – indicates that the normal distribution is best fit to data with a p-value greater than or equal to 0.05.

t-Test (LN) – indicates that the lognormal distribution is best fit to data with a p-value greater than or equal to 0.05.

Sign Test – the Sign test was used because one of the following situations occurred:

1. there were greater than 50 percent non-detects,
2. between 15 and 50 percent non-detects and data not symmetrically distributed,
3. less than 15 percent non-detects, but fails Shapiro-Wilk test for both normality and lognormality and data not symmetrically distributed.

Wilcoxon SR – the Wilcoxon Signed Rank procedure was used because of one of the following situations:

1. between 15 and 50 percent non-detects and data symmetrically distributed,
2. less than 15 percent non-detects, but fails Shapiro-Wilk test for both normality and lognormality and data symmetrically distributed.

Note: Data was considered to be "symmetrically distributed" if the Standardized Skewness had an Absolute Value of less than or equal to 2.00 (i.e., between –2.00 and 2.00).

Number of NDs – number of non-detects.

@ - maximum result was below the FRL indicating that no statistical result needed to be reported.

APPENDIX A.1
SURFACE SAMPLING RESULTS AND STATISTICS
FIRST SAMPLING ROUND

Certification Unit 1

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-1-1-1	1.387 -	1.098 -	1.09 -	1.098 -	11.695 -	0.37 -	0.103 J	0.276 U	9.77 J	0.068 J	43.2 UJ
A9P1-C-1-2-1	--	--	--	--	--	--	--	--	3.81 -	--	--
A9P1-C-1-3-1	1.472 -	1.236 -	1.24 -	1.236 -	15.008 -	0.548 -	0.075 J	0.336 J	7.96 J	0.2 J	43.3 UJ
A9P1-C-1-4-1	1.259 -	1.091 -	1.107 -	1.091 -	10.987 -	0.348 -	0.06 J	0.274 U	6 J	0.033 UJ	41.9 UJ
A9P1-C-1-5-1	--	--	--	--	--	--	--	--	5.18 -	--	--
A9P1-C-1-6-1	1.529 -	1.1 -	1.077 -	1.1 -	16.144 -	0.459 -	0.082 J	0.281 U	11.6 J	0.52 J	42.2 UJ
A9P1-C-1-7-1	1.341 -	1.124 -	1.094 -	1.124 -	9.257 -	0.558 -	0.065 J	0.301 UJ	9.74 J	0.3 J	44.2 UJ
A9P1-C-1-8-1	1.405 -	1.191 -	1.142 -	1.191 -	12.431 -	0.223 -	0.048 J	0.296 U	8.43 -	0.12 J	43.2 UJ
A9P1-C-1-9-1	1.327 -	1.036 -	0.955 -	1.036 -	15.418 -	0.326 -	0.086 J	0.272 J	5.43 -	0.034 UJ	42.5 UJ
A9P1-C-1-10-1	1.136 -	1.082 -	1.053 -	1.082 -	12.031 -	0.291 -	0.077 J	0.25 U	6.05 -	0.031 UJ	45.8 UJ
A9P1-C-1-11-1	--	--	--	--	--	--	--	--	5.7 -	--	--
A9P1-C-1-12-1	1.209 -	0.946 -	0.901 -	0.946 -	5.105 -	0.184 -	0.039 J	0.286 U	10.2 -	0.23 J	42.5 UJ
A9P1-C-1-13-1	1.207 -	1.101 -	1.101 -	1.101 -	16.401 -	0.469 -	0.049 J	0.256 U	5.46 -	0.035 UJ	45.9 UJ
A9P1-C-1-13-1-D	1.259 -	1.067 -	1.053 -	1.067 -	12.06 -	0.448 -	0.096 J	0.342 J	6.86 -	0.034 UJ	47.4 UJ
A9P1-C-1-14-1	1.331 -	1.082 -	1.072 -	1.082 -	10.656 -	0.229 -	0.059 J	0.259 U	9.95 -	0.17 J	42.8 UJ
A9P1-C-1-15-1	1.266 -	1.047 -	1.014 -	1.047 -	8.101 -	0.138 -	0.056 J	0.294 U	7.52 -	0.16 J	43.7 UJ
A9P1-C-1-16-1	--	--	--	--	--	--	--	--	6.86 -	--	--
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.529	1.236 @	1.24 @	1.236 @	16.401 @	0.558 @	0.103 @	0.342 @	11.6	0.52 @	23.7 @
Standardized Skewness	0.3	--	--	--	--	--	--	--	0.33	--	--
W-Statistic Probability *	0.982	--	--	--	--	--	--	--	0.715	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	16	12	12
Number of NDs	0	0	0	0	0	0	0	9	0	4	12
Estimated Mean**	1.33	--	--	--	--	--	--	--	7.60	--	--
UCL of the Mean	1.39	--	--	--	--	--	--	--	8.49	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	5	--	--	--	--	--	--	--	7	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	Pass	--	--

Footnotes for Appendix A.1

* 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.

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

000052

4582

Certification Unit 2

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-2-2-1	1.331 J	1.085 -	1.099 -	1.085 -	7.091 J	0.221 U	2.95 J	0.034 U	44.6 UJ
A9P1-C-2-3-1	1.293 J	1.073 -	1.051 -	1.073 -	14.116 J	0.253 U	3.52 J	0.033 U	43.2 UJ
A9P1-C-2-4-1	1.41 J	1.079 -	1.062 -	1.079 -	11.741 J	0.249 U	4.83 J	0.035 U	42.9 UJ
A9P1-C-2-5-1	1.042 J	0.778 -	0.746 -	0.778 -	3.279 U	0.258 J	5.83 J	0.11 -	41.5 UJ
A9P1-C-2-7-1	1.394 J	1.242 -	1.205 -	1.242 -	10.328 J	0.263 U	8.28 J	0.31 -	41.3 UJ
A9P1-C-2-8-1	1.04 J	0.874 -	0.882 -	0.874 -	4.233 J	0.28 U	7.71 J	0.56 -	42.2 UJ
A9P1-C-2-9-1	1.517 J	1.142 -	1.127 -	1.142 -	11.953 J	0.30 U	3.06 J	0.04 J	41.6 UJ
A9P1-C-2-11-1	1.344 J	1.01 -	0.967 -	1.01 -	12.251 J	0.271 U	3.25 J	0.033 U	43.5 UJ
A9P1-C-2-12-1	0.902 J	0.627 -	0.646 -	0.627 -	5.134 J	0.256 U	6.01 J	0.075 -	36.9 UJ
A9P1-C-2-13-1	1.013 J	0.656 -	0.645 -	0.656 -	4.587 J	0.304 U	7.47 J	0.18 J	38.3 UJ
A9P1-C-2-13-1-D	1.153 J	0.702 -	0.703 -	0.702 -	3.288 U	0.304 U	8.2 J	0.27 J	40.1 UJ
A9P1-C-2-14-1	1.233 J	0.787 -	0.776 -	0.787 -	4.37 J	0.318 UJ	5.45 J	0.38 -	40.3 UJ
A9P1-C-2-15-1	1.37 J	1.044 -	1.051 -	1.044 -	6.372 J	0.256 U	8.03 J	0.509 -	41.3 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.517	1.242 @	1.205 @	1.242 @	14.116 @	0.258 @	8.28 @	0.56 @	22.3 @
Standardized Skewness	-0.88	- -	- -	- -	- -	- -	- -	- -	- -
W-Statistic Probability *	0.482	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	t-Test (N)	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	11	0	4	12
Estimated Mean**	1.25	- -	- -	- -	- -	- -	- -	- -	- -
UCL of the Mean	1.35	- -	- -	- -	- -	- -	- -	- -	- -
Non-Parametric Prob.	- -	- -	- -	- -	- -	- -	- -	- -	- -
Est. Mean - Pass / Fail	Pass	- -	- -	- -	- -	- -	- -	- -	- -
2x Rule - Pass / Fail	Pass	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	5	- -	- -	- -	- -	- -	- -	- -	- -
Size Calculation	Pass	- -	- -	- -	- -	- -	- -	- -	- -

000053

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-3-1-1	1.365 -	1.154 -	1.153 -	1.154 -	27.485 -	0.366 -	8.29 -	0.034 U	45.5 UJ
A9P1-C-3-3-1	1.369 -	1.108 -	1.057 -	1.108 -	16.7 -	0.247 U	3.26 -	0.032 U	41.4 UJ
A9P1-C-3-4-1	1.694 -	1.245 -	1.258 -	1.245 -	6.458 -	0.266 U	10.1 -	0.13 -	43.2 UJ
A9P1-C-3-5-1	1.112 -	0.878 -	0.856 -	0.878 -	6.548 -	0.385 -	7.25 -	0.25 -	40.2 UJ
A9P1-C-3-6-1	1.074 -	0.828 -	0.838 -	0.828 -	7.334 -	0.245 U	4.2 -	0.16 -	42.1 UJ
A9P1-C-3-7-1	1.214 -	1.025 -	1.015 -	1.025 -	14.432 -	0.32 J	3.8 -	0.03 U	42.4 UJ
A9P1-C-3-9-1	1.50 -	1.214 -	1.181 -	1.214 -	13.623 -	0.259 U	8.66 -	0.083 -	41.7 UJ
A9P1-C-3-10-1	1.089 -	0.959 -	0.947 -	0.959 -	10.108 -	0.262 U	3.9 -	0.03 U	39.9 UJ
A9P1-C-3-11-1	1.456 -	1.139 -	1.116 -	1.139 -	12.288 -	0.317 UJ	5.96 -	0.42 -	42.2 UJ
A9P1-C-3-13-1	1.232 -	1.03 -	0.974 -	1.03 -	16.167 -	0.313 UJ	3.16 -	0.035 U	43.4 UJ
A9P1-C-3-14-1	1.273 -	1.04 -	1.038 -	1.04 -	15.585 -	0.248 U	3.33 -	0.031 U	42.7 UJ
A9P1-C-3-16-1	1.415 -	1.086 -	1.055 -	1.086 -	11.97 -	0.221 U	8.72 -	0.032 U	42.3 UJ
A9P1-C-3-16-1-D	1.292 -	1.07 -	1.074 -	1.07 -	8.561 -	0.229 U	6.51 -	0.033 U	42.7 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.694	1.245 @	1.258 @	1.245 @	27.485 @	0.385 @	10.1	0.42 @	22.8 @
Standardized Skewness	0.67	- -	- -	- -	- -	- -	0.53	- -	- -
W-Statistic Probability *	0.762	- -	- -	- -	- -	- -	0.063	- -	- -
Test Procedure	t-Test (LN)	- -	- -	- -	- -	- -	t-Test (LN)	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	9	0	7	12
Estimated Mean**	1.32	- -	- -	- -	- -	- -	5.94	- -	- -
UCL of the Mean	1.42	- -	- -	- -	- -	- -	7.30	- -	- -
Non-Parametric Prob.	- -	- -	- -	- -	- -	- -	- -	- -	- -
Est. Mean - Pass / Fail	Pass	- -	- -	- -	- -	- -	Pass	- -	- -
2x Rule - Pass / Fail	Pass	- -	- -	- -	- -	- -	Pass	- -	- -
a posteriori Sample	8	- -	- -	- -	- -	- -	4	- -	- -
Size Calculation	Pass	- -	- -	- -	- -	- -	Pass	- -	- -

000054

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-4-1-1	1.26 -	1.013 -	0.991 -	1.013 -	11.213 -	0.291 U	4.8 J	0.036 U	47.5 UJ
A9P1-C-4-2-1	1.364 -	1.087 -	1.097 -	1.087 -	11.71 -	0.349 J	4.42 J	0.032 U	42.9 UJ
A9P1-C-4-4-1	1.397 -	1.126 -	1.122 -	1.126 -	14.029 -	0.251 U	4.81 J	0.034 U	44.3 UJ
A9P1-C-4-6-1	1.162 -	1.067 -	1.043 -	1.067 -	11.671 -	0.247 U	3.34 J	0.034 U	43.3 UJ
A9P1-C-4-6-1-D	1.173 -	1.127 -	1.108 -	1.127 -	12.742 -	0.287 U	3.48 J	0.031 U	44.4 UJ
A9P1-C-4-7-1	1.274 -	1.079 -	1.053 -	1.079 -	12.967 -	0.322 J	4.08 J	0.032 U	43.6 UJ
A9P1-C-4-8-1	1.614 -	1.34 -	1.317 -	1.34 -	17.465 -	0.307 J	6.24 J	0.43 -	44 UJ
A9P1-C-4-10-1	1.344 -	1.01 -	1.001 -	1.01 -	16.165 -	0.252 J	4.41 J	0.035 U	43.2 UJ
A9P1-C-4-11-1	1.548 -	1.197 -	1.19 -	1.197 -	27.351 -	0.499 -	5.26 J	0.27 -	46 UJ
A9P1-C-4-12-1	1.397 -	0.997 -	0.951 -	0.997 -	12.072 -	0.377 -	6.41 J	0.095 -	47.8 UJ
A9P1-C-4-14-1	1.249 -	1.043 -	1.062 -	1.043 -	25.273 -	0.35 J	3.77 J	0.032 U	45 UJ
A9P1-C-4-15-1	1.32 -	1.126 -	1.121 -	1.126 -	31.619 -	0.299 J	4.72 J	0.035 U	44.8 UJ
A9P1-C-4-16-1	1.603 -	1.346 -	1.301 -	1.346 -	17.426 -	0.412 -	4.84 J	0.22 -	46.1 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.614	1.346 @	1.317 @	1.346 @	31.619 @	0.499 @	6.410 @	0.430 @	23.900 @
Standardized Skewness	0.81	- -	- -	- -	- -	- -	- -	- -	- -
W-Statistic Probability *	0.4	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	t-Test (LN)	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	3	0	8	12
Estimated Mean**	1.38	- -	- -	- -	- -	- -	- -	- -	- -
UCL of the Mean	1.46	- -	- -	- -	- -	- -	- -	- -	- -
Non-Parametric Prob.	- -	- -	- -	- -	- -	- -	- -	- -	- -
Est. Mean - Pass / Fail	Pass	- -	- -	- -	- -	- -	- -	- -	- -
2x Rule - Pass / Fail	Pass	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	10	- -	- -	- -	- -	- -	- -	- -	- -
Size Calculation	Pass	- -	- -	- -	- -	- -	- -	- -	- -

000055

4582

Certification Unit 5

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-5-2-2	1.528 -	1.239 -	1.223 -	1.239 -	7.598 -	0.253 U	7.27 -	0.31 -	42.3 UJ
A9P1-C-5-3-2	1.381 -	1.103 -	1.088 -	1.103 -	7.436 -	0.253 U	6.84 -	0.06 J	41 UJ
A9P1-C-5-4-2	1.366 -	1.111 -	1.097 -	1.111 -	9.122 -	0.246 U	4.21 J	0.14 -	42.3 UJ
A9P1-C-5-4-2-D	1.363 -	1.103 -	1.082 -	1.103 -	8.959 -	0.234 U	4.74 J	0.3 -	41.9 UJ
A9P1-C-5-5-2	1.322 -	1.099 -	1.069 -	1.099 -	8.267 -	0.278 U	3.3 -	0.22 -	40 UJ
A9P1-C-5-6-2	1.376 -	1.094 -	1.109 -	1.094 -	9.159 -	0.258 U	8.37 -	0.14 -	41.6 UJ
A9P1-C-5-7-2	1.219 -	1.013 -	1.009 -	1.013 -	4.681 J	0.238 U	3.89 -	0.024 U	41.3 UJ
A9P1-C-5-9-2	1.193 -	1.021 -	0.991 -	1.021 -	6.049 -	0.235 U	4.61 -	0.06 J	42 UJ
A9P1-C-5-10-2	1.164 -	1.129 -	1.128 -	1.129 -	8.736 -	0.289 U	4.73 -	0.05 J	41.9 UJ
A9P1-C-5-12-2	1.371 -	1.158 -	1.113 -	1.158 -	9.752 -	0.263 U	6.19 -	0.18 -	41 UJ
A9P1-C-5-13-2	1.398 -	1.131 -	1.136 -	1.131 -	9.644 -	0.281 J	6.03 -	0.23 -	41.6 UJ
A9P1-C-5-14-2	1.392 -	1.108 -	1.074 -	1.108 -	12.179 -	0.393 -	5.66 -	0.32 -	41.5 UJ
A9P1-C-5-16-2	1.325 -	1.117 -	1.136 -	1.117 -	5.402 -	0.307 J	6.75 -	0.46 -	40.3 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.528	1.239 @	1.223 @	1.239 @	12.179 @	0.393 @	8.370 @	0.460 @	21.150 @
Standardized Skewness	-0.29	--	--	--	--	--	--	--	--
W-Statistic Probability *	0.215	--	--	--	--	--	--	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	9	0	1	12
Estimated Mean**	1.34	--	--	--	--	--	--	--	--
UCL of the Mean	1.39	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	--
a posteriori Sample	4	--	--	--	--	--	--	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	--

000056

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-6-1-2	1.367 -	1.146 -	1.118 -	1.146 -	8.787 -	0.25 U	6.16 J	0.13 J	42.4 UJ
A9P1-C-6-2-2	1.394 -	1.122 -	1.095 -	1.122 -	6.102 -	0.268 U	6.75 J	0.41 J	40.5 UJ
A9P1-C-6-3-2	1.537 -	1.216 -	1.169 -	1.216 -	9.461 -	0.263 U	5.93 J	0.26 -	40.9 UJ
A9P1-C-6-5-2	1.361 -	1.174 -	1.146 -	1.174 -	11.816 -	0.26 U	5.45 J	0.06 J	41.7 UJ
A9P1-C-6-7-2	1.442 -	1.143 -	1.141 -	1.143 -	7.049 -	0.272 U	8.19 J	0.19 -	41.8 UJ
A9P1-C-6-8-2	1.367 -	1.173 -	1.132 -	1.173 -	12.214 -	0.277 U	6.86 J	0.26 -	40.9 UJ
A9P1-C-6-9-2	1.456 -	1.182 -	1.128 -	1.182 -	6.894 -	0.261 U	6.84 J	0.28 -	40 UJ
A9P1-C-6-9-2-D	1.328 -	1.11 -	1.087 -	1.11 -	9.059 -	0.279 U	7.07 J	0.16 -	40.5 UJ
A9P1-C-6-10-2	1.321 -	1.112 -	1.084 -	1.112 -	10.551 -	0.28 U	10.1 J	0.34 -	39.8 UJ
A9P1-C-6-11-2	1.545 -	1.188 -	1.163 -	1.188 -	8.323 -	0.267 U	10.9 J	0.44 -	41 UJ
A9P1-C-6-13-2	1.651 -	1.26 -	1.208 -	1.26 -	6.14 -	0.276 U	11.9 J	0.45 -	40.2 UJ
A9P1-C-6-15-2	1.598 -	1.298 -	1.239 -	1.298 -	9.371 -	0.285 U	10.5 J	0.73 -	40.5 UJ
A9P1-C-6-16-2	1.491 -	1.276 -	1.237 -	1.276 -	8.759 -	0.272 U	10.2 J	0.36 -	40.4 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.651	1.298 @	1.239 @	1.298 @	12.214 @	0.142 @	11.9	0.73	21.2 @
Standardized Skewness	0.65	- -	- -	- -	- -	- -	0.37	1.16	- -
W-Statistic Probability *	0.582	- -	- -	- -	- -	- -	0.194	0.588	- -
Test Procedure	t-Test (LN)	- -	- -	- -	- -	- -	t-Test (LN)	t-Test (N)	- -
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	12	0	0	12
Estimated Mean**	1.46	- -	- -	- -	- -	- -	8.36	0.326	- -
UCL of the Mean	1.52	- -	- -	- -	- -	- -	9.39	0.395	- -
Non-Parametric Prob.	- -	- -	- -	- -	- -	- -	- -	- -	- -
Est. Mean - Pass / Fail	Inconclusive	- -	- -	- -	- -	- -	Pass	Pass	- -
2x Rule - Pass / Fail	Pass	- -	- -	- -	- -	- -	Pass	Pass	- -
a posteriori Sample	39	- -	- -	- -	- -	- -	12	3	- -
Size Calculation	Fail	- -	- -	- -	- -	- -	Pass	Pass	- -

000057

4582

Certification Unit 7

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-7-1-2	1.451 -	1.091 -	1.039 -	1.091 -	12.95 -	0.267 U	5.59 -	0.32 J	39.3 UJ
A9P1-C-7-2-2	1.307 -	1.165 -	1.121 -	1.165 -	7.503 -	0.301 J	5.47 -	0.06 J	38.7 UJ
A9P1-C-7-4-2	1.289 -	1.089 -	1.086 -	1.089 -	12.132 -	0.235 U	4.92 -	0.023 UJ	39.9 UJ
A9P1-C-7-6-2	1.425 -	1.16 -	1.115 -	1.16 -	14.136 -	0.25 U	5.12 -	0.05 J	44.3 UJ
A9P1-C-7-7-2	1.314 -	1.117 -	1.098 -	1.117 -	11.229 -	0.311 J	6.38 -	0.023 UJ	41.1 UJ
A9P1-C-7-8-2	1.328 -	1.127 -	1.1 -	1.127 -	5.168 J	0.251 U	5.86 -	0.03 J	38.6 UJ
A9P1-C-7-9-2	1.615 -	1.221 -	1.192 -	1.221 -	15.322 -	0.256 U	6.52 -	0.19 J	41.6 UJ
A9P1-C-7-10-2	1.521 -	1.111 -	1.08 -	1.111 -	15.504 -	0.269 U	6.3 -	0.34 J	40.3 UJ
A9P1-C-7-12-2	1.424 -	1.119 -	1.092 -	1.119 -	10.973 -	0.249 U	5.13 -	0.023 UJ	41.2 UJ
A9P1-C-7-13-2	1.418 -	1.153 -	1.125 -	1.153 -	12.529 -	0.245 U	6.45 -	0.025 UJ	41.8 UJ
A9P1-C-7-13-2-D	1.363 -	1.237 -	1.209 -	1.237 -	15.836 -	0.243 U	5.88 -	0.08 J	41.6 UJ
A9P1-C-7-15-2	1.325 -	1.188 -	1.158 -	1.188 -	15.764 -	0.323 J	5.61 -	0.023 UJ	40.9 UJ
A9P1-C-7-16-2	1.219 -	1.019 -	1.009 -	1.019 -	11.05 -	0.302 J	4.78 -	0.023 UJ	42.5 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.615	1.237 @	1.209 @	1.237 @	15.836 @	0.323 @	6.52 @	0.34 @	22.2 @
Standardized Skewness	0.9	--	--	--	--	--	--	--	--
W-Statistic Probability *	0.712	--	--	--	--	--	--	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	8	0	5	12
Estimated Mean**	1.39	--	--	--	--	--	--	--	--
UCL of the Mean	1.45	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	--
a posteriori Sample	8	--	--	--	--	--	--	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	--

000058

4582

Certification Unit 8

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Aroclor-1260	Arsenic	Beryllium
A9P1-C-8-1-2	1.392 -	1.121 -	1.113 -	1.121 -	10.239 -	0.248 U	41.7 UJ	6.47 J	0.23 J
A9P1-C-8-3-2	1.487 -	1.099 -	1.087 -	1.099 -	14.307 -	0.254 U	41.3 UJ	4.37 -	0.03 UJ
A9P1-C-8-4-2	1.361 -	1.2 -	1.178 -	1.2 -	9.516 -	0.296 U	42.9 UJ	8.16 -	0.68 J
A9P1-C-8-4-2-D	1.428 -	1.206 -	1.213 -	1.206 -	11.05 -	0.327 UJ	42.6 UJ	8.47 J	0.67 J
A9P1-C-8-6-2	1.362 -	1.214 -	1.222 -	1.214 -	14.371 -	0.29 U	42.9 UJ	6.13 -	0.03 UJ
A9P1-C-8-7-2	1.387 -	1.099 -	1.04 -	1.099 -	10.016 -	0.261 U	41.4 UJ	9.94 -	0.03 UJ
A9P1-C-8-8-2	1.584 -	1.066 -	1.036 -	1.066 -	10.444 -	0.249 U	43 UJ	0.88 U	0.29 J
A9P1-C-8-9-2	1.551 -	1.254 -	1.259 -	1.254 -	20.404 -	0.287 U	41 UJ	8.29 -	0.13 J
A9P1-C-8-10-2	1.467 -	1.18 -	1.208 -	1.18 -	11.421 -	0.266 U	41.9 UJ	6.65 -	0.09 J
A9P1-C-8-12-2	1.727 -	1.319 -	1.304 -	1.319 -	11.298 -	0.278 U	42.8 UJ	10.5 -	0.56 J
A9P1-C-8-13-2	1.634 -	1.279 -	1.238 -	1.279 -	15.541 -	0.268 U	41 UJ	5.98 -	0.03 UJ
A9P1-C-8-15-2	1.352 -	1.158 -	1.122 -	1.158 -	14.901 -	0.235 U	41.4 UJ	5.0 -	0.05 J
A9P1-C-8-16-2	1.574 -	1.312 -	1.289 -	1.312 -	18.026 -	0.282 U	43.1 UJ	8.53 -	0.53 J
FRL	1.5	1.4	1.5	1.4	50	1	40	9.6	0.62
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	ug/kg	mg/kg	mg/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.727	1.319 @	1.304 @	1.319 @	20.404 @	0.164 @	21.6 @	10.5	0.68
Standardized Skewness	0.77	- -	- -	- -	- -	- -	- -	-1.25	1.37
W-Statistic Probability *	0.507	- -	- -	- -	- -	- -	- -	0.435	0.056
Test Procedure	t-Test (LN)	- -	- -	- -	- -	- -	- -	t-Test (N)	Wilcoxon SR
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	12	12	1	4
Estimated Mean**	1.50	- -	- -	- -	- -	- -	- -	6.73	0.11
UCL of the Mean	1.56	- -	- -	- -	- -	- -	- -	7.81	0.29
Non-Parametric Prob.	- -	- -	- -	- -	- -	- -	- -	- -	0.001
Est. Mean - Pass / Fail	Inconclusive	- -	- -	- -	- -	- -	- -	Pass	Pass
2x Rule - Pass / Fail	Pass	- -	- -	- -	- -	- -	- -	Pass	Pass
a posteriori Sample	69	- -	- -	- -	- -	- -	- -	5	3
Size Calculation	Fail	- -	- -	- -	- -	- -	- -	Pass	Pass

