CERTIFICATION REPORT FOR AREA 6 WASTE PITS 1, 2, AND 3, THE BURN PIT, THE CLEARWELL, AND THE AREAS WEST AND NORTH OF THE WASTE PITS

FERNALD CLOSURE PROJECT
FERNALD, OHIO

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U.S. DEPARTMENT OF ENERGY

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LIST OF ACRONYMS AND ABBREVIATIONS

ASCOC	area-specific constituent of concern
ASL	analytical support level
BTV	benchmark toxicity value
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	constituent of concern
CRARE	Comprehensive Response Action Risk Evaluation
CRDL	Contract Required Detection Limit
CU	certification unit
DOE	U.S. Department of Energy
ECOC	ecological constituent of concern
EPA	U.S. Environmental Protection Agency
FCP	Fernald Closure Project
FRL	final remediation level
GMA	Great Miami Aquifer
HAMDC	highest allowable minimum detectable concentration
HPGe	high-purity Germanium (detector)
HQ	hazard quotient
ICP-AES	inductively coupled plasma-atomic emission spectroscopy
ICP-MS	inductively coupled plasma-mass spectrometry
ILCR	incremental lifetime cancer risk
keV	kiloelectron volt.
m^2	square meters
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
MDL	minimum detection level
mg/kg	milligrams per kilogram
OEPA	Ohio Environmental Protection Agency
OSDF	On-Site Disposal Facility
OU	Operable Unit
PCB	polychlorinated biphenyl
pCi/g	picoCuries per gram
PSP	Project Specific Plan
RAIS	Oak Ridge Risk Assessment Information System
RAWP	Remedial Action Work Plan
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SP	Soil Stockpile
SVOC	semi-volatile organic compound
TPU	total propagated uncertainty
UCL	upper confidence limit
V/FCN	Variance/Field Change Notice

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

V&V	verification and validation
VOC	volatile organic compound
WAC	waste acceptance criteria

EXECUTIVE SUMMARY

This Certification Report presents the information and data used by the U.S. Department of Energy (DOE) to determine that soils in Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits meet established final remediation levels (FRLs). Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits are located in the western and northern portion of the Fernald Closure Project (FCP).

This Certification Report includes details of the certification sampling, analysis, and validation that took place in Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits. Figure 1-1 depicts the original layout of Area 6 and Figure 1-2 the portion of Area 6 that is to be certified.

Consistent with the Sitewide Excavation Plan (DOE 1998), these areas underwent predesign, excavation, and precertification activities, including the use of real-time instrumentation as well as physical sampling and analysis. As a result of these activities, it was determined that no further remediation was necessary prior to certification.

The SEP also has specific statistical criteria for certification. These criteria state: 1) the average primary area-specific constituent of concern (ASCOC) concentrations within a certification unit (CU) must be below FRLs at a 95 percent upper confidence level (UCL) (90 percent UCL for secondary ASCOCs), and 2) that no certification result can be greater than twice the FRL (the hotspot criterion). If either of these criteria is not met, then further investigation and possible excavation is required. If both of these criteria are met for a CU, then it can be released for development of the final land use.

During the certification process, CUs A6WP-C12, A6WP-C13, A6WP-C17, A6WP-C19, and A6WP-C21 failed the certification requirements for one or more of the following constituents of concern; aroclor-1254, aroclor-1260, technetium-99, and/or total uranium. The areas were excavated and additional samples were collected within the affected sub-CUs and at some of the archive locations around the affected sub-CUs. Following the re-sampling, the pre-excavated data was replaced with the new data and the data from the archive locations were included in the statistics for these CUs. Each affected CU is discussed further in Sections 3.2 and 5.1.