000059

4582

Certification Unit 9

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-9-1-2	1.249 J	1.125 -	1.097 -	1.125 -	11.813 -	0.277 U	5.26 J	0.023 U	42.3 UJ
A9P1-C-9-2-2	1.411 J	1.129 -	1.117 -	1.129 -	11.504 -	0.272 U	6.1 J	0.023 U	42.1 UJ
A9P1-C-9-3-2	1.241 J	1.042 -	1.036 -	1.042 -	10.903 -	0.285 U	5.5 J	0.022 U	41.2 UJ
A9P1-C-9-5-2	1.392 J	1.233 -	1.235 -	1.233 -	14.34 -	0.26 U	6.65 J	0.09 -	41.5 UJ
A9P1-C-9-7-2	1.26 J	1.054 -	1.027 -	1.054 -	15.107 -	0.277 U	3.24 J	0.023 U	42 UJ
A9P1-C-9-8-2	1.318 J	1.071 -	1.073 -	1.071 -	14.15 -	0.267 U	6.31 J	0.022 U	44.6 UJ
A9P1-C-9-10-2	1.293 J	1.136 -	1.075 -	1.136 -	13.86 -	0.268 U	6 J	0.18 -	41.5 UJ
A9P1-C-9-11-2	1.409 J	1.091 -	1.102 -	1.091 -	7.836 -	0.287 U	5.93 J	0.023 U	42.3 UJ
A9P1-C-9-11-2-D	1.238 J	1.061 -	1.032 -	1.061 -	10.979 -	0.277 U	3.72 J	0.024 U	42 UJ
A9P1-C-9-12-2	1.252 J	0.984 -	0.969 -	0.984 -	18.456 -	0.283 U	4.01 J	0.025 U	44.4 UJ
A9P1-C-9-14-2	1.424 J	1.171 -	1.167 -	1.171 -	13.027 -	0.254 U	5.26 J	0.024 U	42.3 UJ
A9P1-C-9-15-2	1.203 J	1.024 -	0.999 -	1.024 -	11.012 -	0.277 U	4.96 J	0.021 U	40.7 UJ
A9P1-C-9-16-2	1.155 J	0.842 -	0.83 -	0.842 -	13.113 -	0.259 U	4.81 J	0.33 -	39.6 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.424 @	1.233 @	1.235 @	1.233 @	18.456 @	0.143 @	6.65 @	0.33 @	22.3 @
Standardized Skewness	- -	- -	- -	- -	- -	- -	- -	- -	- -
W-Statistic Probability *	- -	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	12	0	9	12
Estimated Mean**	- -	- -	- -	- -	- -	- -	- -	- -	- -
UCL of the Mean	- -	- -	- -	- -	- -	- -	- -	- -	- -
Non-Parametric Prob.	- -	- -	- -	- -	- -	- -	- -	- -	- -
Est. Mean - Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -	- -
2x Rule - Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -	- -
Size Calculation	- -	- -	- -	- -	- -	- -	- -	- -	- -

000060

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-10-2-2	1.505 -	1.167 -	1.154 -	1.167 -	11.61 -	0.158 -	0.042 J	0.26 U	8.29 -	0.14 J	42.5 UJ
A9P1-C-10-3-2	1.56 -	1.214 -	1.231 -	1.214 -	17.658 -	0.223 -	0.038 UJ	0.226 U	7.4 -	0.03 UJ	42 UJ
A9P1-C-10-4-2	1.513 -	1.274 -	1.264 -	1.274 -	10.571 -	0.119 -	0.04 UJ	0.23 U	9.72 -	0.34 J	43.2 UJ
A9P1-C-10-5-2	1.379 -	1.134 -	1.126 -	1.134 -	17.867 -	0.247 -	0.043 UJ	0.247 U	6.57 -	0.06 J	43.4 UJ
A9P1-C-10-7-2	1.45 -	1.221 -	1.203 -	1.221 -	17.711 -	0.155 -	0.056 J	0.297 J	8.71 -	0.05 J	41.5 UJ
A9P1-C-10-8-2	1.522 -	1.215 -	1.214 -	1.215 -	10.316 -	0.16 -	0.052 UJ	0.236 U	8.83 -	0.03 UJ	41.7 UJ
A9P1-C-10-9-2	1.569 -	1.238 -	1.192 -	1.238 -	17.024 -	0.213 -	0.042 J	0.227 U	8.65 -	0.07 J	42.1 UJ
A9P1-C-10-10-2	1.632 -	1.248 -	1.22 -	1.248 -	10.242 -	0.139 -	0.05 J	0.374 -	8.51 -	0.19 J	41.8 UJ
A9P1-C-10-12-2	1.536 -	1.215 -	1.179 -	1.215 -	18.235 -	0.18 -	0.045 UJ	0.247 U	7.68 -	0.15 J	42 UJ
A9P1-C-10-12-2-D	1.481 -	1.22 -	1.188 -	1.22 -	14.68 -	0.159 -	0.051 UJ	0.253 J	8.85 -	0.11 J	41.3 UJ
A9P1-C-10-14-2	1.349 -	1.234 -	1.201 -	1.234 -	23.157 -	0.232 -	0.068 J	0.331 J	6.66 -	0.06 J	40.3 UJ
A9P1-C-10-15-2	1.467 -	1.195 -	1.151 -	1.195 -	13.348 -	0.151 -	0.057 UJ	0.255 J	8.66 -	0.15 J	41.3 UJ
A9P1-C-10-16-2	1.386 -	1.149 -	1.102 -	1.149 -	10.172 -	0.131 -	0.026 UJ	0.253 U	7.65 -	0.1 J	39.8 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.632	1.274 @	1.264 @	1.274 @	23.157 @	0.247 @	0.068 @	0.374 @	9.72	0.34 @	21.7 @
Standardized Skewness	-0.32	- -	- -	- -	- -	- -	- -	- -	-0.82	- -	- -
W-Statistic Probability *	0.767	- -	- -	- -	- -	- -	- -	- -	0.181	- -	- -
Test Procedure	t-Test (N)	- -	- -	- -	- -	- -	- -	- -	t-Test (N)	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	7	7	0	2	12
Estimated Mean**	1.49	- -	- -	- -	- -	- -	- -	- -	8.21	- -	- -
UCL of the Mean	1.53	- -	- -	- -	- -	- -	- -	- -	8.58	- -	- -
Non-Parametric Prob.	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Est. Mean - Pass / Fail	Inconclusive	- -	- -	- -	- -	- -	- -	- -	Pass	- -	- -
2x Rule - Pass / Fail	Pass	- -	- -	- -	- -	- -	- -	- -	Pass	- -	- -
a posteriori Sample	119	- -	- -	- -	- -	- -	- -	- -	3	- -	- -
Size Calculation	Fail	- -	- -	- -	- -	- -	- -	- -	Pass	- -	- -

000061

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-11-1-2	1.481 -	1.25 J	1.246 J	1.25 J	22.359 -	0.266 -	0.061 UJ	0.346 J	7.17 -	0.21 J	42.7 UJ
A9P1-C-11-2-2	1.408 -	1.229 J	1.215 J	1.229 J	12.049 -	0.111 -	0.044 UJ	0.259 U	4.06 J	0.03 UJ	41.3 UJ
A9P1-C-11-3-2	1.413 -	1.273 J	1.275 J	1.273 J	12.681 -	0.169 -	0.045 UJ	0.275 U	4.36 J	0.03 UJ	41.6 UJ
A9P1-C-11-5-2	1.461 -	1.277 J	1.247 J	1.277 J	23.979 -	0.26 -	0.059 J	0.278 U	6.59 -	0.09 J	42.2 UJ
A9P1-C-11-7-2	1.394 -	1.292 J	1.263 J	1.292 J	10.925 -	0.181 -	0.054 UJ	0.282 U	4.14 J	0.03 UJ	41.8 UJ
A9P1-C-11-8-2	1.541 -	1.344 J	1.323 J	1.344 J	8.974 -	0.107 -	0.06 UJ	0.356 J	6.2 J	0.17 J	41.6 UJ
A9P1-C-11-10-2	1.432 -	1.247 J	1.235 J	1.247 J	16.025 -	0.153 -	0.045 UJ	0.387 J	5.66 J	0.03 UJ	41.1 UJ
A9P1-C-11-11-2	1.638 -	1.289 J	1.236 J	1.289 J	8.971 -	0.06 U	0.045 UJ	0.329 J	7.14 -	0.21 J	42.3 UJ
A9P1-C-11-12-2	1.489 -	1.272 J	1.257 J	1.272 J	9.556 -	0.074 U	0.034 UJ	0.274 U	11.1 -	0.06 J	42 UJ
A9P1-C-11-13-2	1.318 -	1.126 J	1.124 J	1.126 J	19.016 -	0.211 -	0.059 UJ	0.266 J	7.49 -	0.06 J	41.5 UJ
A9P1-C-11-15-2	1.465 -	1.345 J	1.308 J	1.345 J	10.849 -	0.163 -	0.061 UJ	0.311 UJ	6.98 -	0.14 J	42.3 UJ
A9P1-C-11-16-2	1.509 -	1.177 J	1.111 J	1.177 J	14.474 -	0.147 -	0.048 UJ	0.324 UJ	3.86 J	0.04 J	42.5 UJ
A9P1-C-11-16-2-D	1.53 -	1.359 J	1.314 J	1.359 J	12.233 -	0.146 -	0.064 J	0.304 UJ	5.72 J	0.1 J	40.6 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.638	1.359 @	1.323 @	1.359 @	23.979 @	0.266 @	0.064 @	0.387 @	11.1	0.21 @	21.4 @
Standardized Skewness	0.61	--	--	--	--	--	--	--	1.62	--	--
W-Statistic Probability *	0.958	--	--	--	--	--	--	--	0.342	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	2	10	7	0	4	12
Estimated Mean**	1.46	--	--	--	--	--	--	--	6.40	--	--
UCL of the Mean	1.51	--	--	--	--	--	--	--	7.25	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Inconclusive	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	31	--	--	--	--	--	--	--	3	--	--
Size Calculation	Fail	--	--	--	--	--	--	--	Pass	--	--

000062

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Arpclor-1260
A9P1-C-12-1-2	1.408 J	1.173 -	1.152 -	1.173 -	7.698 -	0.095 J	0.035 UJ	0.274 U	14.1 J	0.034 U	41.7 UJ
A9P1-C-12-2-2	1.453 J	1.147 -	1.107 -	1.147 -	8.403 -	0.15 -	0.031 UJ	0.267 U	5.95 J	0.032 U	41.7 UJ
A9P1-C-12-4-2	1.428 J	1.286 -	1.237 -	1.286 -	8.301 -	0.099 -	0.034 UJ	0.25 U	7.2 J	0.03 U	41.8 UJ
A9P1-C-12-6-2	1.311 J	1.204 -	1.173 -	1.204 -	10.653 -	0.117 -	0.03 UJ	0.284 U	10.7 J	0.031 U	41.5 UJ
A9P1-C-12-6-2-D	1.101 J	1.087 -	1.067 -	1.087 -	8.241 -	0.097 -	0.034 UJ	0.28 U	9.95 J	0.031 U	6.7 J
A9P1-C-12-7-2	1.316 J	1.128 -	1.106 -	1.128 -	12.425 -	0.183 -	0.03 UJ	0.276 U	11.7 J	0.069 -	41.2 UJ
A9P1-C-12-8-2	1.328 J	1.192 -	1.173 -	1.192 -	19.442 -	0.184 -	0.054 J	0.352 J	13.9 J	0.23 -	41.6 UJ
A9P1-C-12-9-2	1.201 J	1.092 -	1.101 -	1.092 -	15.129 -	0.141 -	0.037 UJ	0.261 U	9.29 J	0.14 -	41.2 UJ
A9P1-C-12-10-2	1.337 J	1.186 -	1.167 -	1.186 -	15.651 -	0.163 -	0.044 J	0.51 -	11 J	0.24 -	41.5 UJ
A9P1-C-12-12-2	1.55 J	1.27 -	1.23 -	1.27 -	16.175 -	0.161 -	0.031 UJ	0.257 J	8.68 J	0.23 -	41.7 UJ
A9P1-C-12-13-2	1.356 J	1.171 -	1.139 -	1.171 -	17.981 -	0.235 -	0.035 J	0.234 U	9.29 J	0.1 -	41.7 UJ
A9P1-C-12-14-2	1.49 J	1.212 -	1.179 -	1.212 -	14.805 -	0.107 -	0.034 J	0.232 U	11.4 J	0.3 -	43.4 UJ
A9P1-C-12-15-2	1.407 J	1.265 -	1.257 -	1.265 -	16.28 -	0.15 -	0.033 UJ	0.252 U	11.5 J	0.2 -	41.8 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.55	1.286 @	1.257 @	1.286 @	19.442 @	0.235 @	0.054 @	0.51 @	14.1	0.30 @	21.7 @
Standardized Skewness	-0.07	--	--	--	--	--	--	--	-0.31	--	--
W-Statistic Probability *	0.947	--	--	--	--	--	--	--	0.773	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	t-Test (N)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	8	9	0	4	12
Estimated Mean**	1.38	--	--	--	--	--	--	--	10.39	--	--
UCL of the Mean	1.43	--	--	--	--	--	--	--	11.36	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	Inconclusive	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	6	--	--	--	--	--	--	--	44	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	Fail	--	--

000063

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-13-2-2	1.374 -	1.234 -	1.214 -	1.234 -	11.186 J	0.097 UJ	0.054 J	0.283 U	9.14 -	0.13 J	41.3 UJ
A9P1-C-13-3-2	1.412 -	1.246 -	1.251 -	1.246 -	9.22 J	0.188 -	0.07 J	0.268 U	8.54 J	0.032 UJ	42 UJ
A9P1-C-13-4-2	1.292 -	1.25 -	1.215 -	1.25 -	15.055 J	0.17 -	0.076 J	0.269 U	7.59 -	0.032 UJ	40.3 UJ
A9P1-C-13-5-2	1.373 -	1.148 -	1.133 -	1.148 -	13.086 J	0.127 -	0.049 UJ	0.24 U	6.4 J	0.038 J	42.2 UJ
A9P1-C-13-7-2	1.331 -	1.172 -	1.129 -	1.172 -	14.427 J	0.148 -	0.041 UJ	0.257 U	5 J	0.03 UJ	41.2 UJ
A9P1-C-13-8-2	1.325 -	1.142 -	1.147 -	1.142 -	7.698 J	0.088 UJ	0.061 J	0.256 U	6.95 J	0.032 UJ	41 UJ
A9P1-C-13-9-2	1.227 -	1.178 -	1.137 -	1.178 -	14.939 J	0.227 -	0.055 UJ	0.329 J	6.2 J	0.034 UJ	42.4 UJ
A9P1-C-13-9-2-D	1.266 -	1.156 -	1.124 -	1.156 -	14.702 J	0.202 -	0.06 J	0.27 U	6.2 J	0.034 UJ	42.4 UJ
A9P1-C-13-10-2	1.373 -	1.157 -	1.134 -	1.157 -	12.228 J	0.143 -	0.053 J	0.265 U	7.22 J	0.031 UJ	41.8 UJ
A9P1-C-13-12-2	1.316 -	1.178 -	1.169 -	1.178 -	13.37 J	0.219 -	0.047 J	0.234 U	6.43 J	0.032 UJ	40.9 UJ
A9P1-C-13-14-2	1.374 -	1.374 -	1.219 -	1.225 -	10.789 J	0.122 -	0.092 J	0.233 U	5.54 -	0.032 UJ	41.5 UJ
A9P1-C-13-15-2	1.435 -	1.23 -	1.225 -	1.23 -	15.014 J	0.213 -	0.049 UJ	0.257 U	6.1 J	0.032 UJ	41.8 UJ
A9P1-C-13-16-2	1.481 -	1.192 -	1.183 -	1.192 -	12.65 J	0.162 -	0.062 J	0.267 U	11 J	0.031 UJ	41.4 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.481 @	1.374 @	1.251 @	1.25 @	15.055 @	0.227 @	0.092 @	0.329 @	11	0.13 @	21.2 @
Standardized Skewness	--	--	--	--	--	--	--	--	1.56	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	0.851	--	--
Test Procedure	--	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	2	3	11	0	10	12
Estimated Mean**	--	--	--	--	--	--	--	--	7.19	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	7.88	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	4	--	--
Size Calculation	--	--	--	--	--	--	--	--	Pass	--	--

000064

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-14-1-2	1.539 -	1.241 -	1.24 -	1.241 -	11.877 -	0.156 J	0.025 J	0.138 J	7.47 J	0.033 U	41.8 UJ
A9P1-C-14-2-2	1.626 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-14-3-2	1.449 -	1.229 -	1.23 -	1.229 -	8.686 -	0.119 J	0.025 UJ	0.125 J	6.54 J	0.12 -	41.5 UJ
A9P1-C-14-4-2	1.442 -	1.309 -	1.31 -	1.309 -	11.357 -	0.12 J	0.033 J	0.196 J	8.93 J	0.06 J	41.6 UJ
A9P1-C-14-5-2	1.534 -	1.209 -	1.166 -	1.209 -	15.196 -	0.121 J	0.022 UJ	0.197 -	7.55 J	0.1 -	41.8 UJ
A9P1-C-14-6-2	1.813 -	1.394 -	1.386 -	1.394 -	12.631 -	0.18 J	0.035 J	0.181 J	9.81 J	0.4 -	41.3 UJ
A9P1-C-14-7-2	1.284 -	0.986 -	0.942 -	0.986 -	11.903 -	0.085 J	0.027 UJ	0.141 J	7.24 J	0.12 -	41.3 UJ
A9P1-C-14-8-2	1.618 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-14-9-2	1.490 -	1.234 -	1.239 -	1.234 -	12.705 -	0.222 J	0.048 J	0.151 J	8.21 J	0.14 -	42 UJ
A9P1-C-14-10-2	1.394 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-14-11-2	1.576 -	1.285 -	1.297 -	1.285 -	15.423 -	0.211 J	0.029 J	0.163 -	6.76 J	0.18 -	41.9 UJ
A9P1-C-14-12-2	1.607 -	1.265 -	1.254 -	1.265 -	10.887 -	0.111 J	0.026 J	0.129 U	8.28 J	0.05 J	43.6 UJ
A9P1-C-14-13-2	1.317 -	1.159 -	1.141 -	1.159 -	12.173 -	0.167 J	0.033 J	0.178 -	6.31 J	0.1 -	42.3 UJ
A9P1-C-14-14-2	1.588 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-14-15-2	1.475 -	1.322 -	1.297 -	1.322 -	17.243 -	0.285 J	0.037 J	0.213 -	7.89 J	0.19 -	41.8 UJ
A9P1-C-14-15-2-D	1.476 -	1.305 -	1.26 -	1.305 -	14.837 -	0.188 J	0.051 J	0.139 J	7.26 J	0.12 -	41.7 UJ
A9P1-C-14-16-2	1.626 -	1.305 -	1.269 -	1.305 -	6.98 -	0.129 J	0.038 J	0.149 J	9.78 J	0.07 -	41.8 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.813	1.394 @	1.386 @	1.394 @	17.243 @	0.285 @	0.051 @	0.213 @	9.81	0.40 @	21.8 @
Standardized Skewness	0.13	--	--	--	--	--	--	--	0.63	--	--
W-Statistic Probability *	0.731	--	--	--	--	--	--	--	0.685	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	16	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	3	1	0	1	12
Estimated Mean**	1.52	--	--	--	--	--	--	--	7.90	--	--
UCL of the Mean	1.58	--	--	--	--	--	--	--	8.39	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Inconclusive	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	193	--	--	--	--	--	--	--	4	--	--
Size Calculation	Fail	--	--	--	--	--	--	--	Pass	--	--

000065

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-15-1-2	1.093 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-15-2-2	1.4 J	1.143 -	1.105 -	1.143 -	12.163 -	0.117 -	0.035 J	0.128 J	4.16 J	0.03 UJ	41.6 UJ
A9P1-C-15-3-2	1.574 J	1.18 -	1.156 -	1.18 -	12.541 -	0.162 -	0.051 J	0.195 -	7.05 J	0.19 J	41.3 UJ
A9P1-C-15-4-2	1.406 J	1.205 -	1.182 -	1.205 -	10.93 -	0.171 -	0.04 J	0.178 -	4.04 J	0.044 J	42.1 UJ
A9P1-C-15-5-2	1.375 J	0.98 -	0.964 -	0.98 -	7.129 -	0.103 J	0.028 UJ	0.119 U	4.16 J	0.39 J	41 UJ
A9P1-C-15-6-2	1.168 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-15-7-2	1.304 J	1.097 -	1.09 -	1.097 -	12.635 -	0.148 -	0.032 UJ	0.138 J	4.12 J	0.19 J	41.2 UJ
A9P1-C-15-8-2	1.215 J	1.162 -	1.159 -	1.162 -	7.788 -	0.165 -	0.05 J	0.125 U	3.89 J	0.26 J	40.8 UJ
A9P1-C-15-9-2	1.304 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-15-10-2	1.355 J	1.145 -	1.121 -	1.145 -	14.886 -	0.175 -	0.048 J	0.14 J	3.93 J	0.34 J	41.9 UJ
A9P1-C-15-11-2	1.393 J	1.083 -	1.082 -	1.083 -	7.606 -	0.156 -	0.029 J	0.132 J	2.96 J	0.03 UJ	41.6 UJ
A9P1-C-15-12-2	1.36 J	1.152 -	1.141 -	1.152 -	11.289 -	0.122 -	0.037 J	0.158 U	4.97 J	0.24 J	41.3 UJ
A9P1-C-15-12-2-D	1.169 J	1.133 -	1.093 -	1.133 -	11.558 -	0.091 J	0.024 J	0.121 U	4.58 J	0.26 J	41.3 UJ
A9P1-C-15-13-2	1.422 J	1.149 -	1.122 -	1.149 -	16.488 -	0.203 -	0.038 J	0.141 J	4.66 J	0.031 UJ	41.1 UJ
A9P1-C-15-14-2	1.47 J	1.091 -	1.095 -	1.091 -	8.277 -	0.096 J	0.166 J	0.165 J	4.4 J	0.34 J	41.2 UJ
A9P1-C-15-15-2	1.276 J	1.215 -	1.163 -	1.215 -	12.959 -	0.153 -	0.187 J	0.149 U	5.91 J	0.2 J	40.9 UJ
A9P1-C-15-16-2	1.325 -	--	--	--	--	--	--	--	--	--	--
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.574	1.215 @	1.182 @	1.215 @	16.488 @	0.203 @	0.187 @	0.195 @	7.05 @	0.39 @	21.1 @
Standardized Skewness	-0.49	--	--	--	--	--	--	--	--	--	--
W-Statistic Probability *	0.873	--	--	--	--	--	--	--	--	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	--	--	--
Sample Size	16	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	2	4	0	3	12
Estimated Mean**	1.34	--	--	--	--	--	--	--	--	--	--
UCL of the Mean	1.39	--	--	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	--	--	--
a posteriori Sample	5	--	--	--	--	--	--	--	--	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	--	--	--

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-16-2-2	1.378 -	1.211 -	1.215 -	1.211 -	9.679 J	0.22 -	0.045 J	0.301 U	5.87 -	0.031 UJ	42.2 UJ
A9P1-C-16-3-2	1.469 -	1.045 -	1.011 -	1.045 -	11.075 J	0.205 -	0.029 UJ	0.273 UJ	5.86 -	0.047 J	41.3 UJ
A9P1-C-16-4-2	1.453 -	1.275 -	1.263 -	1.275 -	8.817 J	0.132 -	0.03 UJ	0.297 U	11.1 -	0.14 J	41.3 UJ
A9P1-C-16-5-2	1.497 -	1.174 -	1.128 -	1.174 -	12.514 J	0.221 -	0.035 UJ	0.264 U	4.72 -	0.11 J	40.9 UJ
A9P1-C-16-5-2-D	1.422 -	1.237 -	1.219 -	1.237 -	18.066 J	0.235 -	0.044 J	0.289 U	3.8 J	0.1 J	40.5 UJ
A9P1-C-16-7-2	1.494 -	1.245 -	1.221 -	1.245 -	9.05 J	0.184 -	0.035 UJ	0.279 U	0.39 U	0.032 UJ	40.4 UJ
A9P1-C-16-8-2	1.415 -	1.229 -	1.235 -	1.229 -	5.691 J	0.115 -	0.032 UJ	0.289 U	7.79 -	0.068 J	39.7 UJ
A9P1-C-16-10-2	1.351 -	1.201 -	1.203 -	1.201 -	8.669 J	0.127 J	0.04 UJ	0.258 U	6.81 J	0.03 UJ	40.6 UJ
A9P1-C-16-11-2	1.39 -	1.373 -	1.32 -	1.373 -	5.884 J	0.114 -	0.031 UJ	0.286 U	12.7 J	0.74 J	40.2 UJ
A9P1-C-16-12-2	1.463 -	1.2 -	1.176 -	1.2 -	4.471 J	0.128 -	0.033 UJ	0.276 U	8.1 J	0.032 UJ	40.8 UJ
A9P1-C-16-14-2	1.309 -	1.22 -	1.231 -	1.22 -	14.045 J	0.112 J	0.033 UJ	0.28 U	6.21 J	0.03 UJ	40.8 UJ
A9P1-C-16-15-2	1.278 -	1.147 -	1.12 -	1.147 -	12.113 J	0.183 -	0.032 UJ	0.279 U	11 J	0.047 J	41 UJ
A9P1-C-16-16-2	1.42 -	1.265 -	1.235 -	1.265 -	6.918 J	0.072 J	0.037 UJ	0.262 U	7.37 -	0.13 J	41 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.497 @	1.373 @	1.320 @	1.373 @	18.066 @	0.235 @	0.045 @	0.150 @	12.7	0.74	21.1 @
Standardized Skewness	--	--	--	--	--	--	--	--	-0.52	4.45	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	0.539	0.06	--
Test Procedure	--	--	--	--	--	--	--	--	t-Test (N)	Sign Test	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	10	12	1	5	12
Estimated Mean**	--	--	--	--	--	--	--	--	7.31	0.047	--
UCL of the Mean	--	--	--	--	--	--	--	--	8.62	0.11	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	0.003	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	Pass	Pass	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	Pass	Pass	--
a posteriori Sample	--	--	--	--	--	--	--	--	11	5	--
Size Calculation	--	--	--	--	--	--	--	--	Pass	Pass	--

000067

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-17-1-2	1.309 -	0.845 -	0.847 -	0.845 -	4.116 J	0.063 U	0.034 UJ	0.274 U	10.3 J	0.95 -	41.5 UJ
A9P1-C-17-2-2	1.359 -	1.172 -	1.146 -	1.172 -	8.796 -	0.138 -	0.05 J	0.267 U	6.81 J	0.59 -	39.8 UJ
A9P1-C-17-2-2-D	1.347 -	1.108 -	1.097 -	1.108 -	12.30 -	0.181 -	0.031 UJ	0.269 U	6.83 J	0.77 -	40.1 UJ
A9P1-C-17-4-2	1.338 -	1.172 -	1.161 -	1.172 -	5.018 J	0.064 U	0.032 UJ	0.286 U	5 J	0.25 -	42.7 UJ
A9P1-C-17-5-2	1.423 -	1.198 -	1.203 -	1.198 -	9.681 -	0.155 -	0.046 J	0.26 U	6.8 J	0.63 -	42.4 UJ
A9P1-C-17-7-2	1.248 -	1.10 -	1.075 -	1.10 -	12.682 -	0.192 -	0.044 J	0.259 U	6 J	0.5 -	40.4 UJ
A9P1-C-17-8-2	1.306 -	1.15 -	1.162 -	1.15 -	11.776 -	0.164 -	0.033 J	0.256 U	5.69 J	0.31 -	42.6 UJ
A9P1-C-17-9-2	1.413 -	1.201 -	1.205 -	1.201 -	12.288 -	0.163 -	0.035 UJ	0.253 U	6.95 J	0.44 -	42.4 UJ
A9P1-C-17-10-2	1.373 -	1.157 -	1.162 -	1.157 -	12.702 -	0.261 -	0.048 J	0.28 U	8.07 J	0.48 -	41.8 UJ
A9P1-C-17-12-2	1.262 -	1.078 -	1.042 -	1.078 -	8.463 -	0.163 -	0.048 J	0.256 U	4.26 J	0.32 -	40.8 UJ
A9P1-C-17-14-2	1.217 -	1.143 -	1.122 -	1.143 -	13.559 -	0.191 -	0.039 UJ	0.285 U	5.3 J	0.32 -	41.9 UJ
A9P1-C-17-15-2	1.261 -	1.074 -	1.019 -	1.074 -	9.515 -	0.189 -	0.036 UJ	0.384 -	4.9 J	0.55 -	40.7 UJ
A9P1-C-17-16-2	1.349 -	1.156 -	1.145 -	1.156 -	12.577 -	0.152 -	0.03 UJ	0.27 J	8.04 J	0.35 -	41 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.423 @	1.201 @	1.205 @	1.201 @	13.559 @	0.261 @	0.050 @	0.384 @	10.3	0.95	21.4 @
Standardized Skewness	--	--	--	--	--	--	--	--	1.26	1.53	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	0.923	0.765	--
Test Procedure	--	--	--	--	--	--	--	--	t-Test (LN)	t-Test (LN)	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	2	6	10	0	0	12
Estimated Mean**	--	--	--	--	--	--	--	--	6.53	0.49	--
UCL of the Mean	--	--	--	--	--	--	--	--	7.26	0.59	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	Pass	Pass	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	Pass	Pass	--
a posteriori Sample	--	--	--	--	--	--	--	--	3	9	--
Size Calculation	--	--	--	--	--	--	--	--	Pass	Pass	--

000068

4582

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-18-1-2	1.352 -	1.295 J	1.25 -	1.295 J	9.567 -	0.155 -	0.031 J	0.236 U	6.58 -	0.03 U	40.9 UJ
A9P1-C-18-2-2	1.463 -	1.223 J	1.219 -	1.223 J	4.033 U	0.094 -	0.035 J	0.248 U	7.57 J	0.032 U	40.4 UJ
A9P1-C-18-3-2	1.443 -	1.268 J	1.234 -	1.268 J	6.353 -	0.173 -	0.034 UJ	0.239 U	8.93 J	0.031 U	41.3 UJ
A9P1-C-18-5-2	1.291 J	1.152 J	1.113 -	1.152 J	12.971 -	0.103 J	0.035 J	0.251 U	7.84 J	0.031 U	41.6 UJ
A9P1-C-18-7-2	1.34 -	1.171 J	1.119 -	1.171 J	5.922 -	0.147 -	0.038 J	0.244 U	6.08 J	0.032 U	41.4 UJ
A9P1-C-18-8-2	1.366 -	1.20 J	1.169 -	1.20 J	10.399 -	0.205 -	0.028 UJ	0.247 U	4.81 J	0.03 U	41.2 UJ
A9P1-C-18-9-2	1.413 -	1.228 J	1.209 -	1.228 J	12.387 -	0.141 -	0.041 J	0.27 U	7.38 -	0.032 U	40.7 UJ
A9P1-C-18-10-2	1.381 J	1.239 J	1.212 -	1.239 J	9.445 -	0.14 -	0.031 UJ	0.229 U	7.29 J	0.031 U	42.7 UJ
A9P1-C-18-12-2	1.369 -	1.137 J	1.081 -	1.137 J	13.621 -	0.122 -	0.045 J	0.239 U	7.62 J	0.032 U	40.9 UJ
A9P1-C-18-13-2	1.379 -	1.123 J	1.104 -	1.123 J	8.222 -	0.17 -	0.049 J	0.244 U	6.7 -	0.18 -	40.7 UJ
A9P1-C-18-13-2-D	1.351 -	1.101 J	1.141 -	1.101 J	9.428 -	0.191 -	0.041 J	0.268 U	8.1 J	0.13 -	40.6 UJ
A9P1-C-18-14-2	1.319 -	1.128 J	1.12 -	1.128 J	12.863 -	0.173 -	0.049 J	0.282 U	10.3 J	0.033 U	42.6 UJ
A9P1-C-18-16-2	1.446 -	1.246 J	1.225 -	1.246 J	10.212 -	0.217 -	0.033 J	0.262 U	9.37 J	0.031 U	42.2 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.463 @	1.295 @	1.250 @	1.295 @	13.621 @	0.217 @	0.049 @	0.141 @	10.3	0.18 @	21.4 @
Standardized Skewness	--	--	--	--	--	--	--	--	-0.13	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	0.957	--	--
Test Procedure	--	--	--	--	--	--	--	--	t-Test (N)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	3	12	0	11	12
Estimated Mean**	--	--	--	--	--	--	--	--	7.66	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	8.23	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	4	--	--
Size Calculation	--	--	--	--	--	--	--	--	Pass	--	--

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Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-19-2-2	1.351 -	1.203 -	1.219 -	1.203 -	6.336 -	0.116 -	0.025 UJ	0.252 U	4.66 J	0.15 -	41.2 UJ
A9P1-C-19-2-2-D	1.43 -	1.239 -	1.217 -	1.239 -	4.865 J	0.103 J	0.027 UJ	0.27 U	6.75 J	0.16 -	42.5 UJ
A9P1-C-19-3-2	1.358 -	1.162 -	1.161 -	1.162 -	9.402 -	0.135 -	0.032 J	0.24 U	4.46 J	0.11 -	40.8 UJ
A9P1-C-19-4-2	1.445 -	1.207 -	1.191 -	1.207 -	6.139 -	0.172 -	0.025 J	0.264 U	4.01 J	0.22 -	41.6 UJ
A9P1-C-19-5-2	1.3 -	1.142 -	1.114 -	1.142 -	10.348 -	0.182 -	0.036 J	0.259 U	4.25 J	0.1 -	42 UJ
A9P1-C-19-6-2	1.364 -	1.164 -	1.139 -	1.164 -	9.129 -	0.076 U	0.028 J	0.329 J	4.4 J	0.09 -	42.7 UJ
A9P1-C-19-8-2	1.351 -	1.165 -	1.157 -	1.165 -	11.548 -	0.201 -	0.032 J	0.24 U	5.02 J	0.1 -	41.8 UJ
A9P1-C-19-9-2	1.244 -	1.128 -	1.075 -	1.128 -	11.197 -	0.183 -	0.054 J	0.258 U	4.72 J	0.61 -	41.4 UJ
A9P1-C-19-10-2	1.327 -	1.11 -	1.113 -	1.11 -	6.557 -	0.099 J	0.026 J	0.298 J	5.29 J	0.13 -	42.2 UJ
A9P1-C-19-12-2	1.394 -	1.108 -	1.082 -	1.108 -	8.293 -	0.142 -	0.037 J	0.323 J	4.79 J	0.34 -	41.4 UJ
A9P1-C-19-13-2	1.406 -	1.098 -	1.069 -	1.098 -	12.528 -	0.241 -	0.048 J	0.386 -	5.47 J	0.23 -	41.8 UJ
A9P1-C-19-15-2	1.296 -	1.05 -	1.013 -	1.05 -	9.34 -	0.15 -	0.031 J	0.234 U	3.05 J	0.05 J	41.3 UJ
A9P1-C-19-16-2	1.392 -	1.154 -	1.127 -	1.154 -	11.093 -	0.22 -	0.042 J	0.249 U	3.78 J	0.19 -	42.9 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.445 @	1.239 @	1.219 @	1.239 @	12.528 @	0.241 @	0.054 @	0.386 @	6.75 @	0.61 @	21.5 @
Standardized Skewness	--	--	--	--	--	--	--	--	--	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	1	1	8	0	0	12
Estimated Mean**	--	--	--	--	--	--	--	--	--	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--	--	--
Size Calculation	--	--	--	--	--	--	--	--	--	--	--

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Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-20-1-2	1.35 -	1.154 -	1.128 -	1.154 -	11.155 -	0.283 -	0.058 J	0.261 U	5.18 J	0.19 -	43.4 UJ
A9P1-C-20-1-2-D	1.411 -	1.209 -	1.185 -	1.209 -	11.144 -	0.191 -	0.084 J	0.384 J	4.76 J	0.07 -	41.8 UJ
A9P1-C-20-2-2	1.524 -	1.201 -	1.194 -	1.201 -	7.466 -	0.244 -	0.04 J	0.409 -	6.9 J	0.3 -	41.6 UJ
A9P1-C-20-3-2	1.6 -	1.168 -	1.138 -	1.168 -	12.448 -	0.192 -	0.034 UJ	0.264 U	4.94 J	0.24 -	40 UJ
A9P1-C-20-5-2	1.404 -	1.239 -	1.254 -	1.239 -	4.669 J	0.191 -	0.039 J	0.25 U	4.64 J	0.08 -	41.3 UJ
A9P1-C-20-7-2	1.408 -	1.193 -	1.157 -	1.193 -	12.119 -	0.174 -	0.035 UJ	0.268 U	5.04 J	0.1 -	40.8 UJ
A9P1-C-20-8-2	1.441 -	1.317 -	1.252 -	1.317 -	11.623 -	0.211 -	0.032 J	0.27 U	5.47 J	0.22 -	41.1 UJ
A9P1-C-20-9-2	1.358 -	1.167 -	1.102 -	1.167 -	7.921 -	0.129 -	0.044 UJ	0.246 U	4.25 J	0.023 U	41.6 UJ
A9P1-C-20-10-2	1.453 -	1.323 -	1.312 -	1.323 -	4.504 J	0.121 J	0.034 UJ	0.263 U	9.6 J	0.2 -	40.4 UJ
A9P1-C-20-11-2	1.294 -	1.173 -	1.059 -	1.173 -	10.591 -	0.168 -	0.037 J	0.253 U	6.04 J	0.3 -	41.2 UJ
A9P1-C-20-13-2	1.359 -	1.159 -	1.186 -	1.159 -	14.982 -	0.229 -	0.055 J	0.411 -	5.92 J	0.1 -	41.1 UJ
A9P1-C-20-15-2	1.469 -	1.198 -	1.168 -	1.198 -	10.394 -	0.164 -	0.044 UJ	0.257 J	5.12 J	0.15 -	41.4 UJ
A9P1-C-20-16-2	1.417 -	1.195 -	1.18 -	1.195 -	12.051 -	0.236 -	0.042 UJ	0.294 J	7.09 J	0.29 -	41.3 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.6	1.323 @	1.312 @	1.323 @	14.982 @	0.283 @	0.084 @	0.411 @	9.6	0.30 @	21.7 @
Standardized Skewness	0.88	--	--	--	--	--	--	--	2.39	--	--
W-Statistic Probability *	0.835	--	--	--	--	--	--	--	0.253	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	6	7	0	1	12
Estimated Mean**	1.43	--	--	--	--	--	--	--	5.85	--	--
UCL of the Mean	1.47	--	--	--	--	--	--	--	6.43	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	9	--	--	--	--	--	--	--	2	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	Pass	--	--

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APPENDIX A.2
BASELINE CONFIRMATION RESULTS AND STATISTICS

ARSENIC

Subsurface

	A9P1	Back
Samples	64	140
Average	8.14	7.54
Median	7.75	7.40
Std. Dev.	2.78	2.96
Minimum	2.78	0.69
Maximum	14.90	15.80
Lower Quartile	6.24	5.31
Upper Quartile	9.64	9.75
UCL-Mean (90%)	8.59	7.86
t-Test Prob.	**0.176**	
F-test (SD) Prob.	**0.579**	
W-test (median) P	**0.207**	
K-S (distr.) Prob.	**0.120**	

INTERPRETATION
Okay at the 90% level
Std. Dev. similar - t-test valid
Okay at the 90% level
Okay at the 90% level

CONCLUSION: A9P1 is NOT (statistically) significantly greater than Background.

BERYLLIUM

Subsurface

	A9P1	Back
Samples	64	140
Average	0.48	0.77
Median	0.43	0.75
Std. Dev.	0.29	0.36
Minimum	0.03	0.22
Maximum	1.54	3.05
Lower Quartile	0.28	0.54
Upper Quartile	0.66	0.94
UCL-Mean (90%)	0.53	0.81
t-Test Prob.	**1.000**	
F-test (SD) Prob.	**0.074**	
W-test (median) P	**1.000**	
K-S (distr.) Prob.	**5.85E-07**	

INTERPRETATION
A9P1 < Back
Std. Dev. similar - t-test valid
A9P1 < Back
A9P1 distribution is different from Back

CONCLUSION: A9P1 is (statistically) significantly LESS than Background.

Radium 226

Subsurface

	A9P1	Back
Samples	64	140
Average	1.494	1.174
Median	1.512	1.267
Std. Dev.	0.161	0.302
Minimum	1.157	0.515
Maximum	1.790	1.686
Lower Quartile	1.401	0.880
Upper Quartile	1.618	1.435
UCL-Mean (95%)	1.528	1.216
t-Test Prob.	**0**	
F-test (SD) Prob.	**1.439E-07**	
W-test (median) P	**1.12E-12**	
K-S (distr.) Prob.	**3.90E-08**	

INTERPRETATION
A9P1 > Back at the 99.99...% level
Std. Dev. Dissimilar - t-test NOT valid
A9P1 > Back at the 99.99...% level
A9P1 > Back at the 99.99...% level

CONCLUSION: There is strong evidence that A9P1 is greater than Background.

Radium 226

Subsurface (only from CUs with exceedances of Background 95th percentile)

	A9P1	Back
Samples	44	
Average	1.536	
Median	1.588	
Std. Dev.	0.157	
Minimum	1.180	
Maximum	1.790	
Lower Quartile	1.424	
Upper Quartile	1.640	
UCL-Mean (90%)	*1.566*	
UCL-Mean (95%)	**1.575**	**1.564**
t-Test Prob.	**0.123**	
W-test (median) P	**0.247**	

Excluded: CUs 5, 9, 12, 13, 19

<--	**Fails @ 5% and 10% level**
<--	**Fails @ 5% and 10% level**

Radium 226

Subsurface (only from CUs with exceedances of Background 95th percentile)

	A9P1	Back
Samples	40	
Average	1.519	
Median	1.579	
Std. Dev.	0.154	
Minimum	1.180	
Maximum	1.754	
Lower Quartile	1.401	
Upper Quartile	1.630	
UCL-Mean (90%)	*1.551*	
UCL-Mean (95%)	**1.560**	**1.564**
t-Test Prob.	**0.038**	
W-test (median) P	**0.097**	

Excluded: CUs 5, 9, 12, 13, 19 AND 14 (high avg.)

Okay @ 5%
Fails @ 5%; Okay @ 10%

Radium-228

Subsurface

	A9P1	Back
Samples	64	140
Average	1.190	0.944
Median	1.203	0.997
Std. Dev.	0.130	0.244
Minimum	0.880	0.467
Maximum	1.449	1.321
Lower Quartile	1.107	0.713
Upper Quartile	1.278	1.161
UCL-Mean (95%)	1.217	0.978
t-Test Prob.	**6.02E-07**	
F-test (SD) Prob.	**1.44E-07**	
W-test (median) P	**5.62E-12**	
K-S (distr.) Prob.	**7.84E-08**	

INTERPRETATION
A9P1 > Back at the 99% level
Std. Dev. Dissimilar
A9P1 > Back at the 99% level
A9P1 > Back at the 99% level

CONCLUSION: There is strong evidence that A9P1 is greater than Background.

Radium-228

Subsurface (only from CUs with exceedances of Background 95th percentile)

	A9P1	Back		
Samples	44			**Excluded: CUs 6, 7, 9, 12, 13**
Average	1.225			
Median	1.261			
Std. Dev.	0.123			
Minimum	0.880			
Maximum	1.449			
Lower Quartile	1.163			
Upper Quartile	1.310			
UCL-Mean (95%)	**1.256**	**1.269**		
t-Test Prob.	**0.012**		<--	**Passes @ 5%**
W-test (median) P	**0.042**		<--	**Passes @ 5%**

Thorium-228 Subsurface

	A9P1	Back
Samples	64	140
Average	1.171	0.926
Median	1.189	0.966
Std. Dev.	0.132	0.239
Minimum	0.844	0.459
Maximum	1.410	1.305
Lower Quartile	1.084	0.702
Upper Quartile	1.274	1.135
UCL-Mean (95%)	1.198	0.959
t-Test Prob.	**0**	
F-test (SD) Prob.	**6.23E-07**	
W-test (median) P	**3.07E-12**	
K-S (distr.) Prob.	**3.27E-08**	

INTERPRETATION
A9P1 > Back at the 99% level
Std. Dev. Dissimilar
A9P1 > Back at the 99% level
A9P1 > Back at the 99% level

CONCLUSION: There is strong evidence that A9P1 is greater than Background.

Thorium-228 Subsurface (only from CUs with exceedances of Background 95th percentile)

	A9P1	Back		
Samples	44			Excluded: CUs 6, 7, 9, 12, 13
Average	1.207			
Median	1.245			
Std. Dev.	0.126			
Minimum	0.844			
Maximum	1.410			
Lower Quartile	1.142			
Upper Quartile	1.290			
UCL-Mean (95%)	**1.239**	**1.248**		
t-Test Prob.	**0.020**		<--	**Passes @ 5%**
W-test (median) P	**0.000**		<--	**Passes @ 5%**

Thorium-232

Subsurface

	A9P1	Back
Samples	64	140
Average	1.190	0.944
Median	1.203	0.997
Std. Dev.	0.130	0.244
Minimum	0.880	0.467
Maximum	1.449	1.321
Lower Quartile	1.107	0.713
Upper Quartile	1.278	1.161
UCL-Mean (95%)	1.217	0.978
t-Test Prob.	**6.02E-07**	
F-test (SD) Prob.	**1.44E-07**	
W-test (median) P	**5.62E-12**	
K-S (distr.) Prob.	**7.84E-08**	

INTERPRETATION
A9P1 > Back at the 99% level
Std. Dev. Dissimilar
A9P1 > Back at the 99% level
A9P1 > Back at the 99% level

CONCLUSION: There is strong evidence that A9P1 is greater than Background.

Thorium-232

Subsurface (only from CUs with exceedances of Background 95th percentile)

	A9P1	Back		
Samples	44			**Excluded: CUs 6, 7, 9, 12, 13**
Average	1.225			
Median	1.261			
Std. Dev.	0.123			
Minimum	0.880			
Maximum	1.449			
Lower Quartile	1.163			
Upper Quartile	1.310			
UCL-Mean (95%)	**1.256**	**1.269**		
t-Test Prob.	**0.012**		<--	**Passes @ 5%**
W-test (median) P	**0.042**		<--	**Passes @ 5%**

Uranium, Total Subsurface

	A9P1	Back
Samples	64	140
Average	3.600	2.557
Median	2.110	2.568
Std. Dev.	2.289	1.337
Minimum	1.547	0.792
Maximum	11.762	8.823
Lower Quartile	1.780	1.193
Upper Quartile	5.340	3.411
UCL-Mean (95%)	4.078	2.744
t-Test Prob.	**0.0011**	
F-test (SD) Prob.	**1.465E-07**	
W-test (median) P	**0.0023**	
K-S (distr.) Prob.	**4.24E-05**	

INTERPRETATION
A9P1 > Back at the 99% level
Std. Dev. Dissimilar
A9P1 > Back at the 99% level
A9P1 > Back at the 99% level

CONCLUSION: There is strong evidence that A9P1 is greater than Background.

Uranium, Total Subsurface (only from CUs with exceedances of Background 95th percentile)

	A9P1	Back		
Samples	52			**Excluded: CUs 15, 17, 19**
Average	3.916			
Median	3.330			
Std. Dev.	2.399			
Minimum	1.547			
Maximum	11.762			
Lower Quartile	1.882			
Upper Quartile	5.634			
UCL-Mean (95%)	**4.474**	**4.555**		
t-Test Prob.	**0.030**		<--	**Passes @ 5%**
W-test (median) P	**0.009**		<--	**Passes @ 5%**

APPENDIX A.3
SURFACE SAMPLING RESULTS AND STATISTICS
SECOND SAMPLING ROUND

Station Number	Radium-226
A9P1-C-6-1-2	1.367 -
A9P1-C-6-2-2	1.394 -
A9P1-C-6-3-2	1.537 -
A9P1-C-6-5-2	1.361 -
A9P1-C-6-7-2	1.442 -
A9P1-C-6-8-2	1.367 -
A9P1-C-6-9-2	1.456 -
A9P1-C-6-9-2-D	1.328 -
A9P1-C-6-10-2	1.321 -
A9P1-C-6-11-2	1.545 -
A9P1-C-6-13-2	1.651 -
A9P1-C-6-15-2	1.598 -
A9P1-C-6-16-2	1.491 -
A9P1-C-6-17-2	1.396 -
A9P1-C-6-18-2	1.507 -
A9P1-C-6-19-2	1.643 -
A9P1-C-6-20-2	1.789 -
A9P1-C-6-21-2	1.403 -
A9P1-C-6-21-2-D	1.365 -
A9P1-C-6-22-2	1.442 -
A9P1-C-6-23-2	1.425 -
A9P1-C-6-24-2	1.634 -
A9P1-C-6-25-2	1.414 -
A9P1-C-6-26-2	1.423 -
A9P1-C-6-27-2	1.545 -
A9P1-C-6-28-2	1.560 -
A9P1-C-6-29-2	1.764 -
A9P1-C-6-30-2	1.402 -
A9P1-C-6-31-2	1.646 -
A9P1-C-6-32-2	1.768 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.789
Standardized Skewness	1.49
W-Statistic Probability *	7.3% (LN)
Test Procedure	Lognormal
Sample Size	28
Number of NDs	0
Estimated Mean**	1.51
UCL of the Mean	1.55
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Inconclusive
2x Rule - Pass / Fail	Pass
a posteriori Sample Size Calculation	4306 Fail

Station Number	Beryllium
A9P1-C-7-1-2	0.32 J
A9P1-C-7-2-2	0.06 J
A9P1-C-7-3-2	0.229 J
A9P1-C-7-4-2	0.023 UJ
A9P1-C-7-5-2	0.023 UJ
A9P1-C-7-6-2	0.05 J
A9P1-C-7-7-2	0.023 UJ
A9P1-C-7-8-2	0.03 J
A9P1-C-7-9-2	0.19 J
A9P1-C-7-10-2	0.34 J
A9P1-C-7-11-2	0.363 J
A9P1-C-7-12-2	0.023 UJ
A9P1-C-7-13-2	0.025 UJ
A9P1-C-7-13-2-D	0.08 J
A9P1-C-7-14-2	0.152 J
A9P1-C-7-15-2	0.023 UJ
A9P1-C-7-16-2	0.023 UJ
FRL	0.62
Units	mg/kg
Confidence Level	90%
Max Result	0.363 @
Standardized Skewness	- -
W-Statistic Probability *	- -
Test Procedure	- -
Sample Size	16
Number of NDs	6
Estimated Mean**	- -
UCL of the Mean	- -
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	- -
2x Rule - Pass / Fail	- -
a posteriori Sample	- -
Size Calculation	- -

Station Number	Radium-226
A9P1-C-8-1-2	1.392 -
A9P1-C-8-2-2	1.387 -
A9P1-C-8-3-2	1.487 -
A9P1-C-8-4-2	1.361 -
A9P1-C-8-4-2-D	1.428 -
A9P1-C-8-5-2	1.339 -
A9P1-C-8-6-2	1.362 -
A9P1-C-8-7-2	1.387 -
A9P1-C-8-8-2	1.584 -
A9P1-C-8-9-2	1.551 -
A9P1-C-8-10-2	1.467 -
A9P1-C-8-11-2	1.295 -
A9P1-C-8-12-2	1.727 -
A9P1-C-8-13-2	1.634 -
A9P1-C-8-14-2	1.460 -
A9P1-C-8-15-2	1.352 -
A9P1-C-8-16-2	1.574 -
A9P1-C-8-17-2	1.427 -
A9P1-C-8-18-2	1.514 -
A9P1-C-8-19-2	1.401 -
A9P1-C-8-20-2	1.328 -
A9P1-C-8-20-2-D	1.411 -
A9P1-C-8-21-2	1.260 -
A9P1-C-8-22-2	1.384 -
A9P1-C-8-23-2	1.205 -
A9P1-C-8-24-2	1.334 -
A9P1-C-8-25-2	1.392 -
A9P1-C-8-26-2	1.545 -
A9P1-C-8-27-2	1.441 -
A9P1-C-8-28-2	1.374 -
A9P1-C-8-29-2	1.611 -
A9P1-C-8-30-2	1.548 -
A9P1-C-8-31-2	1.428 -
A9P1-C-8-32-2	1.539 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.727
Standardized Skewness	0.76
W-Statistic Probability *	93.5% (LN)
Test Procedure	Lognormal
Sample Size	32
Number of NDs	0
Estimated Mean**	1.45
UCL of the Mean	1.48
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Pass
2x Rule - Pass / Fail	Pass
a posteriori Sample	25
Size Calculation	Pass

Station Number	Radium-226
A9P1-C-10-1-2	1.341 -
A9P1-C-10-2-2	1.505 -
A9P1-C-10-3-2	1.560 -
A9P1-C-10-4-2	1.513 -
A9P1-C-10-5-2	1.379 -
A9P1-C-10-6-2	1.419 -
A9P1-C-10-7-2	1.450 -
A9P1-C-10-8-2	1.522 -
A9P1-C-10-9-2	1.569 -
A9P1-C-10-10-2	1.632 -
A9P1-C-10-11-2	1.306 -
A9P1-C-10-12-2	1.536 -
A9P1-C-10-12-2-D	1.481 -
A9P1-C-10-13-2	1.490 -
A9P1-C-10-14-2	1.349 -
A9P1-C-10-15-2	1.467 -
A9P1-C-10-16-2	1.386 -
A9P1-C-10-17-2	1.345 -
A9P1-C-10-18-2	1.425 -
A9P1-C-10-18-2-D	1.396 -
A9P1-C-10-19-2	1.573 -
A9P1-C-10-20-2	1.529 -
A9P1-C-10-21-2	1.247 -
A9P1-C-10-22-2	1.324 -
A9P1-C-10-23-2	1.363 -
A9P1-C-10-24-2	1.524 -
A9P1-C-10-25-2	1.451 -
A9P1-C-10-26-2	1.318 -
A9P1-C-10-27-2	1.465 -
A9P1-C-10-28-2	1.410 -
A9P1-C-10-29-2	1.557 -
A9P1-C-10-30-2	1.596 -
A9P1-C-10-31-2	1.616 -
A9P1-C-10-32-2	1.403 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.632
Standardized Skewness	-0.27
W-Statistic Probability *	0.490
Test Procedure	t-Test (LN)
Sample Size	32
Number of NDs	0
Estimated Mean**	1.46
UCL of the Mean	1.49
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Pass
2x Rule - Pass / Fail	Pass
a posteriori Sample Size Calculation	30 Pass

Station Number	Radium-226
A9P1-C-11-1-2	1.481 -
A9P1-C-11-2-2	1.408 -
A9P1-C-11-3-2	1.413 -
A9P1-C-11-5-2	1.461 -
A9P1-C-11-7-2	1.394 -
A9P1-C-11-8-2	1.541 -
A9P1-C-11-10-2	1.432 -
A9P1-C-11-11-2	1.638 -
A9P1-C-11-12-2	1.489 -
A9P1-C-11-13-2	1.318 -
A9P1-C-11-15-2	1.465 -
A9P1-C-11-16-2	1.509 -
A9P1-C-11-16-2-D	1.530 -
A9P1-C-11-17-2	1.413 -
A9P1-C-11-18-2	1.432 -
A9P1-C-11-19-2	1.551 -
A9P1-C-11-20-2	1.600 -
A9P1-C-11-21-2	1.328 -
A9P1-C-11-22-2	1.397 -
A9P1-C-11-23-2	1.351 -
A9P1-C-11-24-2	1.283 -
A9P1-C-11-25-2	1.291 -
A9P1-C-11-26-2	1.325 -
A9P1-C-11-26-2-D	1.423 -
A9P1-C-11-27-2	1.568 -
A9P1-C-11-28-2	1.561 -
A9P1-C-11-29-2	1.475 -
A9P1-C-11-30-2	1.479 -
A9P1-C-11-31-2	1.526 -
A9P1-C-11-32-2	1.455 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.638
Standardized Skewness	-0.10
W-Statistic Probability *	83.8% (N)
Test Procedure	Normal
Sample Size	28
Number of NDs	0
Estimated Mean**	1.45
UCL of the Mean	1.48
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Pass
2x Rule - Pass / Fail	Pass
a posteriori Sample Size Calculation	26 Pass