There were also two CUs, A6WP-C11 and A6WP-C16, in which the 95 percent UCL on the mean was greater than the FRL for radium-226, and there was one CU, A6WP-C10, that had one radium-226 result that was greater than two times the FRL, but the 95 percent UCL on the mean was less than the FRL. Although these are considered failures by the certification process, the OU5 ROD (Section 10.1.1) states

that the selected remedy remains protective of human health and the environment if the cumulative risk for all contaminants is below $1x10^{-4}$ and the hazard index is less than one.. The risk assessment presented in Section 5.2 demonstrates that no further action is needed for these CUs (i.e., the incremental lifetime cancer risk is less than $1x10^{-4}$ and the hazard index is less than one for the undeveloped park user in the former waste pit area). Additionally, the Oak Ridge Institute for Science and Education (ORISE) conducted an independent radiological survey of the waste pits and they concluded that the remedial actions were effective in meeting the established FRLs (ORISE 2006).

Upon completion of final certification statistics, all of the Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits CUs, with the exception of the special cases noted above, pass the certification criteria. Additionally, following the protocols of the Closure Plan Review Guidance for Resource Conservation and Recovery Act Facilities (OEPA 2004), written by the OEPA Division of Hazardous Waste Management, all hazardous waste management units within this area are closed. On the basis of this reported information and supporting project files, DOE has determined that no additional remedial actions are required in this portion of the site. The area will be considered certified when the U.S. Environmental Protection Agency and OEPA concur that certification criteria have been met. DOE intends to proceed with final land use activities as outlined in the Natural Resource Restoration Plan (DOE 2002).

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

1.0 INTRODUCTION

1.1 PURPOSE

This Certification Report presents the information and data used by the U.S. Department of Energy (DOE) to determine that soils in Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits meet the established final remediation levels (FRLs), with the exception of three CUs in Waste Pit 3 that failed the certification criteria for radium-226. However, the OU5 ROD (Section 10.1.1) indicates that the selected soil remedy must protect human health and the environment by maintaining a cumulative risk below 1×10^{-4} and a hazard index below one. Therefore, due to the considerable effort and resources that were expended to chase the radium-226 contamination (Section 3.1), risk assessment calculations (Section 5.2) are used to demonstrate that the residual levels of radium-226 in this isolated location are protective of human health and the environment.

Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, as defined for this certification effort, are located in the western and northern portion of the Fernald Closure Project (FCP). On the basis of this reported information and supporting project files, DOE has determined that no additional remedial actions are required in this portion of the site.

1.2 BACKGROUND

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

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

In the SEP, the FCP was divided into distinct remedial areas and phases for soil remediation, based on the operable units' remediation schedule. After all necessary remediation is completed within each area/phase, the soil is certified as having attained all clean up goals (i.e., FRLs). The general approach for the removal of contaminated soil and debris in Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits followed "Excavation Approach B - Excavation In Waste Storage/ Management Areas Outside The Former Production Area," as described in Section 4.2 of the SEP.

1.3 SCOPE AND AREA DESCRIPTION

The scope of this Certification Report includes details of certification sampling, analysis and validation that took place in Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits. Figure 1-1 depicts the layout of the entire Area 6 and Figure 1-2 the areas to be certified under this Certification Report.

Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits are located in the western and northern portion of the FCP. The entire Area 6 is approximately 86 acres. However, as shown on Figure 1-3, only approximately 21 acres will be included in the scope of this Certification Report. The Area 6 General Areas will be included in the scope of other certification efforts to be defined at a later time.

1.4 OBJECTIVES

The objectives of this Certification Report are:

- Summarize the precertification and remedial activities,
- Describe the analytical methods, data validation processes, data reduction and statistical processes used to support the certification process,
- Present certification sampling results for all certification units (CUs),
- Present the statistical analysis showing that all CUs have passed the certification criteria, including FRL attainment and hotspot criteria, and
- Describe access controls implemented to prevent recontamination.

1.5 REPORT FORMAT

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

Section 1.0 Introduction: Purpose, background, area description, scope, and objectives of the report

Section 2.0 Certification Approach: The approach for certification sampling and analysis

Section 3.0 Overview of Field Activities: Historical data evaluation, precertification, area preparation, excavation 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