Station Number	Arsenic
A9P1-C-12-1-2	14.1 J
A9P1-C-12-2-2	5.95 J
A9P1-C-12-3-2	7.28 -
A9P1-C-12-4-2	7.2 J
A9P1-C-12-5-2	9.2 -
A9P1-C-12-6-2	10.7 J
A9P1-C-12-6-2-D	9.95 J
A9P1-C-12-7-2	11.7 J
A9P1-C-12-8-2	13.9 J
A9P1-C-12-9-2	9.29 J
A9P1-C-12-10-2	11.0 J
A9P1-C-12-11-2	8.28 -
A9P1-C-12-12-2	8.68 J
A9P1-C-12-13-2	9.29 J
A9P1-C-12-14-2	11.4 J
A9P1-C-12-15-2	11.5 J
A9P1-C-12-16-2	9.68 -
A9P1-C-12-17-2	6.42 -
A9P1-C-12-18-2	2.59 U
A9P1-C-12-19-2	7.3 -
A9P1-C-12-20-2	4.69 J
A9P1-C-12-21-2	6.43 -
A9P1-C-12-22-2	5.5 -
A9P1-C-12-23-2	8.99 J
A9P1-C-12-24-2	7.89 -
A9P1-C-12-25-2	6.9 J
A9P1-C-12-26-2	6.58 J
A9P1-C-12-27-2	7.15 -
A9P1-C-12-28-2	8.04 J
A9P1-C-12-29-2	6.68 -
A9P1-C-12-30-2	8.25 J
A9P1-C-12-30-2-D	7.56 -
A9P1-C-12-31-2	8.43 -
A9P1-C-12-32-2	9.18 -
FRL	9.60
Units	mg/kg
Confidence Level	90%
Max Result	14.1
Standardized Skewness	-0.04
W-Statistic Probability *	52.3% (N)
Test Procedure	Normal
Sample Size	32
Number of NDs	1
Estimated Mean**	8.40
UCL of the Mean	9.00
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Pass
2x Rule - Pass / Fail	Pass
a posteriori Sample	23
Size Calculation	Pass

Station Number	Radium-226
A9P1-C-14-1-2	1.539 -
A9P1-C-14-2-2	1.626 -
A9P1-C-14-3-2	1.449 -
A9P1-C-14-4-2	1.442 -
A9P1-C-14-5-2	1.534 -
A9P1-C-14-6-2	1.813 -
A9P1-C-14-7-2	1.284 -
A9P1-C-14-8-2	1.618 -
A9P1-C-14-9-2	1.490 -
A9P1-C-14-10-2	1.394 -
A9P1-C-14-11-2	1.576 -
A9P1-C-14-12-2	1.607 -
A9P1-C-14-13-2	1.317 -
A9P1-C-14-14-2	1.588 -
A9P1-C-14-15-2	1.475 -
A9P1-C-14-15-2-D	1.476 -
A9P1-C-14-16-2	1.626 -
A9P1-C-14-17-2	1.535 -
A9P1-C-14-18-2	1.460 -
A9P1-C-14-19-2	1.511 -
A9P1-C-14-20-2	1.572 -
A9P1-C-14-21-2	1.356 -
A9P1-C-14-22-2	1.406 -
A9P1-C-14-23-2	1.335 -
A9P1-C-14-24-2	1.520 -
A9P1-C-14-25-2	1.339 -
A9P1-C-14-26-2	1.488 -
A9P1-C-14-27-2	1.431 -
A9P1-C-14-28-2	1.460 -
A9P1-C-14-29-2	1.444 -
A9P1-C-14-30-2	1.656 -
A9P1-C-14-31-2	1.468 -
A9P1-C-14-31-2-D	1.466 -
A9P1-C-14-32-2	1.442 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.813
Standardized Skewness	1.05
W-Statistic Probability *	89.7% (LN)
Test Procedure	Lognormal
Sample Size	32
Number of NDs	0
Estimated Mean**	1.49
UCL of the Mean	1.53
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Inconclusive
2x Rule - Pass / Fail	Pass
a posteriori Sample Size Calculation	739 Fail

APPENDIX A.4
BASELINE CONFIRMATION RESULTS
CERTIFICATION UNIT 14A

ID	DATA
A9P1-C-14A-17	1.636 -
A9P1-C-14A-18	1.733 -
A9P1-C-14A-19	1.145 -
A9P1-C-14A-20	1.284 -
A9P1-C-14A-21	1.551 -
A9P1-C-14A-22	1.656 -
A9P1-C-14A-23	1.303 -
A9P1-C-14A-24	1.478 -
A9P1-C-14A-25	1.499 -
A9P1-C-14A-26	1.592 -
A9P1-C-14A-27	1.802 -
A9P1-C-14A-28	1.725 -
A9P1-C-14A-29	1.178 -
A9P1-C-14A-30	1.540 -
A9P1-C-14A-31	1.437 -
A9P1-C-14A-31-D	1.497 -
A9P1-C-14A-32	1.407 -
A9P1-C-14-10	1.616 -
A9P1-C-14-14	1.790 -
A9P1-C-14-2	1.622 -
A9P1-C-14-8	1.771 -
Limit	1.50
Units	pCi/g
Confidence Level	95%
Max. Result	1.802
Standardized Skewness	-1.162
W-statistic Prob. #	0.281
Test Procedure	t-Test (N)
Sample Size	20
Nondetects	0
Est. Mean*	1.5413
UCL	1.6169
Prob. > Limit	- -
Est. Mean - Pass / Fail	Inconclusive
2x Rule - Pass / Fail	Pass
a posteriori Sample	141
Size calculation	Fail

With Additional CU-14 samples

	Back	A9P1 Wt'd	
Samples		60	
Average		1.525	
Median		1.579	
Std. Dev.		0.135	
Minimum		1.145	
Maximum		1.802	
Lower Quartile		- -	
Upper Quartile		- -	
UCL-Mean (95%)	**1.5635**	**1.5546**	
t-Test Prob.		**0.033**	**Okay @ 5%**
W-test (median) P	- -	- -	

Note: "Wt'd" - indicates samples have been weighted so each CU is equally represented.

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APPENDIX A.5
NULL HYPOTHESIS TESTS

ID	DATA
A9P1-C-6-1	1.367 -
A9P1-C-6-2	1.394 -
A9P1-C-6-3	1.537 -
A9P1-C-6-5	1.361 -
A9P1-C-6-7	1.442 -
A9P1-C-6-8	1.367 -
A9P1-C-6-9/D (1)	1.456 -
A9P1-C-6-10	1.321 -
A9P1-C-6-11	1.545 -
A9P1-C-6-13	1.651 -
A9P1-C-6-15	1.598 -
A9P1-C-6-16	1.491 -
A9P1-C-6-17	1.396 -
A9P1-C-6-18	1.507 -
A9P1-C-6-19	1.643 -
A9P1-C-6-20	1.789 -
A9P1-C-6-21/D (2)	1.403 -
A9P1-C-6-22	1.442 -
A9P1-C-6-23	1.425 -
A9P1-C-6-24	1.634 -
A9P1-C-6-25	1.414 -
A9P1-C-6-26	1.423 -
A9P1-C-6-27	1.545 -
A9P1-C-6-28	1.560 -
A9P1-C-6-29	1.764 -
A9P1-C-6-30	1.402 -
A9P1-C-6-31	1.646 -
A9P1-C-6-32	1.768 -
N	28
Min	1.321
Max	1.789
Mean*	1.511
Std.Dev.*	0.130
$LCL_{(90\%)}$	**1.470**
$UCL_{(90\%)}$	**1.554**
H_o: Mean = FRL(1.5)	
Distribution #	Lognormal
t-Stat / W-Stat	0.189
P-value	**0.850**
Conclusion	Fail to reject the null hypothesis for alpha = 0.05.

Note: * Est. Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
The maximum value of the two duplicates was used in all statistical equations - original results: (1) 1.328/1.456; (2) 1.365/1.403.
#: This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

ID	DATA
A9P1-C-14-1	1.539 -
A9P1-C-14-2	1.626 -
A9P1-C-14-3	1.449 -
A9P1-C-14-4	1.442 -
A9P1-C-14-5	1.534 -
A9P1-C-14-6	1.813 -
A9P1-C-14-7	1.284 -
A9P1-C-14-8	1.618 -
A9P1-C-14-9	1.490 -
A9P1-C-14-10	1.394 -
A9P1-C-14-11	1.576 -
A9P1-C-14-12	1.607 -
A9P1-C-14-13	1.317 -
A9P1-C-14-14	1.588 -
A9P1-C-14-15/D(1)	1.476 -
A9P1-C-14-16	1.626 -
A9P1-C-14-17	1.535 -
A9P1-C-14-18	1.460 -
A9P1-C-14-19	1.511 -
A9P1-C-14-20	1.572 -
A9P1-C-14-21	1.356 -
A9P1-C-14-22	1.406 -
A9P1-C-14-23	1.335 -
A9P1-C-14-24	1.520 -
A9P1-C-14-25	1.339 -
A9P1-C-14-26	1.488 -
A9P1-C-14-27	1.431 -
A9P1-C-14-28	1.460 -
A9P1-C-14-29	1.444 -
A9P1-C-14-30	1.656 -
A9P1-C-14-31/D(2)	1.468 -
A9P1-C-14-32	1.442 -
N	32
Min	1.284
Max	1.813
Mean*	1.494
Std.Dev.*	0.112
$LCL_{(90\%)}$	**1.459**
$UCL_{(90\%)}$	**1.529**
H_0: Mean = FRL(1.5)	
Distribution #	Lognormal
t-Stat / W-Stat	0.530
P-value	**0.596**
Conclusion	Fail to reject the null hypothesis for alpha = 0.05.

Note: • Est. Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
The maximum value of the two duplicates was used in all statistical equations - original results: (1) 1.475/1.476; (2) 1.468/1.466.
#: This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

APPENDIX A.6
AROCLOR-1260 RESULTS
SECOND SAMPLING ROUND

Station Number	Aroclor-1260
A9P1-C-1-17	5.3 U
A9P1-C-2-17	5.5 U
A9P1-C-3-17	5.3 U
A9P1-C-4-17	5.1 U
A9P1-C-5-17	5 U
A9P1-C-6-33	5.1 U
A9P1-C-7-17	5 U
A9P1-C-8-33	5 U
A9P1-C-9-17	5 U
A9P1-C-10-33	5 U
A9P1-C-11-33	5 U
A9P1-C-12-33	4.9 U
A9P1-C-13-17	5.1 U
A9P1-C-14-33	5 U
A9P1-C-15-17	5 U
A9P1-C-16-17	4.8 U
A9P1-C-17-17	5 U
A9P1-C-18-17	5.1 U
A9P1-C-19-17	5 U
A9P1-C-20-17	5 U
FRL	40
Units	ug/kg

APPENDIX B

VARIANCES/FIELD CHANGE NOTICES FOR A9PI CERTIFICATION PROJECT SPECIFIC PLAN

VARIANCE/FIELD CHANGE NOTICE LOG FOR THE PROJECT SPECIFIC PLAN FOR AREA 9, PHASE I CERTIFICATION SAMPLING

Variance No.	Variance Date	Variance Description	Significant? (Y or N)	Date Signed	Date Distributed	EPA/OEPA Approval
21120-PSP-0003-1	11/15/01	Documents the changes to Table 3-1 to reduce rinsate volume for metal and rad analyses and Table 3-3 and Appendix B to correct typographical errors.	Y	11/29/01	12/4/01	12/4/01
21120-PSP-0003-2	12/13/01	Documents changes/exceptions to a note at the bottom of Table 3-2 to raise the MDC for Tc-99 to 0.3 pCi/g in an attempt to reduce the excessive precipitation.	Y	12/17/01	12/19/01	12/19/01
21120-PSP-0003-3	1/2/02	Documents the submittal of previously collected archive samples in CU A9P1-C-1 for arsenic analysis.	Y	1/8/02	1/9/02	1/14/02
21120-PSP-0003-4	1/9/02	Documents the submittal of previously collected archive samples in CUs A9P1-C-14 and A9P1-C-15 for radium-226 analysis.	N	1/14/02	1/25/02	N/A
21120-PSP-0003-5	1/24/02	Cancelled	-	-	-	-
21120-PSP-0003-6	1/28/02	Documents the submittal of previously collected archive samples in CU A9PI-C-8 for radium-226 analysis.	N	1/29/02	1/30/02	N/A
21120-PSP-0003-7	2/6/02	Documents the submittal of previously collected archive samples in CU A9PI-C-12 for arsenic analysis.	N	2/6/02	2/7/02	N/A
21120-PSP-0003-8	2/6/02	Documents the submittal of previously collected archive samples in CU A9PI-C-10 for radium-226 analysis.	N	2/7/02	2/7/02	N/A
21120-PSP-0003-09	2/14/02	Documents the submittal of archive samples in CU A9PI-C-7 for beryllium analysis.	N	2/21/02	2/21/02	N/A
21120-PSP-0003-10	2/20/02	Documents the collection and submittal of additional random surface samples from CU 12 for arsenic, and CUs 6, 8, 10, 11, and 14 for radium-226. Also, includes collection and submittal of additional surface samples at the center point of all 20 CUs for aroclor-1260. Finally, includes subsurface samples for from CU 14 for radium-226 and for archive because it is impacted and has to be certified.	Y	2/20/02	2/25/02	2/25/02
21120-PSP-0003-11	5/8/02	Documents movement of three sample points greater than three feet from the original proposed locations.	N	5/9/02	5/9/02	N/A
21120-PSP-0003-12	7/31/02	Documents clarification of use of duplicate analyses and duplicate samples for gamma spectroscopy method to satisfy ASL D requirements stated in SCQ.	N	8/7/02	8/26/02	N/A

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VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-01
WBS NO.: PROJECT/DOCUMENT/ECDC #21120-PSP-0003 REV 0	Page 1 of 23
PROJECT TITLE: PSP for Area 9 Phase I Certification Sampling	Date 11/15/01

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents changes to Table 3-1, Table 3-~~3~~ 2 and Appendix B to the PSP.

The revised tables and appendix are attached; the changes are summarized as follows:

Table 3-1: reduced rinsate volume for metals and radiological analyses

Table 3-2: corrected Aroclor-1260 FRL to read, "0.04" rather than "0.004"

Appendix B: changed the "A" in the Location ID to a "V" to match the maps; corrected typographical errors in coordinates and sample IDs

Justification

Table 3-1: volume required for on site metals analysis can be taken from the 1 liter collected for on site radiological analysis. The onsite radiological volume can be reduced based on higher MDCs than originally requested.

Table 3-2: corrects error in originally issued PSP.

Appendix B: corrects errors and conforms to maps.

REQUESTED BY: Frank Miller Date: 11/15/01

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN	DATE
X	QUALITY ASSURANCE	11/29/01	X	PROJECT MANAGER	11/29/01
	DATA QUALITY MANAGEMENT		X	Characterization Manager	11/29/01
X	ANALYTICAL CUSTOMER SUPPORT	11/27/01	X	Sampling Manager	11/27/01

VARIANCE/FCN APPROVED [X]YES [ ]NO REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

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

ORIGINAL

TABLE 3-1
SAMPLING AND ANALYTICAL REQUIREMENTS

Analytes/TAL	Sample Matrix	Lab	ASL	Preserve	Holding Time	Volume Required	Container [a]
Radiological (except Sr-90)	Solid	On-site or off-site	D [b]	None	6 months	300 g	Plastic or Stainless Steel Core Liner or Glass or Plastic
Radiological (except Sr-90)	Liquid	On-site or off-site	D [b]	HNO_3 to pH<2; Cool to 4°C	6 months	1 liters	Polyethylene/ plastic
Metals	Solid	On-site or off-site	D [b]	Cool to 4°C	6 months	50 g	Glass or plastic
Metals	Liquid	On-site or off-site	D [b]	HNO_3 to pH<2; Cool to 4°C	6 months	*	Polyethylene/ plastic
Aroclor-1260	Solid	Off-site	D [b]	Cool to 4°C	14 days	120 g	Glass
Aroclor-1260	Liquid	Off-site	D [b]	Cool to 4°C	7 days	2 liters	Amber glass/ teflon lined lid
Strontium-90	Solid	Off-site	D [b]	None	6 months	100 g	Glass or plastic
Strontium-90	Liquid	Off-site	D [b]	HNO_3 to pH<2; Cool to 4°C	6 months	2 liters	Polyethylene/ plastic

[a] Sample container types may be changed at the direction of the Field Sampling Lead, as long as the volume requirements and SCQ requirements are met. Metals and Radiological samples may be collected in the same container as long and the volume requirements are met.

[b] Soil samples will be collected according to Analytical Support Level (ASL) D requirements. During analysis, the detection level for total uranium and thorium will be set at 10 percent of the FRL (i.e., analyses are considered ASL E).

* Volume required for metals analysis can be taken from the 1 liter collected for radiological analysis.

TABLE 3-2
TARGET ANALYTE LISTS
A9PICERT-A
(TAL A)

GAMMA SPECTROSCOPY ANALYSIS	
ASL E*	Total Uranium (FRL 50 mg/kg)
ASL E*	Radium-226 (FRL 1.5 pCi/g)
ASL E*	Radium-228 (FRL 1.4 pCi/g)
ASL E*	Thorium-228 (FRL 1.5 pCi/g)
ASL E*	Thorium-232 (FRL 1.4 pCi/g)
ASL E*	Cesium-137 (FRL 0.82 pCi/g)
GPC	
ASL E*	Technecium-99 (FRL 1.0 pCi/g)
ICP-AES or Graphite	
ASL E*	Arsenic (FRL 9.6 mg/kg)
ASL E*	Beryllium (FRL 0.62 mg/kg)
GC (off-site lab)	
ASL E*	Aroclor-1260 (FRL 0.04 mg/kg)
GPC (off-site lab)	
ASL E*	Strontium-90 (FRL 0.61 pCi/g)

* Analytical requirements will meet ASL D with a minimum detection level set at 10 percent of the FRL

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

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
1	1-1	0"-6"	A9P1-C-1-1-1-RM	TAL A	1352107.1	483623.77
		0"-6"	A9P1-C-1-1-1-R			
		0"-6"	A9P1-C-1-1-1-P			
	1-2V	0"-6"	A9P1-C-1-2-1-V	ARCHIVE	1352144.05	483581.23
	1-3	0"-6"	A9P1-C-1-3-1-RM	TAL A	1352173.12	483619.23
		0"-6"	A9P1-C-1-3-1-R			
		0"-6"	A9P1-C-1-3-1-P			
	1-4	0"-6"	A9P1-C-1-4-1-RM	TAL A	1352137.36	483546.77
		0"-6"	A9P1-C-1-4-1-R			
		0"-6"	A9P1-C-1-4-1-P			
	1-5V	0"-6"	A9P1-C-1-5-1-V	ARCHIVE	1352189.35	483552.91
	1-6	0"-6"	A9P1-C-1-6-1-RM	TAL A	1352103.52	483516.4
		0"-6"	A9P1-C-1-6-1-R			
		0"-6"	A9P1-C-1-6-1-P			
	1-7	0"-6"	A9P1-C-1-7-1-RM	TAL A	1352221.47	483503.55
		0"-6"	A9P1-C-1-7-1-R			
		0"-6"	A9P1-C-1-7-1-P			
	1-8	0"-6"	A9P1-C-1-8-1-RM	TAL A	1352114.67	483467.38
		0"-6"	A9P1-C-1-8-1-R			
		0"-6"	A9P1-C-1-8-1-P			
	1-9	0"-6"	A9P1-C-1-9-1-RM	TAL A	1352218.2	483456.24
		0"-6"	A9P1-C-1-9-1-R			
		0"-6"	A9P1-C-1-9-1-P			
	1-10	0"-6"	A9P1-C-1-10-1-RM	TAL A	1352133.45	483419.04
		0"-6"	A9P1-C-1-10-1-R			
		0"-6"	A9P1-C-1-10-1-P			
	1-11V	0"-6"	A9P1-C-1-11-1-V	ARCHIVE	1352170.54	483425.42
	1-12	0"-6"	A9P1-C-1-12-1-RM	TAL A	1352082.29	483352.84
		0"-6"	A9P1-C-1-12-1-R			
		0"-6"	A9P1-C-1-12-1-P			
	1-13D	0"-6"	A9P1-C-1-13-1-RM	TAL A	1352174.03	483387.89
		0"-6"	A9P1-C-1-13-1-R			
		0"-6"	A9P1-C-1-13-1-P			
		0"-6"	A9P1-C-1-13-1-RM-D	TAL A	1352174.03	483387.89
		0"-6"	A9P1-C-1-13-1-R-D			
		0"-6"	A9P1-C-1-13-1-P-D + D98			
	1-14	0"-6"	A9P1-C-1-14-1-RM	TAL A	1352100.95	483310.31
		0"-6"	A9P1-C-1-14-1-R			
		0"-6"	A9P1-C-1-14-1-P			
	1-15	0"-6"	A9P1-C-1-15-1-RM	TAL A	1352148.3	483294.73
		0"-6"	A9P1-C-1-15-1-R			
		0"-6"	A9P1-C-1-15-1-P			
	1-16V	0"-6"	A9P1-C-1-16-1-V	ARCHIVE	1352205.23	483328.18
2	2-1V	0"-6"	A9P1-C-2-1-1-V	ARCHIVE	1352116.81	483709.98
	2-2	0"-6"	A9P1-C-2-2-1-RM	TAL B	1352244.74	483695.44
		0"-6"	A9P1-C-2-2-1-P			
	2-3	0"-6"	A9P1-C-2-3-1-RM	TAL B	1352346.53	483696.13
		0"-6"	A9P1-C-2-3-1-P			
	2-4	0"-6"	A9P1-C-2-4-1-RM	TAL B	1352410.84	483690.68
		0"-6"	A9P1-C-2-4-1-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
2 (cont.)	2-5	0"-6"	A9P1-C-2-5-1-RM	TAL B	1352529.01	483670.79
		0"-6"	A9P1-C-2-5-1-P			
	2-6V	0"-6"	A9P1-C-2-6-1-V	ARCHIVE	1352705.58	483676.05
	2-7	0"-6"	A9P1-C-2-7-1-RM	TAL B	1352777.55	483695.51
		0"-6"	A9P1-C-2-7-1-P			
	2-8	0"-6"	A9P1-C-2-8-1-RM	TAL B	1352859.93	483685.51
		0"-6"	A9P1-C-2-8-1-P			
	2-9	0"-6"	A9P1-C-2-9-1-RM	TAL B	1352349.09	483591.5
		0"-6"	A9P1-C-2-9-1-P			
	2-10V	0"-6"	A9P1-C-2-10-1-V	ARCHIVE	1352421.54	483634.27
	2-11	0"-6"	A9P1-C-2-11-1-RM	TAL B	1352453.9	483540.1
		0"-6"	A9P1-C-2-11-1-P			
	2-12	0"-6"	A9P1-C-2-12-1-RM	TAL B	1352530.1	483480.51
		0"-6"	A9P1-C-2-12-1-P			
	2-13D	0"-6"	A9P1-C-2-13-1-RM	TAL B	1352576.3	483591.64
		0"-6"	A9P1-C-2-13-1-P			
		0"-6"	A9P1-C-2-13-1-RM-D	TAL B	1352576.3	483591.64
		0"-6"	A9P1-C-2-13-1-P-D			
	2-14	0"-6"	A9P1-C-2-14-1-RM	TAL B	1352681.91	483487.81
		0"-6"	A9P1-C-2-14-1-P			
	2-15	0"-6"	A9P1-C-2-15-1-RM	TAL B	1352706.31	483542.98
		0"-6"	A9P1-C-2-15-1-P			
	2-16V	0"-6"	A9P1-C-2-16-1-V	ARCHIVE	1352775.73	483513.53
3	3-1	0"-6"	A9P1-C-3-1-1-RM	TAL B	1352288.09	483470.47
		0"-6"	A9P1-C-3-1-1-P			
	3-2V	0"-6"	A9P1-C-3-2-1-V	ARCHIVE	1352252.89	483382.78
	3-3	0"-6"	A9P1-C-3-3-1-RM	TAL B	1352324.55	483440.22
		0"-6"	A9P1-C-3-3-1-P			
	3-4	0"-6"	A9P1-C-3-4-1-RM	TAL B	1352500.57	483439.22
		0"-6"	A9P1-C-3-4-1-P			
	3-5	0"-6"	A9P1-C-3-5-1-RM	TAL B	1352629.7	483477.91
		0"-6"	A9P1-C-3-5-1-P			
	3-6	0"-6"	A9P1-C-3-6-1-RM	TAL B	1352766.31	483438.46
		0"-6"	A9P1-C-3-6-1-P			
	3-7	0"-6"	A9P1-C-3-7-1-RM	TAL B	1352839.18	483397.98
		0"-6"	A9P1-C-3-7-1-P			
	3-8V	0"-6"	A9P1-C-3-8-1-V	ARCHIVE	1352246.85	483310.33
	3-9	0"-6"	A9P1-C-3-9-1-RM	TAL B	1352349.8	483325.58
		0"-6"	A9P1-C-3-9-1-P			
	3-10	0"-6"	A9P1-C-3-10-1-RM	TAL B	1352416.18	483362.9
		0"-6"	A9P1-C-3-10-1-P			
	3-11	0"-6"	A9P1-C-3-11-1-RM	TAL B	1352483.63	483361.65
		0"-6"	A9P1-C-3-11-1-P			
	3-12V	0"-6"	A9P1-C-3-12-1-V	ARCHIVE	1352559.17	483329.93
	3-13	0"-6"	A9P1-C-3-13-1-RM	TAL B	1352614.53	483354.39
		0"-6"	A9P1-C-3-13-1-P			
	3-14	0"-6"	A9P1-C-3-14-1-RM	TAL B	1352675.67	483323.8
		0"-6"	A9P1-C-3-14-1-P			
	3-15V	0"-6"	A9P1-C-3-15-1-V	ARCHIVE	1352756.67	483324.5

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
3 (cont.)	3-16D	0"-6"	A9P1-C-3-16-1-RM	TAL B	1352797.05	483271.61
		0"-6"	A9P1-C-3-16-1-P			
		0"-6"	A9P1-C-3-16-1-RM-D	TAL B	1352797.05	483271.61
		0"-6"	A9P1-C-3-16-1-P-D			
4	4-1	0"-6"	A9P1-C-4-1-1-RM	TAL B	1352729.31	483203.48
		0"-6"	A9P1-C-4-1-1-P			
	4-2	0"-6"	A9P1-C-4-2-1-RM	TAL B	1352759.77	483157.19
		0"-6"	A9P1-C-4-2-1-P			
	4-3V	0"-6"	A9P1-C-4-3-1-V	ARCHIVE	1352781.49	483095.78
	4-4	0"-6"	A9P1-C-4-4-1-RM	TAL B	1352824.55	483209.97
		0"-6"	A9P1-C-4-4-1-P			
	4-5V	0"-6"	A9P1-C-4-5-1-V	ARCHIVE	1352719.29	483059.6
	4-6D	0"-6"	A9P1-C-4-6-1-RM	TAL B	1352750.25	483045.39
		0"-6"	A9P1-C-4-6-1-P			
		0"-6"	A9P1-C-4-6-1-RM-D	TAL B	1352750.25	483045.39
		0"-6"	A9P1-C-4-6-1-P-D			
	4-7	0"-6"	A9P1-C-4-7-1-RM	TAL B	1352785.07	483060.06
		0"-6"	A9P1-C-4-7-1-P			
	4-8	0"-6"	A9P1-C-4-8-1-RM	TAL B	1352800.23	483015.6
		0"-6"	A9P1-C-4-8-1-P			
	4-9V	0"-6"	A9P1-C-4-9-1-V	ARCHIVE	1352693.44	482913.9
	4-10	0"-6"	A9P1-C-4-10-1-RM	TAL B	1352726.59	482851.92
		0"-6"	A9P1-C-4-10-1-P			
	4-11	0"-6"	A9P1-C-4-11-1-RM	TAL B	1352769.43	482914.48
		0"-6"	A9P1-C-4-11-1-P			
	4-12	0"-6"	A9P1-C-4-12-1-RM	TAL B	1352795.76	482883.77
		0"-6"	A9P1-C-4-12-1-P			
	4-13V	0"-6"	A9P1-C-4-13-1-V	ARCHIVE	1352678	482646.05
	4-14	0"-6"	A9P1-C-4-14-1-RM	TAL B	1352699.89	482692.46
		0"-6"	A9P1-C-4-14-1-P			
	4-15	0"-6"	A9P1-C-4-15-1-RM	TAL B	1352726.79	482650.27
		0"-6"	A9P1-C-4-15-1-P			
	4-16	0"-6"	A9P1-C-4-16-1-RM	TAL B	1352764.05	482732.39
		0"-6"	A9P1-C-4-16-1-P+D268			
5	5-1V	0"-12"	A9P1-C-5-1-2-V	ARCHIVE	1352373.42	483131.89
		12"-36"	A9P1-C-5-1-3-RM	TAL B		
		12"-36"	A9P1-C-5-1-3-P			
	5-2	0"-12"	A9P1-C-5-2-2-RM	TAL B	1352475.02	483114.28
		0"-12"	A9P1-C-5-2-2-P			
	5-3	0"-12"	A9P1-C-5-3-2-RM	TAL B	1352598.71	483155.69
		0"-12"	A9P1-C-5-3-2-P			
	5-4D	0"-12"	A9P1-C-5-4-2-RM	TAL B	1352644.23	483101.79
		0"-12"	A9P1-C-5-4-2-P			
		0"-12"	A9P1-C-5-4-2-RM-D	TAL B	1352644.23	483101.79
		0"-12"	A9P1-C-5-4-2-P-D			
	5-5	0"-12"	A9P1-C-5-5-2-RM	TAL B	1352368.64	482961.29
		0"-12"	A9P1-C-5-5-2-P			
	5-6	0"-12"	A9P1-C-5-6-2-RM	TAL B	1352471.09	483032.27
		0"-12"	A9P1-C-5-6-2-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
5 (cont.)	5-7	0"-12"	A9P1-C-5-7-2-RM	TAL B	1352573.42	483060.15
		0"-12"	A9P1-C-5-7-2-P			
	5-8V	0"-12"	A9P1-C-5-8-2-V	ARCHIVE	1352608.19	482987.25
		12"-36"	A9P1-C-5-8-3-RM	TAL B		
		12"-36"	A9P1-C-5-8-3-P			
	5-9	0"-12"	A9P1-C-5-9-2-RM	TAL B	1352358.14	482829.35
		0"-12"	A9P1-C-5-9-2-P			
	5-10	0"-12"	A9P1-C-5-10-2-RM	TAL B	1352451.61	482905.91
		0"-12"	A9P1-C-5-10-2-P			
	5-11V	0"-12"	A9P1-C-5-11-2-V	ARCHIVE	1352548.69	482836.88
		12"-36"	A9P1-C-5-11-3-RM	TAL B		
		12"-36"	A9P1-C-5-11-3-P			
	5-12	0"-12"	A9P1-C-5-12-2-RM	TAL B	1352633.15	482800.95
		0"-12"	A9P1-C-5-12-2-P			
	5-13	0"-12"	A9P1-C-5-13-2-RM	TAL B	1352329.06	482684.45
		0"-12"	A9P1-C-5-13-2-P			
	5-14	0"-12"	A9P1-C-5-14-2-RM	TAL B	1352387.79	482704.13
		0"-12"	A9P1-C-5-14-2-P			
	5-15V	0"-12"	A9P1-C-5-15-2-V	ARCHIVE	1352557.27	482696.76
		12"-36"	A9P1-C-5-15-3-RM	TAL B		
		12"-36"	A9P1-C-5-15-3-P			
	5-16	0"-12"	A9P1-C-5-16-2-RM	TAL B	1352637.07	482667.88
		0"-12"	A9P1-C-5-16-2-P			
6	6-1	0"-12"	A9P1-C-6-1-2-RM	TAL B	1352187.75	482551.9
		0"-12"	A9P1-C-6-1-2-P			
	6-2	0"-12"	A9P1-C-6-2-2-RM	TAL B	1352270.26	482604.21
		0"-12"	A9P1-C-6-2-2-P			
	6-3	0"-12"	A9P1-C-6-3-2-RM	TAL B	1352427.6	482538.38
		0"-12"	A9P1-C-6-3-2-P			
	6-4V	0"-12"	A9P1-C-6-4-2-V	ARCHIVE	1352537.1	482595.22
		12"-36"	A9P1-C-6-4-3-RM	TAL B		
		12"-36"	A9P1-C-6-4-3-P			
	6-5	0"-12"	A9P1-C-6-5-2-RM	TAL B	1352180.32	482450.62
		0"-12"	A9P1-C-6-5-2-P			
	6-6V	0"-12"	A9P1-C-6-6-2-V	ARCHIVE	1352265.2	482496.13
		12"-36"	A9P1-C-6-6-3-RM	TAL B		
		12"-36"	A9P1-C-6-6-3-P			
	6-7	0"-12"	A9P1-C-6-7-2-RM	TAL B	1352408.89	482473.11
		0"-12"	A9P1-C-6-7-2-P			
	6-8	0"-12"	A9P1-C-6-8-2-RM	TAL B	1352499.14	482422.29
		0"-12"	A9P1-C-6-8-2-P			
	6-9D	0"-12"	A9P1-C-6-9-2-RM	TAL B	1352150.12	482285.92
		0"-12"	A9P1-C-6-9-2-P			
		0"-12"	A9P1-C-6-9-2-RM-D	TAL B	1352150.12	482285.92
		0"-12"	A9P1-C-6-9-2-P-D			
	6-10	0"-12"	A9P1-C-6-10-2-RM	TAL B	1352282.44	482296.45
		0"-12"	A9P1-C-6-10-2-P			
	6-11	0"-12"	A9P1-C-6-11-2-RM	TAL B	1352449.38	482352.49
		0"-12"	A9P1-C-6-11-2-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
6 (cont.)	6-12V	0"-12"	A9P1-C-6-12-2-V	ARCHIVE	1352567.38	482301.26
		12"-36"	A9P1-C-6-12-3-RM	TAL B		
		12"-36"	A9P1-C-6-12-3-P			
	6-13	0"-12"	A9P1-C-6-13-2-RM	TAL B	1352172.21	482201.11
		0"-12"	A9P1-C-6-13-2-P			
	6-14V	0"-12"	A9P1-C-6-14-2-V	ARCHIVE	1352278.09	482180.55
		12"-36"	A9P1-C-6-14-3-RM	TAL B		
		12"-36"	A9P1-C-6-14-3-P			
	6-15	0"-12"	A9P1-C-6-15-2-RM	TAL B	1352425.71	482172.97
		0"-12"	A9P1-C-6-15-2-P			
	6-16	0"-12"	A9P1-C-6-16-2-RM	TAL B	1352519.49	482168.88
		0"-12"	A9P1-C-6-16-2-P			
7	7-1	0"-12"	A9P1-C-7-1-2-RM	TAL B	1352203.99	482119.8
		0"-12"	A9P1-C-7-1-2-P			
	7-2	0"-12"	A9P1-C-7-2-2-RM	TAL B	1352343.51	482065.49
		0"-12"	A9P1-C-7-2-2-P			
	7-3V	0"-12"	A9P1-C-7-3-2-V	ARCHIVE	1352458.12	482122.96
		12"-36"	A9P1-C-7-3-3-RM	TAL B		
		12"-36"	A9P1-C-7-3-3-P			
	7-4	0"-12"	A9P1-C-7-4-2-RM	TAL B	1352550.04	482099.72
		0"-12"	A9P1-C-7-4-2-P			
	7-5V	0"-12"	A9P1-C-7-5-2-RM	ARCHIVE	1352121.11	482010.06
		12"-36"	A9P1-C-7-5-3-V	TAL B		
		12"-36"	A9P1-C-7-5-3-P			
	7-6	0"-12"	A9P1-C-7-6-2-RM	TAL B	1352264.93	481947.51
		0"-12"	A9P1-C-7-6-2-P			
	7-7	0"-12"	A9P1-C-7-7-2-RM	TAL B	1352442.56	481937.88
		0"-12"	A9P1-C-7-7-2-P			
	7-8	0"-12"	A9P1-C-7-8-2-RM	TAL B	1352507.15	482019.63
		0"-12"	A9P1-C-7-8-2-P			
	7-9	0"-12"	A9P1-C-7-9-2-RM	TAL B	1352124.68	481883.45
		0"-12"	A9P1-C-7-9-2-P			
	7-10	0"-12"	A9P1-C-7-10-2-RM	TAL B	1352253.53	481819.87
		0"-12"	A9P1-C-7-10-2-P			
	7-11V	0"-12"	A9P1-C-7-11-2-V	ARCHIVE	1352360.69	481897.72
		12"-36"	A9P1-C-7-11-3-RM	TAL B		
		12"-36"	A9P1-C-7-11-3-P			
	7-12	0"-12"	A9P1-C-7-12-2-RM	TAL B	1352528.03	481875.73
		0"-12"	A9P1-C-7-12-2-P			
	7-13D	0"-12"	A9P1-C-7-13-2-RM	TAL B	1352154.13	481788.56
		0"-12"	A9P1-C-7-13-2-P			
		0"-12"	A9P1-C-7-13-2-RM-D	TAL B	1352154.13	481788.56
		0"-12"	A9P1-C-7-13-2-P-D			
	7-14V	0"-12"	A9P1-C-7-14-2-V	ARCHIVE	1352258.8	481710.56
		12"-36"	A9P1-C-7-14-3-RM	TAL B		
		12"-36"	A9P1-C-7-14-3-P			
	7-15	0"-12"	A9P1-C-7-15-2-RM	TAL B	1352401.11	481723.36
		0"-12"	A9P1-C-7-15-2-P			
	7-16	0"-12"	A9P1-C-7-16-2-RM	TAL B	1352486.06	481777.94
		0"-12"	A9P1-C-7-16-2-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
8	8-1	0"-12"	A9P1-C-8-1-2-RM	TAL B	1352189.53	481579
		0"-12"	A9P1-C-8-1-2-P			
	8-2V	0"-12"	A9P1-C-8-2-2-V	ARCHIVE	1352320.73	481617.74
		12"-36"	A9P1-C-8-2-3-RM	TAL B		
		12"-36"	A9P1-C-8-2-3-P			
	8-3	0"-12"	A9P1-C-8-3-2-RM	TAL B	1352413.27	481601.91
		0"-12"	A9P1-C-8-3-2-P			
	8-4D	0"-12"	A9P1-C-8-4-2-RM	TAL B	1352486.57	481599.87
		0"-12"	A9P1-C-8-4-2-P			
		0"-12"	A9P1-C-8-4-2-RM-D	TAL B	1352486.57	481599.87
		0"-12"	A9P1-C-8-4-2-P-D			
	8-5V	0"-12"	A9P1-C-8-5-2-V	ARCHIVE	1352198.93	481498.1
		12"-36"	A9P1-C-8-5-3-RM	TAL B		
		12"-36"	A9P1-C-8-5-3-P			
	8-6	0"-12"	A9P1-C-8-6-2-RM	TAL B	1352315.76	481485.36
		0"-12"	A9P1-C-8-6-2-P			
	8-7	0"-12"	A9P1-C-8-7-2-RM	TAL B	1352405.58	481472.21
		0"-12"	A9P1-C-8-7-2-P			
	8-8	0"-12"	A9P1-C-8-8-2-RM	TAL B	1352475.61	481507.43
		0"-12"	A9P1-C-8-8-2-P			
	8-9	0"-12"	A9P1-C-8-9-2-RM	TAL B	1352214.44	481425.02
		0"-12"	A9P1-C-8-9-2-P			
	8-10	0"-12"	A9P1-C-8-10-2-RM	TAL B	1352297.47	481335.49
		0"-12"	A9P1-C-8-10-2-P			
	8-11V	0"-12"	A9P1-C-8-11-2-V	ARCHIVE	1352415.62	481365.99
		12"-36"	A9P1-C-8-11-3-RM	TAL B		
		12"-36"	A9P1-C-8-11-3-P			
	8-12	0"-12"	A9P1-C-8-12-2-RM	TAL B	1352477.5	481440.12
		0"-12"	A9P1-C-8-12-2-P			
	8-13	0"-12"	A9P1-C-8-13-2-RM	TAL B	1352179.51	481264.44
		0"-12"	A9P1-C-8-13-2-P			
	8-14V	0"-12"	A9P1-C-8-14-2-V	ARCHIVE	1352266.58	481248.61
		12"-36"	A9P1-C-8-14-3-RM	TAL B		
		12"-36"	A9P1-C-8-14-3-P			
	8-15	0"-12"	A9P1-C-8-15-2-RM	TAL B	1352384.23	481286.73
		0"-12"	A9P1-C-8-15-2-P			
	8-16	0"-12"	A9P1-C-8-16-2-RM	TAL B	1352493.9	481259.99
		0"-12"	A9P1-C-8-16-2-P			
9	9-1	0"-12"	A9P1-C-9-1-2-RM	TAL B	1352153.85	481181.26
		0"-12"	A9P1-C-9-1-2-P			
	9-2	0"-12"	A9P1-C-9-2-2-RM	TAL B	1352250.27	481185.41
		0"-12"	A9P1-C-9-2-2-P			
	9-3	0"-12"	A9P1-C-9-3-2-RM	TAL B	1352377.51	481179.88
		0"-12"	A9P1-C-9-3-2-P			
	9-4V	0"-12"	A9P1-C-9-4-2-V	ARCHIVE	1352490.57	481130.5
		12"-36"	A9P1-C-9-4-3-RM	TAL B		
		12"-36"	A9P1-C-9-4-3-P			
	9-5	0"-12"	A9P1-C-9-5-2-RM	TAL B	1352129.9	481034.68
		0"-12"	A9P1-C-9-5-2-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
9 (cont.)	9-6V	0"-12"	A9P1-C-9-6-2-V	ARCHIVE	1352229.08	481059.62
		12"-36"	A9P1-C-9-6-3-RM	TAL B		
		12"-36"	A9P1-C-9-6-3-P			
	9-7	0"-12"	A9P1-C-9-7-2-RM	TAL B	1352353.1	481053.89
		0"-12"	A9P1-C-9-7-2-P			
	9-8	0"-12"	A9P1-C-9-8-2-RM	TAL B	1352521.18	481019.55
		0"-12"	A9P1-C-9-8-2-P			
	9-9V	0"-12"	A9P1-C-9-9-2-V	ARCHIVE	1352112.05	480837.67
		12"-36"	A9P1-C-9-9-3-RM	TAL B		
		12"-36"	A9P1-C-9-9-3-P			
	9-10	0"-12"	A9P1-C-9-10-2-RM	TAL B	1352257.56	480872.5
		0"-12"	A9P1-C-9-10-2-P			
	9-11D	0"-12"	A9P1-C-9-11-2-RM	TAL B	1352424.91	480912.27
		0"-12"	A9P1-C-9-11-2-P			
		0"-12"	A9P1-C-9-11-2-RM-D	TAL B	1352424.91	480912.27
		0"-12"	A9P1-C-9-11-2-P-D			
	9-12	0"-12"	A9P1-C-9-12-2-RM	TAL B	1352522.37	480901.18
		0"-12"	A9P1-C-9-12-2-P			
	9-13V	0"-12"	A9P1-C-9-13-2-V	ARCHIVE	1352168.47	480801.25
		12"-36"	A9P1-C-9-13-3-RM	TAL B		
		12"-36"	A9P1-C-9-13-3-P			
	9-14	0"-12"	A9P1-C-9-14-2-RM	TAL B	1352329.26	480808.91
		0"-12"	A9P1-C-9-14-2-P			
	9-15	0"-12"	A9P1-C-9-15-2-RM	TAL B	1352443.2	480723.3
		0"-12"	A9P1-C-9-15-2-P			
	9-16	0"-12"	A9P1-C-9-16-2-RM	TAL B	1352556.78	480811.44
		0"-12"	A9P1-C-9-16-2-P			
10	10-1V	0"-12"	A9P1-C-10-1-2-V	ARCHIVE	1351862.4	480965.6
		12"-36"	A9P1-C-10-1-3-RM	TAL A		
		12"-36"	A9P1-C-10-1-3-R			
		12"-36"	A9P1-C-10-1-3-P			
	10-2	0"-12"	A9P1-C-10-2-2-RM	TAL A	1351906.41	480994.89
		0"-12"	A9P1-C-10-2-2-R			
		0"-12"	A9P1-C-10-2-2-P			
	10-3	0"-12"	A9P1-C-10-3-2-RM	TAL A	1351979.04	480971.44
		0"-12"	A9P1-C-10-3-2-R			
		0"-12"	A9P1-C-10-3-2-P			
	10-4	0"-12"	A9P1-C-10-4-2-RM	TAL A	1352075.64	480985.26
		0"-12"	A9P1-C-10-4-2-R			
		0"-12"	A9P1-C-10-4-2-P			
	10-5	0"-12"	A9P1-C-10-5-2-RM	TAL A	1351895.3	480934.8
		0"-12"	A9P1-C-10-5-2-R			
		0"-12"	A9P1-C-10-5-2-P			
	10-6V	0"-12"	A9P1-C-10-6-2-V	ARCHIVE	1351926.25	480943.02
		12"-36"	A9P1-C-10-6-3-RM	TAL A		
		12"-36"	A9P1-C-10-6-3-R			
		12"-36"	A9P1-C-10-6-3-P			
	10-7	0"-12"	A9P1-C-10-7-2-RM	TAL A	1351996.1	480923
		0"-12"	A9P1-C-10-7-2-R			
		0"-12"	A9P1-C-10-7-2-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
10 (cont.)	10-8	0"-12"	A9P1-C-10-8-2-RM	TAL A	1352068.1	480955.3
		0"-12"	A9P1-C-10-8-2-R			
		0"-12"	A9P1-C-10-8-2-P			
	10-9	0"-12"	A9P1-C-10-9-2-RM	TAL A	1352080.98	480915.89
		0"-12"	A9P1-C-10-9-2-R			
		0"-12"	A9P1-C-10-9-2-P			
	10-10	0"-12"	A9P1-C-10-10-2-RM	TAL A	1351891.45	480856.76
		0"-12"	A9P1-C-10-10-2-R			
		0"-12"	A9P1-C-10-10-2-P			
	10-11V	0"-12"	A9P1-C-10-11-2-V	ARCHIVE	1351954.38	480917.3
		12"-36"	A9P1-C-10-11-3-RM	TAL A		
		12"-36"	A9P1-C-10-11-3-R			
		12"-36"	A9P1-C-10-11-3-P			
	10-12D	0"-12"	A9P1-C-10-12-2-RM	TAL A	1352019.62	480891.99
		0"-12"	A9P1-C-10-12-2-R			
		0"-12"	A9P1-C-10-12-2-P			
		0"-12"	A9P1-C-10-12-2-RM-D	TAL A	1352019.62	480891.99
		0"-12"	A9P1-C-10-12-2-R-D			
		0"-12"	A9P1-C-10-12-2-P-D			
	10-13V	0"-12"	A9P1-C-10-13-2-V	ARCHIVE	1352057.51	480857.65
		12"-36"	A9P1-C-10-13-3-RM	TAL A		
		12"-36"	A9P1-C-10-13-3-R			
		12"-36"	A9P1-C-10-13-3-P			
	10-14	0"-12"	A9P1-C-10-14-2-RM	TAL A	1351928.25	480866.12
		0"-12"	A9P1-C-10-14-2-R			
		0"-12"	A9P1-C-10-14-2-P			
	10-15	0"-12"	A9P1-C-10-15-2-RM	TAL A	1352016.24	480837.44
		0"-12"	A9P1-C-10-15-2-R			
		0"-12"	A9P1-C-10-15-2-P			
	10-16	0"-12"	A9P1-C-10-16-2-RM	TAL A	1352056.74	480829.63
		0"-12"	A9P1-C-10-16-2-R			
		0"-12"	A9P1-C-10-16-2-P			
11	11-1	0"-12"	A9P1-C-11-1-2-RM	TAL A	1351851.91	481181.6
		0"-12"	A9P1-C-11-1-2-R			
		0"-12"	A9P1-C-11-1-2-P			
	11-2	0"-12"	A9P1-C-11-2-2-RM	TAL A	1351930.03	481175.24
		0"-12"	A9P1-C-11-2-2-R			
		0"-12"	A9P1-C-11-2-2-P			
	11-3	0"-12"	A9P1-C-11-3-2-RM	TAL A	1351994.38	481175.85
		0"-12"	A9P1-C-11-3-2-R			
		0"-12"	A9P1-C-11-3-2-P			
	11-4V	0"-12"	A9P1-C-11-4-2-V	ARCHIVE	1352039.9	481189.67
		12"-36"	A9P1-C-11-4-3-RM	TAL A		
		12"-36"	A9P1-C-11-4-3-R			
		12"-36"	A9P1-C-11-4-3-P			
	11-5	0"-12"	A9P1-C-11-5-2-RM	TAL A	1351853.97	481139.81
		0"-12"	A9P1-C-11-5-2-R			
		0"-12"	A9P1-C-11-5-2-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
11 (cont.)	11-6V	0"-12"	A9P1-C-11-6-2-V	ARCHIVE	1351912.67	481146.82
		12"-36"	A9P1-C-11-6-3-RM	TAL A		
		12"-36"	A9P1-C-11-6-3-R			
		12"-36"	A9P1-C-11-6-3-P			
	11-7	0"-12"	A9P1-C-11-7-2-RM	TAL A	1352001.59	481126.05
		0"-12"	A9P1-C-11-7-2-R			
		0"-12"	A9P1-C-11-7-2-P			
	11-8	0"-12"	A9P1-C-11-8-2-RM	TAL A	1352082.66	481118.46
		0"-12"	A9P1-C-11-8-2-R			
		0"-12"	A9P1-C-11-8-2-P			
	11-9V	0"-12"	A9P1-C-11-9-2-V	ARCHIVE	1351871.25	481077.46
		12"-36"	A9P1-C-11-9-3-RM	TAL A		
		12"-36"	A9P1-C-11-9-3-R			
		12"-36"	A9P1-C-11-9-3-P			
	11-10	0"-12"	A9P1-C-11-10-2-RM	TAL A	1351927.63	481065.52
		0"-12"	A9P1-C-11-10-2-R			
		0"-12"	A9P1-C-11-10-2-P			
	11-11	0"-12"	A9P1-C-11-11-2-RM	TAL A	1352019.2	481088.8
		0"-12"	A9P1-C-11-11-2-R			
		0"-12"	A9P1-C-11-11-2-P			
	11-12	0"-12"	A9P1-C-11-12-2-RM	TAL A	1352070.8	481092.52
		0"-12"	A9P1-C-11-12-2-R			
		0"-12"	A9P1-C-11-12-2-P			
	11-13	0"-12"	A9P1-C-11-13-2-RM	TAL A	1351881.36	481018.06
		0"-12"	A9P1-C-11-13-2-R			
		0"-12"	A9P1-C-11-13-2-P			
	11-14V	0"-12"	A9P1-C-11-14-2-V	ARCHIVE	1351957.5	481042.4
		12"-36"	A9P1-C-11-14-3-RM	TAL A		
		12"-36"	A9P1-C-11-14-3-R			
		12"-36"	A9P1-C-11-14-3-P			
	11-15	0"-12"	A9P1-C-11-15-2-RM	TAL A	1352011.23	481045.98
		0"-12"	A9P1-C-11-15-2-R			
		0"-12"	A9P1-C-11-15-2-P			
	11-16D	0"-12"	A9P1-C-11-16-2-RM	TAL A	1352037.58	481019.63
		0"-12"	A9P1-C-11-16-2-R			
		0"-12"	A9P1-C-11-16-2-P			
		0"-12"	A9P1-C-11-16-2-RM-D	TAL A	1352037.58	481019.63
		0"-12"	A9P1-C-11-16-2-R-D			
		0"-12"	A9P1-C-11-16-2-P-D			
12	12-1	0"-12"	A9P1-C-12-1-2-RM	TAL A	1351904.09	481404.97
		0"-12"	A9P1-C-12-1-2-R			
		0"-12"	A9P1-C-12-1-2-P			
	12-2	0"-12"	A9P1-C-12-2-2-RM	TAL A	1351947.36	481428.66
		0"-12"	A9P1-C-12-2-2-R			
		0"-12"	A9P1-C-12-2-2-P			
	12-3V	0"-12"	A9P1-C-12-3-2-V	ARCHIVE	1351982.73	481432.78
		12"-36"	A9P1-C-12-3-3-RM	TAL A		
		12"-36"	A9P1-C-12-3-3-R			
		12"-36"	A9P1-C-12-3-3-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
12 (cont.)	12-4	0"-12"	A9P1-C-12-4-2-RM	TAL A	1352041.83	481417.36
		0"-12"	A9P1-C-12-4-2-R			
		0"-12"	A9P1-C-12-4-2-P			
	12-5V	0"-12"	A9P1-C-12-5-2-V	ARCHIVE	1351875.09	481379.85
		12"-36"	A9P1-C-12-5-3-RM	TAL A		
		12"-36"	A9P1-C-12-5-3-R			
		12"-36"	A9P1-C-12-5-3-P			
	12-6D	0"-12"	A9P1-C-12-6-2-RM	TAL A	1351927.85	481351.04
		0"-12"	A9P1-C-12-6-2-R			
		0"-12"	A9P1-C-12-6-2-P			
		0"-12"	A9P1-C-12-6-2-RM-D	TAL A	1351927.85	481351.04
		0"-12"	A9P1-C-12-6-2-R-D			
		0"-12"	A9P1-C-12-6-2-P-D			
	12-7	0"-12"	A9P1-C-12-7-2-RM	TAL A	1351991.57	481356.62
		0"-12"	A9P1-C-12-7-2-R			
		0"-12"	A9P1-C-12-7-2-P			
	12-8	0"-12"	A9P1-C-12-8-2-RM	TAL A	1352052.49	481351.07
		0"-12"	A9P1-C-12-8-2-R			
		0"-12"	A9P1-C-12-8-2-P			
	12-9	0"-12"	A9P1-C-12-9-2-RM	TAL A	1351893.22	481287.42
		0"-12"	A9P1-C-12-9-2-R			
		0"-12"	A9P1-C-12-9-2-P			
	12-10	0"-12"	A9P1-C-12-10-2-RM	TAL A	1351942.44	481274.05
		0"-12"	A9P1-C-12-10-2-R			
		0"-12"	A9P1-C-12-10-2-P			
	12-11V	0"-12"	A9P1-C-12-11-2-V	ARCHIVE	1352007.1	481282.92
		12"-36"	A9P1-C-12-11-3-R	TAL A		
		12"-36"	A9P1-C-12-11-3-P			
		12"-36"	A9P1-C-12-11-3-P			
	12-12	0"-12"	A9P1-C-12-12-2-RM	TAL A	1352040.51	481292.61
		0"-12"	A9P1-C-12-12-2-R			
		0"-12"	A9P1-C-12-12-2-P			
	12-13	0"-12"	A9P1-C-12-13-2-RM	TAL A	1351873.69	481233.09
		0"-12"	A9P1-C-12-13-2-R			
		0"-12"	A9P1-C-12-13-2-P			
	12-14	0"-12"	A9P1-C-12-14-2-RM	TAL A	1351951.83	481229.38
		0"-12"	A9P1-C-12-14-2-R			
		0"-12"	A9P1-C-12-14-2-P			
	12-15	0"-12"	A9P1-C-12-15-2-RM	TAL A	1351998.75	481226.92
		0"-12"	A9P1-C-12-15-2-R			
		0"-12"	A9P1-C-12-15-2-P			
	12-16V	0"-12"	A9P1-C-12-16-2-V	ARCHIVE	1352049.08	481218.91
		12"-36"	A9P1-C-12-16-3-RM	TAL A		
		12"-36"	A9P1-C-12-16-3-R			
		12"-36"	A9P1-C-12-16-3-P			
13	13-1V	0"-12"	A9P1-C-13-1-2-V	ARCHIVE	1351880.79	481669.91
		12"-36"	A9P1-C-13-1-3-RM	TAL A		
		12"-36"	A9P1-C-13-1-3-R			
		12"-36"	A9P1-C-13-1-3-P			

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CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
13 (cont.)	13-2	0"-12"	A9P1-C-13-2-2-RM	TAL A	1351917.65	481642.54
		0"-12"	A9P1-C-13-2-2-R			
		0"-12"	A9P1-C-13-2-2-P			
	13-3	0"-12"	A9P1-C-13-3-2-RM	TAL A	1352009.04	481683.74
		0"-12"	A9P1-C-13-3-2-R			
		0"-12"	A9P1-C-13-3-2-P			
	13-4	0"-12"	A9P1-C-13-4-2-RM	TAL A	1352044.68	481661.72
		0"-12"	A9P1-C-13-4-2-R			
		0"-12"	A9P1-C-13-4-2-P			
	13-5	0"-12"	A9P1-C-13-5-2-RM	TAL A	1351856.3	481582.82
		0"-12"	A9P1-C-13-5-2-R			
		0"-12"	A9P1-C-13-5-2-P			
	13-6V	0"-12"	A9P1-C-13-6-2-V	ARCHIVE	1351922.48	481599.52
		12"-36"	A9P1-C-13-6-3-RM	TAL A		
		12"-36"	A9P1-C-13-6-3-R			
		12"-36"	A9P1-C-13-6-3-P			
	13-7	0"-12"	A9P1-C-13-7-2-RM	TAL A	1352008.37	481602.21
		0"-12"	A9P1-C-13-7-2-R			
		0"-12"	A9P1-C-13-7-2-P			
	13-8	0"-12"	A9P1-C-13-8-2-RM	TAL A	1352085.63	481595.03
		0"-12"	A9P1-C-13-8-2-R			
		0"-12"	A9P1-C-13-8-2-P			
	13-9D	0"-12"	A9P1-C-13-9-2-RM	TAL A	1351859.71	481563.68
		0"-12"	A9P1-C-13-9-2-R			
		0"-12"	A9P1-C-13-9-2-P			
		0"-12"	A9P1-C-13-9-2-RM-D	TAL A	1351859.71	481563.68
		0"-12"	A9P1-C-13-9-2-R-D			
		0"-12"	A9P1-C-13-9-2-P-D			
	13-10	0"-12"	A9P1-C-13-10-2-RM	TAL A	1351957.75	481549.29
		0"-12"	A9P1-C-13-10-2-R			
		0"-12"	A9P1-C-13-10-2-P			
	13-11V	0"-12"	A9P1-C-13-11-2-V	ARCHIVE	1352010.05	481552.4
		12"-36"	A9P1-C-13-11-3-RM	TAL A		
		12"-36"	A9P1-C-13-11-3-R			
		12"-36"	A9P1-C-13-11-3-P			
	13-12	0"-12"	A9P1-C-13-12-2-RM	TAL A	1352055.19	481565.17
		0"-12"	A9P1-C-13-12-2-R			
		0"-12"	A9P1-C-13-12-2-P			
	13-13V	0"-12"	A9P1-C-13-13-2-V	ARCHIVE	1351856.1	481458.07
		12"-36"	A9P1-C-13-13-3-RM	TAL A		
		12"-36"	A9P1-C-13-13-3-R			
		12"-36"	A9P1-C-13-13-3-P			
	13-14	0"-12"	A9P1-C-13-14-2-RM	TAL A	1351944.52	481486.29
		0"-12"	A9P1-C-13-14-2-R			
		0"-12"	A9P1-C-13-14-2-P			
	13-15	0"-12"	A9P1-C-13-15-2-RM	TAL A	1352014.9	481491.76
		0"-12"	A9P1-C-13-15-2-R			
		0"-12"	A9P1-C-13-15-2-P			

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CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
13 (cont.)	13-16	0"-12"	A9P1-C-13-16-2-RM	TAL A	1352067.53	481475.84
		0"-12"	A9P1-C-13-16-2-R			
		0"-12"	A9P1-C-13-16-2-P			
14	14-1	0"-12"	A9P1-C-14-1-2-RM	TAL A	1351866.4	481910.35
		0"-12"	A9P1-C-14-1-2-R			
		0"-12"	A9P1-C-14-1-2-P			
	14-2V	0"-12"	A9P1-C-14-2-2-V	ARCHIVE	1351925.13	481877.85
		12"-36"	A9P1-C-14-2-3-RM	TAL A		
		12"-36"	A9P1-C-14-2-3-R			
		12"-36"	A9P1-C-14-2-3-P			
	14-3	0"-12"	A9P1-C-14-3-2-RM	TAL A	1351984.46	481877.65
		0"-12"	A9P1-C-14-3-2-R			
		0"-12"	A9P1-C-14-3-2-P			
	14-4	0"-12"	A9P1-C-14-4-2-RM	TAL A	1352054.75	481887.65
		0"-12"	A9P1-C-14-4-2-R			
		0"-12"	A9P1-C-14-4-2-P			
	14-5	0"-12"	A9P1-C-14-5-2-RM	TAL A	1351895.79	481840.57
		0"-12"	A9P1-C-14-5-2-R			
		0"-12"	A9P1-C-14-5-2-P			
	14-6	0"-12"	A9P1-C-14-6-2-RM	TAL A	1351947.73	481850.88
		0"-12"	A9P1-C-14-6-2-R			
		0"-12"	A9P1-C-14-6-2-P			
	14-7	0"-12"	A9P1-C-14-7-2-RM	TAL A	1351995.94	481843.07
		0"-12"	A9P1-C-14-7-2-R			
		0"-12"	A9P1-C-14-7-2-P			
	14-8V	0"-12"	A9P1-C-14-8-2-V	ARCHIVE	1352063.58	481828.26
		12"-36"	A9P1-C-14-8-3-RM	TAL A		
		12"-36"	A9P1-C-14-8-3-R			
		12"-36"	A9P1-C-14-8-3-P			
	14-9	0"-12"	A9P1-C-14-9-2-RM	TAL A	1351896.58	481757.83
		0"-12"	A9P1-C-14-9-2-R			
		0"-12"	A9P1-C-14-9-2-P			
	14-10V	0"-12"	A9P1-C-14-10-2-V	ARCHIVE	1351934.56	481774.3
		12"-36"	A9P1-C-14-10-3-RM	TAL A		
		12"-36"	A9P1-C-14-10-3-R			
		12"-36"	A9P1-C-14-10-3-P			
	14-11	0"-12"	A9P1-C-14-11-2-RM	TAL A	1351983.37	481792.01
		0"-12"	A9P1-C-14-11-2-R			
		0"-12"	A9P1-C-14-11-2-P			
	14-12	0"-12"	A9P1-C-14-12-2-RM	TAL A	1352085.18	481774.95
		0"-12"	A9P1-C-14-12-2-R			
		0"-12"	A9P1-C-14-12-2-P			
	14-13	0"-12"	A9P1-C-14-13-2-RM	TAL A	1351854.78	481705.52
		0"-12"	A9P1-C-14-13-2-R			
		0"-12"	A9P1-C-14-13-2-P			
	14-14V	0"-12"	A9P1-C-14-14-2-V	ARCHIVE	1351951.25	481745.48
		12"-36"	A9P1-C-14-14-3-RM	TAL A		
		12"-36"	A9P1-C-14-14-3-R			
		12"-36"	A9P1-C-14-14-3-P			

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CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
14 (cont.)	14-15D	0"-12"	A9P1-C-14-15-2-RM	TAL A	1351988.18	481727.99
		0"-12"	A9P1-C-14-15-2-R			
		0"-12"	A9P1-C-14-15-2-P			
		0"-12"	A9P1-C-14-15-2-RM-D	TAL A	1351988.18	481727.99
		0"-12"	A9P1-C-14-15-2-R-D			
		0"-12"	A9P1-C-14-15-2-P-D			
	14-16	0"-12"	A9P1-C-14-16-2-RM	TAL A	1352056.8	481725.95
		0"-12"	A9P1-C-14-16-2-R			
		0"-12"	A9P1-C-14-16-2-P			
15	15-1V	0"-12"	A9P1-C-15-1-2-V	ARCHIVE	1351906.02	482100.99
		12"-36"	A9P1-C-15-1-3-RM	TAL A		
		12"-36"	A9P1-C-15-1-3-R			
		12"-36"	A9P1-C-15-1-3-P			
	15-2	0"-12"	A9P1-C-15-2-2-RM	TAL A	1351930.36	482133.17
		0"-12"	A9P1-C-15-2-2-R			
		0"-12"	A9P1-C-15-2-2-P			
	15-3	0"-12"	A9P1-C-15-3-2-RM	TAL A	1351982.43	482106.16
		0"-12"	A9P1-C-15-3-2-R			
		0"-12"	A9P1-C-15-3-2-P			
	15-4	0"-12"	A9P1-C-15-4-2-RM	TAL A	1352069.44	482100.62
		0"-12"	A9P1-C-15-4-2-R			
		0"-12"	A9P1-C-15-4-2-P			
	15-5	0"-12"	A9P1-C-15-5-2-RM	TAL A	1351899.15	482045.41
		0"-12"	A9P1-C-15-5-2-R			
		0"-12"	A9P1-C-15-5-2-P			
	15-6V	0"-12"	A9P1-C-15-6-2-V	ARCHIVE	1351934.5	482056.74
		12"-36"	A9P1-C-15-6-3-RM	TAL A		
		12"-36"	A9P1-C-15-6-3-R			
		12"-36"	A9P1-C-15-6-3-P			
	15-7	0"-12"	A9P1-C-15-7-2-RM	TAL A	1352009.36	482070.08
		0"-12"	A9P1-C-15-7-2-R			
		0"-12"	A9P1-C-15-7-2-P			
	15-8	0"-12"	A9P1-C-15-8-2-RM	TAL A	1352050.32	482065.79
		0"-12"	A9P1-C-15-8-2-R			
		0"-12"	A9P1-C-15-8-2-P			
	15-9V	0"-12"	A9P1-C-15-9-2-V	ARCHIVE	1351870.25	481990.45
		12"36"	A9P1-C-15-9-3-RM	TAL A		
		12"36"	A9P1-C-15-9-3-R			
		12"36"	A9P1-C-15-9-3-P			
	15-10	0"-12"	A9P1-C-15-10-2-RM	TAL A	1351954.31	481991.9
		0"-12"	A9P1-C-15-10-2-R			
		0"-12"	A9P1-C-15-10-2-P			
	15-11	0"-12"	A9P1-C-15-11-2-RM	TAL A	1351999.22	482020.32
		0"-12"	A9P1-C-15-11-2-R			
		0"-12"	A9P1-C-15-11-2-P			

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CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
15 (cont.)	15-12D	0"-12"	A9P1-C-15-12-2-RM	TAL A	1352061.56	482015.8
		0"-12"	A9P1-C-15-12-2-R			
		0"-12"	A9P1-C-15-12-2-P			
		0"-12"	A9P1-C-15-12-2-RM-D	TAL A	1352061.56	482015.8
		0"-12"	A9P1-C-15-12-2-R-D			
		0"-12"	A9P1-C-15-12-2-P-D			
	15-13	0"-12"	A9P1-C-15-13-2-RM	TAL A	1351883.5	481948.66
		0"-12"	A9P1-C-15-13-2-R			
		0"-12"	A9P1-C-15-13-2-P			
	15-14	0"-12"	A9P1-C-15-14-2-RM	TAL A	1351936.1	481942.28
		0"-12"	A9P1-C-15-14-2-R			
		0"-12"	A9P1-C-15-14-2-P			
	15-15	0"-12"	A9P1-C-15-15-2-RM	TAL A	1352002.78	481930.36
		0"-12"	A9P1-C-15-15-2-R			
		0"-12"	A9P1-C-15-15-2-P			
	15-16V	0"-12"	A9P1-C-15-16-2-V	ARCHIVE	1352041.68	481949.92
		12"-36"	A9P1-C-15-16-3-RM	TAL A		
		12"-36"	A9P1-C-15-16-3-R			
		12"-36"	A9P1-C-15-16-3-P			
16	16-1V	0"-12"	A9P1-C-16-1-2-V	ARCHIVE	1351894.32	482374.37
		12"-36"	A9P1-C-16-1-3-RM	TAL A		
		12"-36"	A9P1-C-16-1-3-R			
		12"-36"	A9P1-C-16-1-3-P			
	16-2	0"-12"	A9P1-C-16-2-2-RM	TAL A	1351961.33	482376.45
		0"-12"	A9P1-C-16-2-2-R			
		0"-12"	A9P1-C-16-2-2-P			
	16-3	0"-12"	A9P1-C-16-3-2-RM	TAL A	1352011.67	482363.49
		0"-12"	A9P1-C-16-3-2-R			
		0"-12"	A9P1-C-16-3-2-P			
	16-4	0"-12"	A9P1-C-16-4-2-RM	TAL A	1352041.86	482339.83
		0"-12"	A9P1-C-16-4-2-R			
		0"-12"	A9P1-C-16-4-2-P			
	16-5D	0"-12"	A9P1-C-16-5-2-RM	TAL A	1351887.96	482280.91
		0"-12"	A9P1-C-16-5-2-R			
		0"-12"	A9P1-C-16-5-2-P			
		0"-12"	A9P1-C-16-5-2-RM-D	TAL A	1351887.96	482280.91
		0"-12"	A9P1-C-16-5-2-R-D			
		0"-12"	A9P1-C-16-5-2-P-D			
	16-6V	0"-12"	A9P1-C-16-6-2-V	ARCHIVE	1351958.73	482286.49
		12"-36"	A9P1-C-16-6-3-RM	TAL A		
		12"-36"	A9P1-C-16-6-3-R			
		12"-36"	A9P1-C-16-6-3-P			
	16-7	0"-12"	A9P1-C-16-7-2-RM	TAL A	1352010.94	482323.55
		0"-12"	A9P1-C-16-7-2-R			
		0"-12"	A9P1-C-16-7-2-P	TAL A		
	16-8	0"-12"	A9P1-C-16-8-2-RM	TAL A	1352068.52	482297.01
		0"-12"	A9P1-C-16-8-2-R			
		0"-12"	A9P1-C-16-8-2-P			

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CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
16 (cont.)	16-9V	0"-12"	A9P1-C-16-9-2-V	ARCHIVE	1351878.37	482249.41
		12"-36"	A9P1-C-16-9-3-RM	TAL A		
		12"-36"	A9P1-C-16-9-3-R			
		12"-36"	A9P1-C-16-9-3-P			
	16-10	0"-12"	A9P1-C-16-10-2-RM	TAL A	1351961.82	482211.55
		0"-12"	A9P1-C-16-10-2-R			
		0"-12"	A9P1-C-16-10-2-P			
	16-11	0"-12"	A9P1-C-16-11-2-RM	TAL A	1352006.77	482254.59
		0"-12"	A9P1-C-16-11-2-R			
		0"-12"	A9P1-C-16-11-2-P			
	16-12	0"-12"	A9P1-C-16-12-2-RM	TAL A	1352076.52	482230.93
		0"-12"	A9P1-C-16-12-2-R			
		0"-12"	A9P1-C-16-12-2-P			
	16-13V	0"-12"	A9P1-C-16-13-2-V	ARCHIVE	1351896.95	482161.74
		12"-36"	A9P1-C-16-13-3-RM	TAL A		
		12"-36"	A9P1-C-16-13-3-R			
		12"-36"	A9P1-C-16-13-3-P			
	16-14	0"-12"	A9P1-C-16-14-2-RM	TAL A	1351947.72	482173.26
		0"-12"	A9P1-C-16-14-2-R			
		0"-12"	A9P1-C-16-14-2-P			
	16-15	0"-12"	A9P1-C-16-15-2-RM	TAL A	1352008.57	482157.84
		0"-12"	A9P1-C-16-15-2-R			
		0"-12"	A9P1-C-16-15-2-P			
	16-16	0"-12"	A9P1-C-16-16-2-RM	TAL A	1352062.46	482197.99
		0"-12"	A9P1-C-16-16-2-R			
		0"-12"	A9P1-C-16-16-2-P			
17	17-1	0"-12"	A9P1-C-17-1-2-RM	TAL A	1351865.54	482640.96
		0"-12"	A9P1-C-17-1-2-R			
		0"-12"	A9P1-C-17-1-2-P			
	17-2D	0"-12"	A9P1-C-17-2-2-RM	TAL A	1351951.43	482603.31
		0"-12"	A9P1-C-17-2-2-R			
		0"-12"	A9P1-C-17-2-2-P			
		0"-12"	A9P1-C-17-2-2-RM-D	TAL A	1351951.43	482603.31
		0"-12"	A9P1-C-17-2-2-R-D			
		0"-12"	A9P1-C-17-2-2-P-D			
	17-3V	0"-12"	A9P1-C-17-3-2-V	ARCHIVE	1352012.48	482588.09
		12"-36"	A9P1-C-17-3-3-RM	TAL A		
		12"-36"	A9P1-C-17-3-3-R			
		12"-36"	A9P1-C-17-3-3-P			
	17-4	0"-12"	A9P1-C-17-4-2-RM	TAL A	1352090.7	482584.81
		0"-12"	A9P1-C-17-4-2-R			
		0"-12"	A9P1-C-17-4-2-P			
	17-5	0"-12"	A9P1-C-17-5-2-RM	TAL A	1351873.32	482568.58
		0"-12"	A9P1-C-17-5-2-R			
		0"-12"	A9P1-C-17-5-2-P			
	17-6V	0"-12"	A9P1-C-17-6-2-V	ARCHIVE	1351932.05	482524.87
		12"-36"	A9P1-C-17-6-3-RM	TAL A		
		12"-36"	A9P1-C-17-6-3-R			
		12"-36"	A9P1-C-17-6-3-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
17 (cont.)	17-7	0"-12"	A9P1-C-17-7-2-RM	TAL A	1351997.71	482528.59
		0"-12"	A9P1-C-17-7-2-R			
		0"-12"	A9P1-C-17-7-2-P			
	17-8	0"-12"	A9P1-C-17-8-2-RM	TAL A	1352077.86	482535.4
		0"-12"	A9P1-C-17-8-2-R			
		0"-12"	A9P1-C-17-8-2-P			
	17-9	0"-12"	A9P1-C-17-9-2-RM	TAL A	1351881.41	482483.06
		0"-12"	A9P1-C-17-9-2-R			
		0"-12"	A9P1-C-17-9-2-P			
	17-10	0"-12"	A9P1-C-17-10-2-RM	TAL A	1351951.4	482461.26
		0"-12"	A9P1-C-17-10-2-R			
		0"-12"	A9P1-C-17-10-2-P			
	17-11V	0"-12"	A9P1-C-17-11-2-V	ARCHIVE	1352009.93	482464.16
		12"-36"	A9P1-C-17-11-3-RM	TAL A		
		12"-36"	A9P1-C-17-11-3-R			
		12"-36"	A9P1-C-17-11-3-P			
	17-12	0"-12"	A9P1-C-17-12-2-RM	TAL A	1352046.16	482498.96
		0"-12"	A9P1-C-17-12-2-R			
		0"-12"	A9P1-C-17-12-2-P			
	17-13V	0"-12"	A9P1-C-17-13-2-V	ARCHIVE	1351888.53	482436.33
		12"-36"	A9P1-C-17-13-3-RM	TAL A		
		12"-36"	A9P1-C-17-13-3-R			
		12"-36"	A9P1-C-17-13-3-P			
	17-14	0"-12"	A9P1-C-17-14-2-RM	TAL A	1351943.23	482413.09
		0"-12"	A9P1-C-17-14-2-R			
		0"-12"	A9P1-C-17-14-2-P			
	17-15	0"-12"	A9P1-C-17-15-2-RM	TAL A	1351981.92	482410.01
		0"-12"	A9P1-C-17-15-2-R			
		0"-12"	A9P1-C-17-15-2-P			
	17-16	0"-12"	A9P1-C-17-16-2-RM	TAL A	1352041.02	482420.94
		0"-12"	A9P1-C-17-16-2-R			
		0"-12"	A9P1-C-17-16-2-P			
18	18-1	0"-12"	A9P1-C-18-1-2-RM	TAL A	1352067.52	482827.95
		0"-12"	A9P1-C-18-1-2-R			
		0"-12"	A9P1-C-18-1-2-P			
	18-2	0"-12"	A9P1-C-18-2-2-RM	TAL A	1352128.29	482795.2
		0"-12"	A9P1-C-18-2-2-R			
		0"-12"	A9P1-C-18-2-2-P			
	18-3	0"-12"	A9P1-C-18-3-2-RM	TAL A	1352189.97	482832.74
		0"-12"	A9P1-C-18-3-2-R			
		0"-12"	A9P1-C-18-3-2-P			
	18-4V	0"-12"	A9P1-C-18-4-2-V	ARCHIVE	1352232.13	482790.89
		12"-36"	A9P1-C-18-4-3-RM	TAL A		
		12"-36"	A9P1-C-18-4-3-R			
		12"-36"	A9P1-C-18-4-3-P			
	18-5	0"-12"	A9P1-C-18-5-2-RM	TAL A	1352056.32	482741.28
		0"-12"	A9P1-C-18-5-2-R			
		0"-12"	A9P1-C-18-5-2-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
18 (cont.)	18-6V	0"-12"	A9P1-C-18-6-2-V	ARCHIVE	1352114.98	482763.47
		12"-36"	A9P1-C-18-6-3-RM	TAL A		
		12"-36"	A9P1-C-18-6-3-R			
		12"-36"	A9P1-C-18-6-3-P			
	18-7	0"-12"	A9P1-C-18-7-2-RM	TAL A	1352152.33	482737.31
		0"-12"	A9P1-C-18-7-2-R			
		0"-12"	A9P1-C-18-7-2-P			
	18-8	0"-12"	A9P1-C-18-8-2-RM	TAL A	1352219.54	482754.95
		0"-12"	A9P1-C-18-8-2-R			
		0"-12"	A9P1-C-18-8-2-P			
	18-9	0"-12"	A9P1-C-18-9-2-RM	TAL A	1352051.19	482704.2
		0"-12"	A9P1-C-18-9-2-R			
		0"-12"	A9P1-C-18-9-2-P			
	18-10	0"-12"	A9P1-C-18-10-2-RM	TAL A	1352113.95	482703.08
		0"-12"	A9P1-C-18-10-2-R			
		0"-12"	A9P1-C-18-10-2-P			
	18-11V	0"-12"	A9P1-C-18-11-2-V	ARCHIVE	1352187.86	482726.17
		12"-36"	A9P1-C-18-11-3-RM	TAL A		
		12"-36"	A9P1-C-18-11-3-R			
		12"-36"	A9P1-C-18-11-3-P			
	18-12	0"-12"	A9P1-C-18-12-2-RM	TAL A	1352228.58	482693.64
		0"-12"	A9P1-C-18-12-2-R			
		0"-12"	A9P1-C-18-12-2-P			
	18-13D	0"-12"	A9P1-C-18-13-2-RM	TAL A	1352025.23	482661.55
		0"-12"	A9P1-C-18-13-2-R			
		0"-12"	A9P1-C-18-13-2-P			
		0"-12"	A9P1-C-18-13-2-RM-D	TAL A	1352025.23	482661.55
		0"-12"	A9P1-C-18-13-2-R-D			
		0"-12"	A9P1-C-18-13-2-P-D			
	18-14	0"-12"	A9P1-C-18-14-2-RM	TAL A	1352133.05	482670.78
		0"-12"	A9P1-C-18-14-2-R			
		0"-12"	A9P1-C-18-14-2-P			
	18-15V	0"-12"	A9P1-C-18-15-2-V	ARCHIVE	1352169.14	482647.47
		12"-36"	A9P1-C-18-15-3-RM	TAL A		
		12"-36"	A9P1-C-18-15-3-R			
		12"-36"	A9P1-C-18-15-3-P			
	18-16	0"-12"	A9P1-C-18-16-2-RM	TAL A	1352259.1	482647.02
		0"-12"	A9P1-C-18-16-2-R			
		0"-12"	A9P1-C-18-16-2-P			
19	19-1V	0"-12"	A9P1-C-19-1-2-V	ARCHIVE	1352087.16	483018.01
		12"-36"	A9P1-C-19-1-3-RM	TAL A		
		12"-36"	A9P1-C-19-1-3-R			
		12"-36"	A9P1-C-19-1-3-P			
	19-2D	0"-12"	A9P1-C-19-2-2-RM	TAL A	1352142.07	483022.22
		0"-12"	A9P1-C-19-2-2-R			
		0"-12"	A9P1-C-19-2-2-P			
		0"-12"	A9P1-C-19-2-2-RM-D	TAL A	1352142.07	483022.22
		0"-12"	A9P1-C-19-2-2-R-D			
		0"-12"	A9P1-C-19-2-2-P-D			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
19 (cont.)	19-3	0"-12"	A9P1-C-19-3-2-RM	TAL A	1352184.32	483010.4
		0"-12"	A9P1-C-19-3-2-R			
		0"-12"	A9P1-C-19-3-2-P			
	19-4	0"-12"	A9P1-C-19-4-2-RM	TAL A	1352273.84	483002.68
		0"-12"	A9P1-C-19-4-2-R			
		0"-12"	A9P1-C-19-4-2-P			
	19-5	0"-12"	A9P1-C-19-5-2-RM	TAL A	1352053.96	482947.49
		0"-12"	A9P1-C-19-5-2-R			
		0"-12"	A9P1-C-19-5-2-P			
	19-6	0"-12"	A9P1-C-19-6-2-RM	TAL A	1352121.97	482964.9
		0"-12"	A9P1-C-19-6-2-R			
		0"-12"	A9P1-C-19-6-2-P			
	19-7V	0"-12"	A9P1-C-19-7-2-V	ARCHIVE	1352212.24	482982.88
		12"-36"	A9P1-C-19-7-3-RM	TAL A		
		12"-36"	A9P1-C-19-7-3-R			
		12"-36"	A9P1-C-19-7-3-P			
	19-8	0"-12"	A9P1-C-19-8-2-RM	TAL A	1352295.94	482974.02
		0"-12"	A9P1-C-19-8-2-R			
		0"-12"	A9P1-C-19-8-2-P			
	19-9	0"-12"	A9P1-C-19-9-2-RM	TAL A	1352035.79	482896.64
		0"-12"	A9P1-C-19-9-2-R			
		0"-12"	A9P1-C-19-9-2-P			
	19-10	0"-12"	A9P1-C-19-10-2-RM	TAL A	1352116.97	482917.47
		0"-12"	A9P1-C-19-10-2-R			
		0"-12"	A9P1-C-19-10-2-P			
	19-11V	0"-12"	A9P1-C-19-11-2-V	ARCHIVE	1352203.89	482916.11
		12"-36"	A9P1-C-19-11-3-RM	TAL A		
		12"-36"	A9P1-C-19-11-3-R			
		12"-36"	A9P1-C-19-11-3-P			
	19-12	0"-12"	A9P1-C-19-12-2-RM	TAL A	1352251.97	482926.7
		0"-12"	A9P1-C-19-12-2-R			
		0"-12"	A9P1-C-19-12-2-P			
	19-13	0"-12"	A9P1-C-19-13-2-RM	TAL A	1352030.69	482862.64
		0"-12"	A9P1-C-19-13-2-R			
		0"-12"	A9P1-C-19-13-2-P			
	19-14V	0"-12"	A9P1-C-19-14-2-V.	ARCHIVE	1352115.02	482850.25
		12"-36"	A9P1-C-19-14-3-RM	TAL A		
		12"-36"	A9P1-C-19-14-3-R			
		12"-36"	A9P1-C-19-14-3-P			
	19-15	0"-12"	A9P1-C-19-15-2-RM	TAL A	1352163.09	482872.09
		0"-12"	A9P1-C-19-15-2-R			
		0"-12"	A9P1-C-19-15-2-P			
	19-16	0"-12"	A9P1-C-19-16-2-RM	TAL A	1352277.62	482879.84
		0"-12"	A9P1-C-19-16-2-R			
		0"-12"	A9P1-C-19-16-2-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
20	20-1D	0"-12"	A9P1-C-20-1-2-RM	TAL A	1352064.76	483273.45
		0"-12"	A9P1-C-20-1-2-R			
		0"-12"	A9P1-C-20-1-2-P			
		0"-12"	A9P1-C-20-1-2-RM-D	TAL A	1352064.76	483273.45
		0"-12"	A9P1-C-20-1-2-R-D			
		0"-12"	A9P1-C-20-1-2-P-D			
	20-2	0"-12"	A9P1-C-20-2-2-RM	TAL A	1352171.35	483230.25
		0"-12"	A9P1-C-20-2-2-R			
		0"-12"	A9P1-C-20-2-2-P			
	20-3	0"-12"	A9P1-C-20-3-2-RM	TAL A	1352225.99	483244.47
		0"-12"	A9P1-C-20-3-2-R			
		0"-12"	A9P1-C-20-3-2-P			
	20-4V	0"-12"	A9P1-C-20-4-2-V	ARCHIVE	1352297.19	483220.14
		12"-36"	A9P1-C-20-4-3-RM	TAL A		
		12"-36"	A9P1-C-20-4-3-R			
		12"-36"	A9P1-C-20-4-3-P			
	20-5	0"-12"	A9P1-C-20-5-2-RM	TAL A	1352089.24	483206.58
		0"-12"	A9P1-C-20-5-2-R			
		0"-12"	A9P1-C-20-5-2-P			
	20-6V	0"-12"	A9P1-C-20-6-2-V	ARCHIVE	1352140.33	483188.73
		12"-36"	A9P1-C-20-6-3-RM	TAL A		
		12"-36"	A9P1-C-20-6-3-R			
		12"-36"	A9P1-C-20-6-3-P			
	20-7	0"-12"	A9P1-C-20-7-2-RM	TAL A	1352243.77	483194.2
		0"-12"	A9P1-C-20-7-2-R			
		0"-12"	A9P1-C-20-7-2-P			
	20-8	0"-12"	A9P1-C-20-8-2-RM	TAL A	1352297.45	483161.8
		0"-12"	A9P1-C-20-8-2-R			
		0"-12"	A9P1-C-20-8-2-P			
	20-9	0"-12"	A9P1-C-20-9-2-RM	TAL A	1352062.85	483118.2
		0"-12"	A9P1-C-20-9-2-R			
		0"-12"	A9P1-C-20-9-2-P			
	20-10	0"-12"	A9P1-C-20-10-2-RM	TAL A	1352149.23	483129.36
		0"-12"	A9P1-C-20-10-2-R			
		0"-12"	A9P1-C-20-10-2-P			
	20-11	0"-12"	A9P1-C-20-11-2-RM	TAL A	1352220.79	483123.46
		0"-12"	A9P1-C-20-11-2-R			
		0"-12"	A9P1-C-20-11-2-P			
	20-12V	0"-12"	A9P1-C-20-12-2-V	ARCHIVE	1352267.18	483099.58
		12"-36"	A9P1-C-20-12-3-RM	TAL A		
		12"-36"	A9P1-C-20-12-3-R			
		12"-36"	A9P1-C-20-12-3-P			
	20-13	0"-12"	A9P1-C-20-13-2-RM	TAL A	1352050.95	483069.18
		0"-12"	A9P1-C-20-13-2-R			
		0"-12"	A9P1-C-20-13-2-P			
	20-14V	0"-12"	A9P1-C-20-14-2-V	ARCHIVE	1352163.12	483069.99
		12"-36"	A9P1-C-20-14-3-RM	TAL A		
		12"-36"	A9P1-C-20-14-3-R			
		12"-36"	A9P1-C-20-14-3-P			

APPENDIX B
SAMPLE LOCATION AND IDENTIFIERS

CU	LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
20 (cont.)	20-15	0"-12"	A9P1-C-20-15-2-RM	TAL A	1352218.94	483050.89
		0"-12"	A9P1-C-20-15-2-R			
		0"-12"	A9P1-C-20-15-2-P			
	20-16	0"-12"	A9P1-C-20-16-2-RM	TAL A	1352266.04	483056.47
		0"-12"	A9P1-C-20-16-2-R			
		0"-12"	A9P1-C-20-16-2-P			

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-02
WBS NO.: PROJECT/DOCUMENT/ECDC 21120-PSP-0003, REV 0	Page 1 of 1
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	Date 12/13/01

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents changes/exceptions to a note at the bottom of Table 3-2.

A note at the bottom of the table states that "Analytical requirements will meet ASL D with a minimum detection level set at 10 percent of the FRL." This is true for all analytes EXCEPT for Technecium-99. The FRL for Technecium-99 is 1.0 pCi/g, however the minimum detection level needs to be 0.3 pCi/g.

Justification

In their attempt to meet 0.1 pCi/g Tc-99, the on-site lab experienced unforseen precipitation with the iron in the sample. The MDC for Tc-99 will be raised to 0.3 pCi/g in an attempt to reduce the excessive precipitation.

REQUESTED BY: Frank Miller Date: 12/13/01

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Priske	12-17-01	X	PROJECT MANAGER J.D. Chou	12/17/01
	LABORATORY MANAGER		X	Characterization Manager: F. Miller	12/14/01
X	ANALYTICAL CUSTOMER SUPPORT: D. Arico	12/14/01		RTIMP Manager	
~~X~~	~~WMOnl Darlow~~	12/17/01	X	Sampling Manager: T. Buhrlage	12/17/01

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

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

ORIGINAL

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-03
WBS NO.: PROJECT/DOCUMENT/ECDC 21120-PSP-0003, REV 0	**Page 1 of 1**
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	**Date 01/02/02**

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the submittal of previously collected archive samples in CU A9PI-C-1 for arsenic analysis.

Justification

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

REQUESTED BY: Ana Madani Date: 01/02/02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE:	01-02-02	X	PROJECT MANAGER	1/2/02
	LABORATORY MANAGER		X	Characterization Manager	1/2/02
X	ANALYTICAL CUSTOMER SUPPORT Denise M Cuco	1/7/02		RTIMP Manager	
	WAO:		X	Sampling Manager: Tim Buhlage	1/8/02

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL:	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-04
WBS NO.: PROJECT/DOCUMENT/ECDC 21120-PSP-0003, REV 0	Page 1 of 1
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	Date 01/09/02

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the submittal of previously collected archive samples in CUs A9PI-C-14 and A9PI-C-15 for radium-226 analysis.

Justification

Above-FRL radium-226 concentrations have been detected in this CU. Archive samples will be analyzed to confirm the presence of Ra-226 and to determine whether these concentrations will cause the CU to fail.

REQUESTED BY: Ana Madani Date: 01/09/02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE:	1-14-02	X	PROJECT MANAGER	1/9/02
	LABORATORY MANAGER		X	Characterization Manager:	1/9/02
X	ANALYTICAL CUSTOMER SUPPORT	1/9/02		RTIMP Manager	
	WAO:		X	Sampling Manager:	1/10/02

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL:	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ORIGINAL

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-06
WBS NO.: PROJECT/DOCUMENT/ECDC 21120-PSP-0003, REV 0	Page 1 of 1
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	Date 01/28/02

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the submittal of previously collected archive samples in CU A9PI-C-8 for radium-226 analysis.

Justification

Above-FRL radium-226 concentrations have been detected in this CU. Archive samples will be analyzed to confirm the presence of Ra-226 and to determine whether these concentrations will cause the CU to fail.

REQUESTED BY: Ana Madani Date: 01/28/02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Priske	1/28/02	X	PROJECT MANAGER J.D. Chiou	1/28/02
	LABORATORY MANAGER		X	Characterization Manager: F. Miller	1/28/02
X	ANALYTICAL CUSTOMER SUPPORT: D. Arico	1/28/01		RTIMP Manager	
	WAO: L. Barlow		X	Sampling Manager: T. Bulurlage	1/28/02

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

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

ORIGINAL

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-07
WBS NO.: PROJECT/DOCUMENT/ECDC 21120-PSP-0003, REV 0	Page 1 of 1
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	Date 02/06/02

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the submittal of previously collected archive samples in CU A9PI-C-12 for arsenic analysis.

Justification

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

REQUESTED BY: Ana Madani Date: 02/06/02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	2-6-02	X	PROJECT MANAGER J.D. Chion	2-6-02
	LABORATORY MANAGER		X	Characterization Manager: F. Miller	2-6-02
X	ANALYTICAL CUSTOMER SUPPORT: D. Arico	2/6/02		RTIMP Manager	
	WAO: L. Barlow		X	Sampling Manager: T. Buhrlage	2/6/02

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

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

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VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-08
WBS NO.: PROJECT/DOCUMENT/ECDC 21120-PSP-0003, REV 0	Page 1 of 1
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	Date 02/06/02

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the submittal of previously collected archive samples in CU A9PI-C-10 for radium-226 analysis.

Justification

Above-FRL radium-226 concentrations have been detected in this CU. Archive samples will be analyzed to confirm the presence of radium-226 and to determine whether these concentrations will cause the CU to fail.

REQUESTED BY: Ana Madani Date: 02/06/02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	2/7/02	X	PROJECT MANAGER J.D. Chiou	2-6-02
	LABORATORY MANAGER		X	Characterization Manager: F. Miller	2-6-02
X	ANALYTICAL CUSTOMER SUPPORT: D. Arico	2/7/02		RTIMP Manager	
	WAO: L. Barlow		X	Sampling Manager: T. Buhrlage	2/7/02

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

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

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-09
WBS NO.: PROJECT/DOCUMENT/ECDC #21120-PSP-0003, REV 0	Page 1 of 1
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	Date 2/14/02

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the submittal of previously collected archive samples in CU A9PI-C-7 for beryllium analysis.

Justification

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

REQUESTED BY: Ana Madani Date: 02/14/02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	2/20/02	X	PROJECT MANAGER	2/20/02
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER	2/20/02
X	ANALYTICAL CUSTOMER SUPPORT	2/21/02		RTIMP Manager	
	WAO		X	Sampling Manager	2/20/02

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ORIGINAL

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-~~09~~ 10 TEC
WBS NO.: PROJECT/DOCUMENT/ECDC 21120-PSP-0003, REV 0	Page 1 of 6
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	Date 02/20/02

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents additional surface sampling to be conducted in Area 9 Phase I. The sample IDs and coordinates are shown on Table 1 and the sample locations are shown on Figure 1.

(1) Surface samples from an additional 16 randomly selected locations in CU A9P1-C-12 will be collected, analyzed, and validated for arsenic in accordance with requirements specified in the PSP.

Surface samples from an additional 16 randomly selected locations in each of the following CUs: A9P1-C-6, A9P1-C-8, A9P1-C-10, A9P1-C-11, and A9P1-C-14 will be collected, analyzed, and validated for Radium-226 in accordance with requirements specified in the PSP for Radium-226.

(2) Surface samples from the center point of all 20 CUs will be collected in accordance with the PSP and analyzed for Aroclor-1260. The method of analysis will be switched from CLP to SW846 with an MDC of 0.004 mg/kg, which is 1/10th of the FRL. These samples will be analyzed at ASL D and validated in accordance with the PSP.

(3) Subsurface samples from CU A9P1-C-14 will be collected at intervals 12"-36" and 36"-48" at the exact locations as the surface samples for CU-14 in (1). The samples at the 12"-36" interval will be collected, analyzed, and validated for Radium-226 in accordance with requirements specified in the PSP. (i.e. composited and homogenized) The samples at the 36"-48" interval will be archived.

For surface sampling, consistent with the PSP, any sample location that falls within the plowed zone (CUs 5-20) the entire 12" core will be homogenized. Any sample that falls in the non-plowed zone (CUs 1-4), will be taken from the 0"-6" interval.

Note: The numbering scheme for these samples follows the format set up in the PSP. Beginning with the next consecutive number for each CU from Appendix B in the PSP, item (1) sample numbers were generated first, then (2) and finally (3).

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VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-~~09~~ 10 TEB
WBS NO.: PROJECT/DOCUMENT/ECDC 21120-PSP-0003, REV 0	Page ~~1~~ 2 of 6
PROJECT TITLE: PSP for Area 9, Phase I Certification Sampling	Date 02/20/02

Justification

(1) Statistical analysis (a posteriori test) of results obtained for the planned samples indicated that additional samples are needed for these CUs.

(2) Aroclor-1260 analysis was requested by CLP, which has a CRDL greater than the offsite FRL. All results came back as non-detected. The re-samples will request Aroclor-1260 analysis by SW846, which can provide a much lower detection limit.

(3) Following the guidelines of the SEP Addendum, page ADD-2, CU-14 subsurface is considered impacted, thus requiring certification. The 12"-36" interval will be considered to be an additional unique CU and will be named A9P1-C-14A. The archives will be collected at this time due to limited access agreements. The archives will be utilized for bounding if the subsurface CU fails certification.

REQUESTED BY: Ana Madani Date: 02/20/02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Frisko	2/20/02	X	PROJECT MANAGER J.D. Chico	2/20/02
	LABORATORY MANAGER		X	Characterization Manager: F. Miller	2/20/02
X	ANALYTICAL CUSTOMER SUPPORT: D. Arico for Denise Cerro	2/20/02		RTIMP Manager	
	WAO: L. Barlow		X	Sampling Manager: T. Ruhrfaye	2/20/02

VARIANCE/FCN APPROVED [X]YES [ ]NO	REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

TABLE 1
SAMPLE LOCATIONS AND IDENTIFIERS

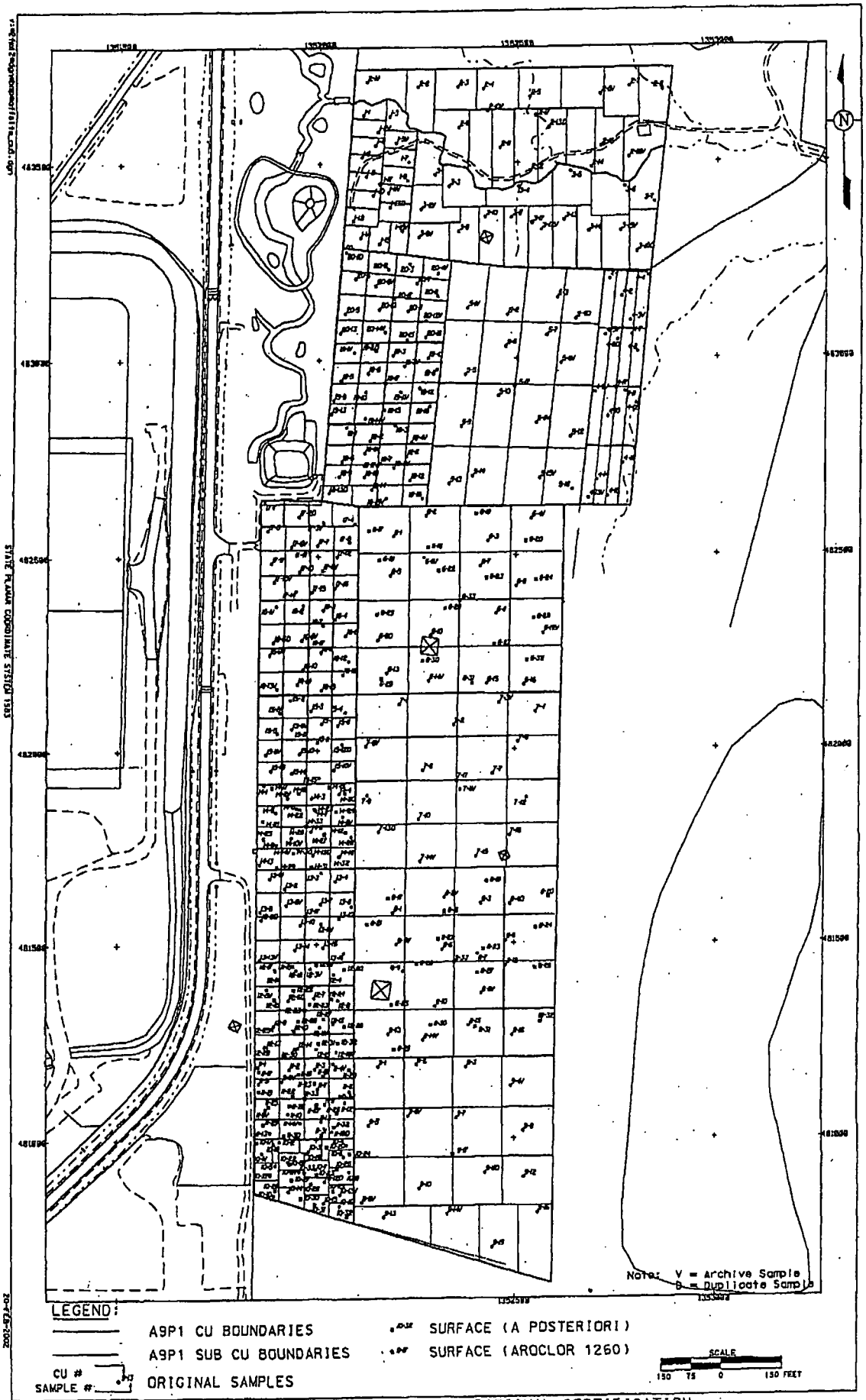
LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
1	0"-6"	A9P1-C-1-17-1-P	Aroclor-1260	483449.03	1352151.85
2	0"-6"	A9P1-C-2-17-1-P	Aroclor-1260	483622.40	1352545.36
3	0"-6"	A9P1-C-3-17-1-P	Aroclor-1260	483347.58	1352536.48
4	0"-6"	A9P1-C-4-17-1-P	Aroclor-1260	482924.79	1352749.60
5	0"-12"	A9P1-C-5-17-2-P	Aroclor-1260	482930.59	1352495.95
6	0"-12"	A9P1-C-6-17-2-R	Radium-226	482567.06	1352128.61
	0"-12"	A9P1-C-6-18-2-R	Radium-226	482522.68	1352278.27
	0"-12"	A9P1-C-6-19-2-R	Radium-226	482609.03	1352400.86
	0"-12"	A9P1-C-6-20-2-R	Radium-226	482537.06	1352525.29
	0"-12"	A9P1-C-6-21-2-R	Radium-226	482490.23	1352154.57
	0"-12"	A9P1-C-6-21-2-R-D	Radium-227	482490.23	1352154.57
	0"-12"	A9P1-C-6-22-2-R	Radium-226	482463.00	1352304.60
	0"-12"	A9P1-C-6-23-2-R	Radium-226	482442.94	1352426.01
	0"-12"	A9P1-C-6-24-2-R	Radium-226	482437.79	1352551.09
	0"-12"	A9P1-C-6-25-2-R	Radium-226	482352.68	1352149.89
	0"-12"	A9P1-C-6-26-2-R	Radium-226	482366.34	1352321.71
	0"-12"	A9P1-C-6-27-2-R	Radium-226	482273.27	1352447.57
	0"-12"	A9P1-C-6-28-2-R	Radium-226	482340.14	1352545.09
	0"-12"	A9P1-C-6-29-2-R	Radium-226	482186.27	1352161.69
	0"-12"	A9P1-C-6-30-2-R	Radium-226	482231.34	1352263.92
	0"-12"	A9P1-C-6-31-2-R	Radium-226	482173.50	1352391.32
	0"-12"	A9P1-C-6-32-2-R	Radium-226	482231.94	1352529.18
	0"-12"	A9P1-C-6-33-2-P	Aroclor-1260	482387.11	1352359.64
7	0"-12"	A9P1-C-7-17-2-P	Aroclor-1260	481921.05	1352353.60
8	0"-12"	A9P1-C-8-17-2-R	Radium-226	481615.53	1352180.26
	0"-12"	A9P1-C-8-18-2-R	Radium-226	481581.63	1352322.60
	0"-12"	A9P1-C-8-19-2-R	Radium-226	481659.18	1352429.39
	0"-12"	A9P1-C-8-20-2-R	Radium-226	481617.55	1352585.04
	0"-12"	A9P1-C-8-20-2-R-D	Radium-227	481617.55	1352585.04
	0"-12"	A9P1-C-8-21-2-R	Radium-226	481550.77	1352127.62
	0"-12"	A9P1-C-8-22-2-R	Radium-226	481512.05	1352306.94
	0"-12"	A9P1-C-8-23-2-R	Radium-226	481486.39	1352422.70
	0"-12"	A9P1-C-8-24-2-R	Radium-226	481539.47	1352553.71
	0"-12"	A9P1-C-8-25-2-R	Radium-226	481339.42	1352189.62
	0"-12"	A9P1-C-8-26-2-R	Radium-226	481442.99	1352252.53
	0"-12"	A9P1-C-8-27-2-R	Radium-226	481419.64	1352407.02
	0"-12"	A9P1-C-8-28-2-R	Radium-226	481432.36	1352552.08
	0"-12"	A9P1-C-8-29-2-R	Radium-226	481224.49	1352195.92
	0"-12"	A9P1-C-8-30-2-R	Radium-226	481288.22	1352288.61
	0"-12"	A9P1-C-8-31-2-R	Radium-226	481282.12	1352403.36
	0"-12"	A9P1-C-8-32-2-R	Radium-226	481296.09	1352566.56
	0"-12"	A9P1-C-8-33-2-P	Aroclor-1260	481449.95	1352348.73
9	0"-12"	A9P1-C-9-17-2-P	Aroclor-1260	480961.81	1352345.53

TABLE 1
SAMPLE LOCATIONS AND IDENTIFIERS

LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
10	0"-12"	A9P1-C-10-17-2-R	Radium-226	480993.26	1351850.66
	0"-12"	A9P1-C-10-18-2-R	Radium-226	480989.30	1351893.42
	0"-12"	A9P1-C-10-18-2-R-D	Radium-227	480989.30	1351893.42
	0"-12"	A9P1-C-10-19-2-R	Radium-226	480965.77	1351976.56
	0"-12"	A9P1-C-10-20-2-R	Radium-226	480981.53	1352027.25
	0"-12"	A9P1-C-10-21-2-R	Radium-226	480910.58	1351884.02
	0"-12"	A9P1-C-10-22-2-R	Radium-226	480939.04	1351932.54
	0"-12"	A9P1-C-10-23-2-R	Radium-226	480910.16	1352001.04
	0"-12"	A9P1-C-10-24-2-R	Radium-226	480963.71	1352084.98
	0"-12"	A9P1-C-10-25-2-R	Radium-226	480924.80	1352052.50
	0"-12"	A9P1-C-10-26-2-R	Radium-226	480870.03	1351897.96
	0"-12"	A9P1-C-10-27-2-R	Radium-226	480897.25	1351938.34
	0"-12"	A9P1-C-10-28-2-R	Radium-226	480885.55	1351986.43
	0"-12"	A9P1-C-10-29-2-R	Radium-226	480867.25	1352042.51
	0"-12"	A9P1-C-10-30-2-R	Radium-226	480848.60	1351960.11
	0"-12"	A9P1-C-10-31-2-R	Radium-226	480832.96	1351995.68
	0"-12"	A9P1-C-10-32-2-R	Radium-226	480802.47	1352077.63
	0"-12"	A9P1-C-10-33-2-P	Aroclor-1260	480915.88	1351989.75
11	0"-12"	A9P1-C-11-17-2-R	Radium-226	481171.00	1351856.45
	0"-12"	A9P1-C-11-18-2-R	Radium-226	481164.23	1351955.67
	0"-12"	A9P1-C-11-19-2-R	Radium-226	481158.48	1352017.59
	0"-12"	A9P1-C-11-20-2-R	Radium-226	481173.69	1352083.21
	0"-12"	A9P1-C-11-21-2-R	Radium-226	481119.57	1351856.02
	0"-12"	A9P1-C-11-22-2-R	Radium-226	481108.54	1351940.95
	0"-12"	A9P1-C-11-23-2-R	Radium-226	481140.07	1351996.62
	0"-12"	A9P1-C-11-24-2-R	Radium-226	481107.37	1352080.69
	0"-12"	A9P1-C-11-25-2-R	Radium-226	481083.91	1351880.30
	0"-12"	A9P1-C-11-26-2-R	Radium-225	481086.40	1351933.64
	0"-12"	A9P1-C-11-26-2-R-D	Radium-226	481088.40	1351933.64
	0"-12"	A9P1-C-11-27-2-R	Radium-226	481088.04	1352000.35
	0"-12"	A9P1-C-11-28-2-R	Radium-226	481066.53	1352051.98
	0"-12"	A9P1-C-11-29-2-R	Radium-226	481039.02	1351867.63
	0"-12"	A9P1-C-11-30-2-R	Radium-226	481010.29	1351919.52
	0"-12"	A9P1-C-11-31-2-R	Radium-226	481011.53	1352012.47.
	0"-12"	A9P1-C-11-32-2-R	Radium-226	481031.35	1352044.09
	0"-12"	A9P1-C-11-33-2-P	Aroclor-1260	481104.32	1351971.03
12	0"-12"	A9P1-C-12-17-2-M	Arsenic	481429.85	1351897.01
	0"-12"	A9P1-C-12-18-2-M	Arsenic	481440.66	1351941.07
	0"-12"	A9P1-C-12-19-2-M	Arsenic	481443.01	1352001.26
	0"-12"	A9P1-C-12-20-2-M	Arsenic	481430.31	1352071.20
	0"-12"	A9P1-C-12-21-2-M	Arsenic	481354.26	1351895.91
	0"-12"	A9P1-C-12-22-2-M	Arsenic	481378.09	1351944.40
	0"-12"	A9P1-C-12-23-2-M	Arsenic	481342.34	1351983.37
	0"-12"	A9P1-C-12-24-2-M	Arsenic	481355.72	1352039.43
	0"-12"	A9P1-C-12-25-2-M	Arsenic	481279.17	1351889.27
	0"-12"	A9P1-C-12-26-2-M	Arsenic	481299.48	1351955.70
	0"-12"	A9P1-C-12-27-2-M	Arsenic	481305.30	1352019.46
	0"-12"	A9P1-C-12-28-2-M	Arsenic	481284.62	1352072.09
	0"-12"	A9P1-C-12-29-2-M	Arsenic	481232.99	1351872.24
	0"-12"	A9P1-C-12-30-2-M	Arsenic	481227.13	1351946.49
	0"-12"	A9P1-C-12-30-2-M-D	Arsenic	481227.13	1351946.49
	0"-12"	A9P1-C-12-31-2-M	Arsenic	481241.05	1352005.59
	0"-12"	A9P1-C-12-32-2-M	Arsenic	481242.22	1352055.04
	0"-12"	A9P1-C-12-33-2-P	Aroclor-1260	481328.68	1351971.02
13	0"-12"	A9P1-C-13-17-2-P	Aroclor-1260	481573.69	1351972.53

TABLE 1
SAMPLE LOCATIONS AND IDENTIFIERS

LOCATION ID	DEPTH	SAMPLE ID	ANALYSIS	EAST-83	NORTH-83
14	0'-12"	A9P1-C-14-17-2-R	Radium-226	481904.80	1351888.07
	12'-36"	A9P1-C-14A-17-3-R	Radium-226		
	36'-48"	A9P1-C-14A-17-8-V	Archive		
	0'-12"	A9P1-C-14-18-2-R	Radium-226	481890.31	1351955.47
	12'-36"	A9P1-C-14A-18-3-R	Radium-226		
	36'-48"	A9P1-C-14A-18-8-V	Archive		
	0'-12"	A9P1-C-14-19-2-R	Radium-226	481905.44	1352031.37
	12'-36"	A9P1-C-14A-19-3-R	Radium-226		
	36'-48"	A9P1-C-14A-19-8-V	Archive		
	0'-12"	A9P1-C-14-20-2-R	Radium-226	481888.46	1352071.37
	12'-36"	A9P1-C-14A-20-3-R	Radium-226		
	36'-48"	A9P1-C-14A-20-8-V	Archive		
	0'-12"	A9P1-C-14-21-2-R	Radium-226	481816.10	1351864.77
	12'-36"	A9P1-C-14A-21-3-R	Radium-226		
	36'-48"	A9P1-C-14A-21-8-V	Archive		
	0'-12"	A9P1-C-14-22-2-R	Radium-226	481849.31	1351957.08
	12'-36"	A9P1-C-14A-22-3-R	Radium-226		
	36'-48"	A9P1-C-14A-22-8-V	Archive		
	0'-12"	A9P1-C-14-23-2-R	Radium-226	481847.30	1351994.83
	12'-36"	A9P1-C-14A-23-3-R	Radium-226		
	36'-48"	A9P1-C-14A-23-8-V	Archive		
	0'-12"	A9P1-C-14-24-2-R	Radium-226	481841.82	1352048.53
	12'-36"	A9P1-C-14A-24-3-R	Radium-226		
	36'-48"	A9P1-C-14A-24-8-V	Archive		
	0'-12"	A9P1-C-14-25-2-R	Radium-226	481773.85	1351867.93
	12'-36"	A9P1-C-14A-25-3-R	Radium-226		
	36'-48"	A9P1-C-14A-25-8-V	Archive		
	0'-12"	A9P1-C-14-26-2-R	Radium-226	481802.91	1351939.96
	12'-36"	A9P1-C-14A-26-3-R	Radium-226		
	36'-48"	A9P1-C-14A-26-8-V	Archive		
	0'-12"	A9P1-C-14-27-2-R	Radium-226	481783.00	1352019.43
	12'-36"	A9P1-C-14A-27-3-R	Radium-226		
	36'-48"	A9P1-C-14A-27-8-V	Archive		
	0'-12"	A9P1-C-14-28-2-R	Radium-226	481786.92	1352073.26
	12'-36"	A9P1-C-14A-28-3-R	Radium-226		
	36'-48"	A9P1-C-14A-28-8-V	Archive		
	0'-12"	A9P1-C-14-29-2-R	Radium-226	481698.18	1351900.61
	12'-36"	A9P1-C-14A-29-3-R	Radium-226		
	36'-48"	A9P1-C-14A-29-8-V	Archive		
	0'-12"	A9P1-C-14-30-2-R	Radium-226	481736.69	1351941.14
	12'-36"	A9P1-C-14A-30-3-R	Radium-226		
	36'-48"	A9P1-C-14A-30-8-V	Archive		
	0'-12"	A9P1-C-14-31-2-R	Radium-226	481697.99	1351985.94
	12'-36"	A9P1-C-14A-31-3-R	Radium-226		
	36'-48"	A9P1-C-14A-31-8-V	Archive		
	0'-12"	A9P1-C-14-31-2-R-D	Radium-226	481697.99	1351985.94
	12'-36"	A9P1-C-14A-31-3-R-D	Radium-226		
	36'-48"	A9P1-C-14A-31-8-V-D	Archive		
	0'-12"	A9P1-C-14-32-2-R	Radium-226	481724.16	1352056.64
	12'-36"	A9P1-C-14A-32-3-R	Radium-226		
	36'-48"	A9P1-C-14A-32-8-V	Archive		
	0'-12"	A9P1-C-14-33-2-P	Aroclor-1260	481805.36	1351973.69
15	0'-12"	A9P1-C-15-17-2-P	Aroclor-1260	482031.35	1351975.16
16	0'-12"	A9P1-C-16-17-2-P	Aroclor-1260	482269.16	1351977.26
17	0'-12"	A9P1-C-17-17-2-P	Aroclor-1260	482516.30	1351979.45
18	0'-12"	A9P1-C-18-17-2-P	Aroclor-1260	482732.61	1352148.44
19	0'-12"	A9P1-C-19-17-2-P	Aroclor-1260	482940.41	1352166.92
20	0'-12"	A9P1-C-20-17-2-P	Aroclor-1260	483157.22	1352186.52



A9P1 CU & SUB CU BOUNDARIES & ADDITIONAL CERTIFICATION SAMPLING LOCATIONS (V/F 21120-PSP-0003-10)

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-11
WBS NO.: PROJECT/DOCUMENT/ECDC #21120-PSP-0003 REV 0	Page 1 of 1
PROJECT TITLE: PSP for Area 9 Phase I Certification Sampling	Date 05/08/02

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents the movement of four sample points greater than three feet from the locations listed in the PSP.

1) A9P1-C-3-6 was re-located to northing 483427.996 and easting 1352770.165

2) A9P1-C-7-12 was re-located to northing 481880.821 and easting 1352511.849

3) A9P1-C-7-16 was re-located to northing 481774.152 and easting 1352473.207

4) A9P1-C-9-12 was re-located to northing 480897.048 and easting 1352520.752

Justification

1) The original sample location for A9P1-C-3-6 was a steep slope. The point was re-located to a flatter surface where a boring could be completed.

2) The original sample location was in a wooded area. The point was re-located to an open field where a boring could be completed.

3) The original sample location was in a wooded area. The point was re-located to an open field where a boring could be completed.

4) The original boring was located in a rocky area; re-locating the boring ensured sufficient sample soil mass.

REQUESTED BY: Ana Madani Date: 05/08/02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN	DATE
X	QUALITY ASSURANCE	5-9-02	X	PROJECT MANAGER	5/9/02
	DATA QUALITY MANAGEMENT		X	Characterization Manager	5/9/02
	ANALYTICAL CUSTOMER SUPPORT		X	Sampling Manager	5/9/02

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

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

VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-12
WBS NO.: PROJECT/DOCUMENT/ECDC #21120-PSP-0003 REV 0	Page 1 of 2
PROJECT TITLE: PSP for Area 9 Phase I Certification Sampling	Date 07-31-02

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents the clarification of the use of duplicate analyses and duplicate samples for the gamma spectroscopy method to satisfy the ASL D precision requirements as stated in the Sitewide CERCLA Quality (SCQ) Assurance Project Plan.

The requirements stated in this PSP in section 4.0 Quality Assurance/Quality Control Requirements, as well as in Appendix A: Data Quality Objectives SL-052, Rev. 3 direct the laboratory to follow the quality control requirements of the SCQ, which are located in Section 4 and Appendix G with definitions located in the Glossary.

The SCQ uses terms like duplicate, duplicate sample, and duplicate or replicate analysis inconsistently. Therefore, to assure that proper quality control measures were taken with respect to precision, the following summary is provided:

Table G-4, Criterion: 26 for Gamma Emitting Isotopes at ASL D requires the laboratory to analyze a *Duplicate Sample* to assess precision. (see Attachment 1) A *Duplicate Sample* is defined in Section 4.1.1 of the SCQ as *"Duplicate sample analyses are used to evaluate precision of analytical laboratory performance and sample collection techniques. Duplicate samples are independent samples prepared by field sampling teams in the same manner as the original sample..."* (see Attachment 2)

By this definition, *Duplicate Samples* have been collected and analyzed at the proper frequency for this entire project and the laboratory satisfied the requirements.

The Glossary defines a duplicate sample within the definition of a *Duplicate*. Here a *Duplicate* is defined as "A duplicate may be a second analysis (or count) of the same sample (duplicate analysis) or <u>identical analyses of two samples that were obtained from a single sample (duplicate sample).</u>" (see Attachment 3) The *Duplicate Sample* in this definition is the underline portion of the definition.

In addition to the *Duplicate Sample* (collected in the field) the laboratory performed a second analysis (recount) of the same dried, ground, and sealed portion of the sample to assess instrumental precision. This definition of a Duplicate falls under *duplicate analysis* and is consistent with the guidance in Section 4 of the SCQ.

Section 4.2.1 of the SCQ entitled Analytical Precision states "A routine program of <u>duplicate</u> or replicate <u>analysis</u> must be established to assess the precision of an analytical method, instrument, or laboratory analysis... The Relative Error Ratio (RER) is used to assess the precision of duplicate measurements for radiochemical analyses. See Appendix G, Table G-4 for a definition of RER." (see Attachment 4) The first line of this section calls for *Duplicate Analysis* but the last line of this section reverts back to Table G-4, which calls for the *Duplicate Sample*.

No change in analytical processes or sample collection methods needed to take place.

Justification

The use of the *Duplicate Sample* that was collected in the field in conjunction with the *Duplicate Analysis* as used by the laboratory meets the requirements for the evaluation of precision as directed by the SCQ.

The intent of a duplicate sample is to evaluate the precision of sampling techniques, sample preparation techniques, and instrumental analysis. This is satisfied by the collection of duplicate samples in the field by the sampling team and by subjecting these duplicate samples to the same preparation and analysis as a true sample. The duplicate analysis performed by the laboratory satisfies the SCQ requirements stated in Section 4.2.1.

This is consistent with the recent Certification Sampling and Analysis that has been performed in other areas of the site.

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VARIANCE / FIELD CHANGE NOTICE	V/F 21120-PSP-0003-12
WBS NO.: PROJECT/DOCUMENT/ECDC #21120-PSP-0003 REV 0	Page 2 of 2
PROJECT TITLE: PSP for Area 9 Phase I Certification Sampling	Date 07-31-02

REQUESTED BY: Frank Miller Date: 07-31-02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN	DATE
X	QUALITY ASSURANCE	8/05/02	X	PROJECT MANAGER	8/5/02
X	DATA QUALITY MANAGEMENT	8/7/02	X	CHARACTERIZATION MANAGER	8/5/02
X	ANALYTICAL CUSTOMER SUPPORT	8/5/02	X	LABORATORY MANAGER	8/5/02

VARIANCE/FCN APPROVED [X]YES [ ]NO REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

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

ATTACHMENT 1

TABLE G-4 RADIOCHEMICAL PERFORMANCE CRITERIA (Page 26 of 32)					
CRITERION: 26	ANALYTICAL SUPPORT LEVEL (ASL) C & D				
ANALYTE: Gamma Emitting Isotopes[7]	SAMPLE MATRIX				
PERFORMANCE PARAMETERS	WATER	SOIL/ SEDIMENT	AIR FILTERS[2]	FLY ASH	CONTAMINATED LIQUID[3]
Highest Allowable Minimum Detectable Concentration (HAMDC)[1]	4.0 pCi/L	0.2 pCi/g	10 pCi/Filter	1.0 pCi/g	10 pCi/L
Percent Overall Tracer/Chemical Recovery	N/A	N/A	N/A	N/A	N/A
Method Blank Concentration	<HAMDC[4]	<HAMDC[4]	<HAMDC[4]	<HAMDC[4]	<HAMDC[4]
Laboratory Control Sample: Percent of Known Value[6]	85-115%	80-120%	80-120%	80-120%	80-120%
Precision Requirements for Duplicate Samples	RER 2[5]	RER 2[5]	RER 2[5]	RER 2[5]	RER 2[5]

(1) The Minimum Detectable Concentration (MDC) must be computed as follows: $MDC = \frac{4.65 * [S_{BKG}]}{K} + \frac{2.71}{T * K}$

where S_{BKG} is the standard deviation of the count rate for an appropriate background count; K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency, and chemical recovery; and T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing about 90% Water + 10% Organic liquid.

(4) When the concentration of a radionuclide in a sample is significantly greater than the applicable HAMDC, the Radiochemical Analysis Performance Specifications for the HAMDC and Method Blank Concentration are waived. Counts may be terminated earlier than usual provided that the one sigma uncertainty in the net count-rate of the sample(s) in question is ten percent (10%) or less. The measured result for the blank must not exceed the HAMDC or five percent (5%) of the activity concentration of the least active sample in the batch.

(5) Relative Error Ratio, RER = $|C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective one sigma total propagated uncertainties. Measurements are acceptable if RER 2. If RER is greater than 2 but less than or equal to 3, investigate the cause and take corrective actions if RER is consistently greater than 2. If RER > 3, take corrective actions and reanalyze the batch of samples.

(6) Recoveries or percentages of known values which are 15% above or below the ranges listed are acceptable on an infrequent basis, e.g., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

(7) All samples must be counted for a length of time and in a geometry that will achieve the stated HAMDC for Cs-137. When this is accomplished, the Minimum Detectable Concentration (MDC) obtained for any other isotope in the spectrum will be considered acceptable, unless HAMDC requirements for other isotopes are specifically stated in a project-specific plan, sampling plan, or laboratory contract. For any gamma emitter determined to be above the respective detection limit, report the radionuclide concentration and also the MDC as determined by the equation in footnote 1.

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In the laboratory, an extract from the container is prepared and analyzed for parameters of interest. Container suppliers provide QA certification information on batches of pre-cleaned containers if requested. In some cases, additional container blanks may be necessary. Container blanks may be necessary when unsealed containers are used, container custody seals and associated documentation is not available, or locally cleaned containers are used. Use of container blanks is appropriate for ASLs B, C, D, and E analyses.

Duplicate sample analyses are used to evaluate precision of analytical laboratory performance and sample collection techniques. Duplicate samples are independent samples prepared by field sampling teams in the same manner as the original sample. They are collected as close as possible to the same point in space and time as the original sample, placed in separate sample containers, assigned unique identification numbers and sent as blind samples to the same laboratory as the original samples to be analyzed independently, providing an intra-laboratory comparison of results. Duplicate samples are required for ASLs C and D and may be appropriate for other ASLs as determined by DQOs.

Split sample analyses are used to evaluate precision of analytical laboratory performance as well as some aspects of field sample handling practices. Split samples are prepared by field sampling teams at sampling locations by subsampling a homogenous sample into two or more portions or sets of sample containers and submitting each portion (split sample) as a separate sample to the laboratory for analysis. Split samples provide results for interlaboratory or intralaboratory comparison. When a non-fluid matrix split sample is collected, the homogenization and subsampling procedures shall be presented in the work plan. Split samples may be required for ASLs B, C, and D.

Field spike control samples are used to determine precision and accuracy of analytical laboratory performance. They are prepared in a laboratory environment and transported to the sampling site for numbering and shipment to the laboratory with the remaining field samples. If required, field spike control samples are included once every sixty days or at least once per project, more frequently if appropriate, or when accuracy of a particular laboratory is in question. When necessary, the collection of a field spike control sample shall be stipulated in the PSP, and the quantitative requirements for accuracy the by chosen analytical method shall be justified. Field spike control samples may be specified for ASLs B through E.

Material blanks are samples of material used in construction, decontamination, or other activity (e.g., drilling fluids, annular sealants, cleaning solutions) that are retained for quality control purposes when unexpected contaminants are detected in related media. A material blank shall be collected in a controlled environment from each solution or mixture of materials (e.g., cleaning solutions and drilling fluids) that have the potential to introduce contamination not otherwise present in the media being sampled. These samples shall be clearly marked as retained samples and placed in an archive for future analysis if an anomalous contamination is identified upon review of sample analysis. Material blanks may be analyzed at any ASL.

ATTACHMENT 3

Controlled-Document Coordinator. The controlled document coordinator is a Fluor Fernald representative responsible for issuing, tracking, and distributing revisions to controlled documents at the FEMP.

Data Package. See Sample Delivery Group.

Data Qualifiers. Data qualifiers are specifically defined letters, groups of letters, and symbols used by data validators to qualify the useability of data.

Data Quality Organization. The FEMP data quality organization is the group that is responsible for the management of activities necessary to verify and assure compliance of data generation functions with the appropriate site and regulatory requirements.

Dedicated Equipment. Dedicated equipment are systems exclusive to a location or purpose.

Designated FEMP Quality Assurance Organization. The Quality Assurance group of Fluor Fernald is designated by DOE to be responsible for oversight of QA functions of contractors and subcontractors onsite. The designated FEMP Quality Assurance Organization may utilize Quality Assurance resources of other contractor and subcontractor organizations to fulfill its duties.

Designee. A designee is an individual designated to perform a function in place of the defined responsible individual. The delegation of authority to a designee must be documented in the project record and must include the scope and length of time the delegation is in effect.

Deviation. A deviation is any departure from a specified requirement; it is used interchangeably with nonconformance. It can be a condition in which a characteristic of an item does not conform to prescribed limits, a required document is not available or is inadequate, a regulatory requirement was violated, or a procedure does not yield desired results.

DQO Coordinator. The DQO coordinator is responsible for overall control of the DQO process at the FEMP. This includes assigning DQO numbers, ensuring that all required approvals have been received, distributing the approved controlled documents, and storing the DQO files.

Duplicate. A duplicate may be a second analysis (or count) of the same sample (duplicate analysis) or identical analyses of two samples that were obtained from a single sample (duplicate sample).

Electro-Fishing. This refers to a fresh-water fish sampling method that uses a pulsating direct current electro-shocker between 300 and 30,000 ohms to stun fish for collection.

Environmental Safety and Health Organization (ES&H). ES&H is the Fluor Fernald group responsible for the radiological and industrial safety of FEMP workers. ES&H may utilize expertise and resources of other contractor and subcontractor organizations to fulfill its duties.

If additional types or frequencies of these QC samples are required, they will be specified in the PSP.

G. Performance evaluation samples supplied by National Performance Evaluation Programs are used to review the comparability of analytical results for all laboratories performing analysis for the FEMP. Results are evaluated against the expected value and against results from other participating laboratories. Each laboratory shall participate in at least one study for the analytes that it analyzes for the FEMP.

4.2 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

The fundamental QA objective, with respect to accuracy, precision, and sensitivity of laboratory analyses, is to meet QC acceptance criteria of analytical protocols. The accuracy, precision, and sensitivity objectives for each major measurement parameter at the FEMP are pertinent to laboratory methods. Specific information on accuracy, precision, and sensitivity is presented in Section 14.

Standard operating procedures shall be written for laboratory analyses and field analyses, and shall include required accuracy, precision, and sensitivity specifications for the analyses. PSPs shall include project required precision, accuracy, representativeness, completeness and comparability guidelines.

4.2.1 Analytical Precision

A routine program of duplicate or replicate analysis must be established to assess the precision of an analytical method, instrument, or laboratory analysis. Results of these analyses are used to calculate relative percent difference for duplicates, matrix spike duplicates, or replicates (see Section 14 for further explanation, including the equation for evaluating relative percent difference). Relative percent difference values may be used to generate precision control charts for organic and inorganic laboratories. The Relative Error Ratio (RER) is used to assess the precision of duplicate measurements for radiochemical analyses. See Appendix G, Table G-4 for a definition of RER.

Range analysis may be used to evaluate the precision or reproducibility of radiological data derived from methods for which performance data are not currently available. Statistical range analysis is used to calculate the expected mean range and control limits for a replicate or duplicate result and assess whether the result is "in control." A range analysis result that lies within three standard deviations of the mean is considered in control. Range analysis results greater than three standard deviations from the mean are considered to be "out of control." Results that are out of control may be re-analyzed as required by the method, or results may be flagged or qualified for use during data validation (refer to Appendix D).

4.2.2 Laboratory Accuracy

Analytical results of laboratory control samples, method blanks, matrix spikes/matrix spike duplicates, field blanks, and container blanks must be assessed along with a periodic program of sample spiking to assess the accuracy of a chemical method or a chemical laboratory analysis. The results of sample spiking are used to calculate percent recovery, which is the quality control indicator for accuracy. Percent recovery of matrix spikes is used to generate accuracy control charts.

APPENDIX C

NON-CONFORMANCE REPORT #272

VALIDATED
QUALITY RECORD
INITIAL DS DATE 5/3/02

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NONCONFORMANCE REPORT FORM

	ORIGINATOR/ASSESSOR	
1	**Nonconformance Number/Revision**	NCR No.: 272 Revision No. 0
2	**Dates**	Date Discovered: Feb. 20, 2002 Date NCR Issued: Feb. 20, 2002
3	**Type of Nonconformance**	[X] FINDING [ ] CONCERN
4	**Project Number Project/Activity @ Fac/Loc/Bldg.**	ARP/ALS Radiological Building
5	**Hazard Category**	Nuclear: [ ] 1 [ ] 2 [ ] 3 Radiological: [ ] Non-Nuclear: [ ] High Hazard [ ] Moderate Hazard [ ] Low Hazard Industrial: [X] Standard Industrial Hazard [ ] Other Industrial Hazard Not Designated [ ] Desktop review, document review, etc.
6	**Assessment**	[X] Internal (Site) [ ] External (OEPA, DOE) [ ] Supplier/Vendor_____
7	**Assessment Type**	[ ] Audit [ ] Surveillance [ ] Inspection [ ] Self Assessment [X]Other Was brought to my attention by Amy Meyer
8	**Assessment Number**	N/A
9	**Responsible Program/Project Division/Vendor**	[ ] WPRAP [ ] D&DP [ ] S&DFP [ ] M&IS [ ] WGS [X] ARP [ ] ESH&Q [ ] SP [ ] CPM [ ] NMD [ ] OP [ ] ADM [ ]Supplier/Vendor/Subcontractor [ ] Other
10	**Responsible Department/Vendor**	ALS/IOA Lab
11	**Responsible Manager/Supervisor/Vendor (Print Name)**	(For Concerns, assign to Project/Program Director Amy Meyer & Roy Cohen
12	**Functional Area (NA for Vendors)** (choose any that apply) (Ref. RM-0016)	[ ] CM [ ] ED [ ] RD [ ] MS [X] QA [ ] AC [ ] PM [ ] PI [ ] FM [ ] EP [ ] EW [ ] MT [ ] OP [ ] PT [ ] SE [ ] TR [ ] CT [ ] HR [ ] PC [ ] EM [ ] FP [ ] NS [ ] SH [ ] RP
13	**QA Criteria** (choose one that applies Ref. RM-0012) Other Criteria (CONOPS, etc.) (not RM-0012 applicable)	[ ] 1 Program [ ] 2 Training [ ] 3 Quality Improvement [ ] 4 Document/Records [X] 5 Work process [ ] 6 Design [ ] 7 Procurement [ ] 8 Inspect/Test [ ] 9 Management Assessment [ ] 10 Independent Assessment [ ] Other
14	**Requirement Description** Cite the requirement (clearly, concisely, and completely) and its source, including document identification number, page and paragraph number. A copy of the document (or page of the document) in which the requirement appears may be attached or added to the NCR file. Use additional or separate sheets as necessary.	**RM-0012 "Quality Assurance Program"** 5.6.2 Fluor Fernald Leadership Shall: • Ensure procedures, instructions, and work control documents include requirements for process controls and formal qualifications. Work-related forms of directions shall include clearly identifiable caution statements when warranted.
15	**Nonconformance Description** Describe the nonconformance. Include details such as supplier names, container numbers, purchase order, work order, or requisition numbers) and clearly describe the deviation from the written requirement. Use additional or separate sheets as necessary.	Method 6523 Rev. 3 "The Determination of Metals by Leeman ICP-AES" does not instruct analysts to turn **OFF** the Interelement Correction Lines when analyzing for Beryllium. This is critical in Beryllium analysis by not turning off the Interelement Correction Lines a false positive is created. In a resent study this resulted in the reporting of false positive data to the customer for Beryllium.
16	**Tagging Required / Number of Tags**	[ ] Yes [X] No Number of Tags: N/A
17	**Originator/Assessor**	Name: David Whittington Signature: David Whittington Date: Feb. 20, 2002
	MANAGER/SUPERVISOR'S REVIEW	
18	**Manager/Supervisor (Trained/Briefed on QA-0001)**	Name: Mike McLane Signature: Mike McLane Date: 2/20/2002
19	**Response Date From Responsible Organization**	REQUESTED RESPONSE DATE: 3/20/02 (Reply within 20 working days)

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NONCONFORMANCE REPORT FORM

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RESPONSIBLE ORGANIZATION'S CORRECTIVE ACTION RESPONSE

	Nonconformance Number/Revision	NCR No.: 272 Revision No. 0
20	**Root Cause Analysis** Provide documentation as attachment. Use additional or separate sheets as necessary	[ ] YES [✓] NO Level 1 Cat.: [ ] (human performance.) [ ] (natural phenom/sabotage [ ] (equip.) [ ] (other) [ ] Supplier/Vendor/Subcontractor (root cause per their program) List Cause: N/A
21	**Corrective Action (CA) Description and Disposition** Describe the actions necessary to correct the nonconformance. Corrective actions must be detailed and complete. They must be written in a clear, concise, and verifiable manner. The corrective action must also include actions to prevent recurrence. Use additional or separate sheets as necessary. (A disposition of Accept-as-is or Repair REQUIRES a written Technical Concurrence/Justification below)	A) Hardware NCR: → [ ] Accept-as-is [ ] Repair [ ] Rework [ ] Reject B) Non-Hardware NCR: → [✓] Other: See Attached Corrective Action Plan [ ] Yes [ ] NA samples were rerun with the U+Th lines shut off. see attached (RERUN SHEET ITEM 3)
22	**Technical Concurrence/Justification (mark NA if not applicable)**	Name: N/a Signature: Date:
23	**Was a Design Change Notice Required?**	[ ] Yes [✓] No DCN # N/A Date Issued
24	**Was a SBDR Performed?** **Was a USQD Performed?**	[ ] Yes [✓] No SBDR # N/A Date Issued [ ] Yes [✓] No USQD # Date Issued
25	**Actions taken to Prevent Recurrence** Use additional or separate sheets as necessary.	Staff were notified of this oversight & cross-checker will examine data to ensure these lines are de activated (except where U+Th are known to be present.)
26	**Proposed Completion Date For CA**	Date: ~~3/15/02~~ 5/01/02 R(2/22/02
27	**Responsible Manager/Supervisor/Vendor**	Name: Roy Cohen Signature: Roy Cohen Date: 2/21/02

EVALUATION OF THE CORRECTIVE ACTION RESPONSE BY THE ORIGINATOR/ASSESSOR

28	**Response Acceptable?**	[✓] Yes [ ] No
29	**Originator's/Assessor's**	Name: DAVID WHITTINGTON Signature: David Whittington Date: 2/22/02

COMPLETION OF THE CORRECTIVE ACTIONS BY THE RESPONSIBLE ORGANIZATION

30	**Date Corrective Action Completed**	Date: 4-30-02 (see attached) Email from Amy Item 1 Rev 4-30-02
31	**Responsible Manager/Supervisor/Vendor**	Name: Amy Meyer Signature: Amy Meyer Date: 4-30-02

VERIFICATION OF COMPLETED CORRECTIVE ACTIONS BY THE VERIFIER

32	**Verification Action** (Describe what objective evidence was examined to verify completion of this action and attach documentation to the NCR)	ATTACHED E-MAIL FROM AMY MEYER TO STEPHEN DAUGHERTY CANCELING PROCEDURE 6523, THIS IS THE PROCEDURE THE NCR WAS WRITTEN ON. ALSO SEE ROY COHEN'S EMAIL (ITEM 2) AMY'S NOTE AT BOTTOM. ROY RERAN SAMPLES SEE ITEM 3 THE RERUN OF SAMPLES.
33	**Verifier**	Name: DAVID WHITTINGTON Signature: David Whittington Date: 4-30-02

CLOSURE BY THE VERIFIER'S MANAGER/SUPERVISOR

34	**Verifier's Manager/Supervisor (NCR Closed)**	Name: Mike Malone Signature: Mike Malone Date: 4/30/02