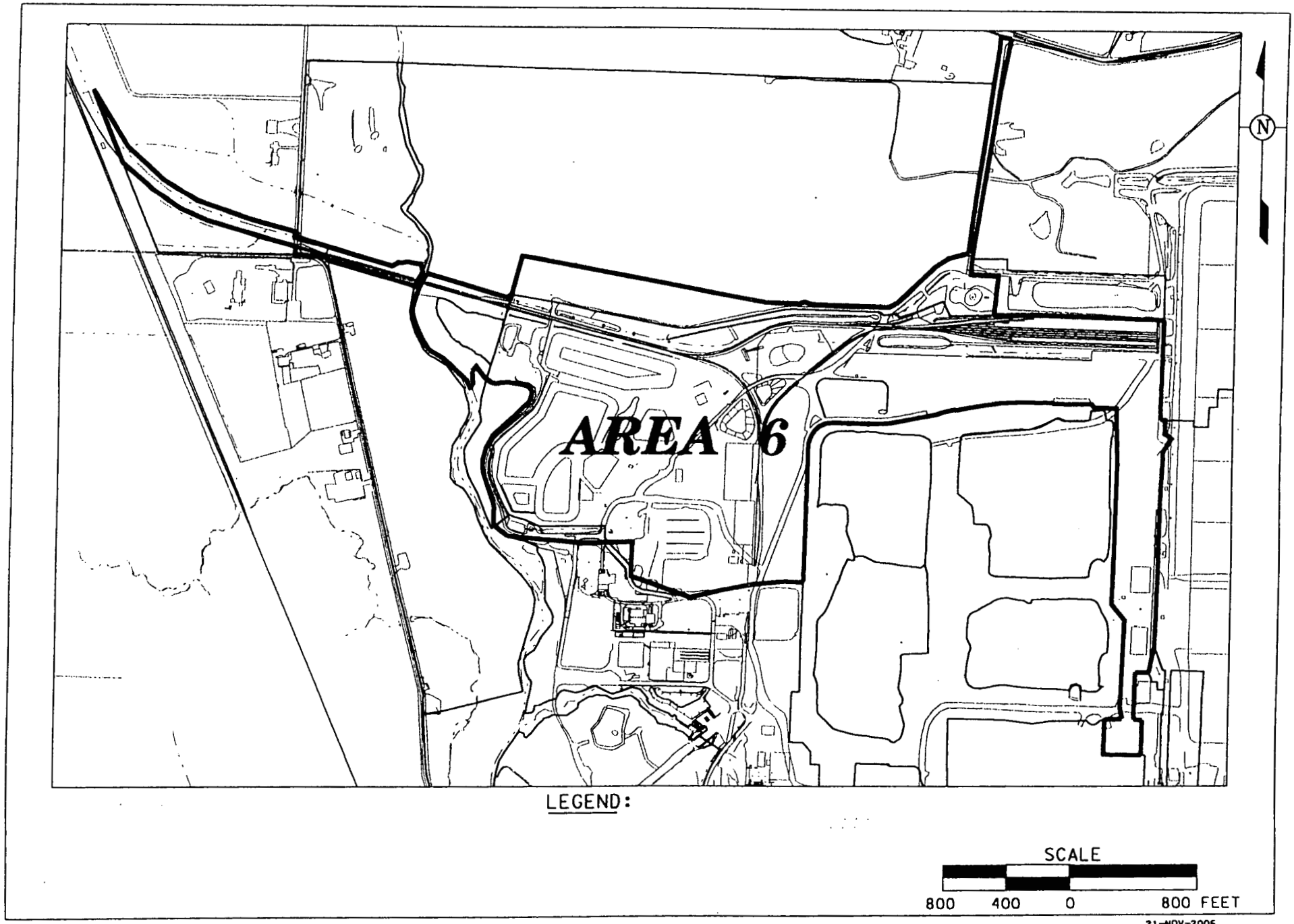
Appendix A Certification Samples, Analytical Results, and Statistics Tables

Appendix B Variances/Field Change Notices (V/FCNs) for the Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Design Letter (CDL) and Certification Project Specific Plan (PSP, DOE 2006)

Appendix C Risk Assessment Calculations

1.6 FCP MASTER CERTIFICATION MAP

In order to track certification and restoration at the FCP, DOE updates a controlled map (Figure 1-4) showing the status of the soil remediation areas and phased areas with all Certification Reports. This map has been updated to include certification of Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits.



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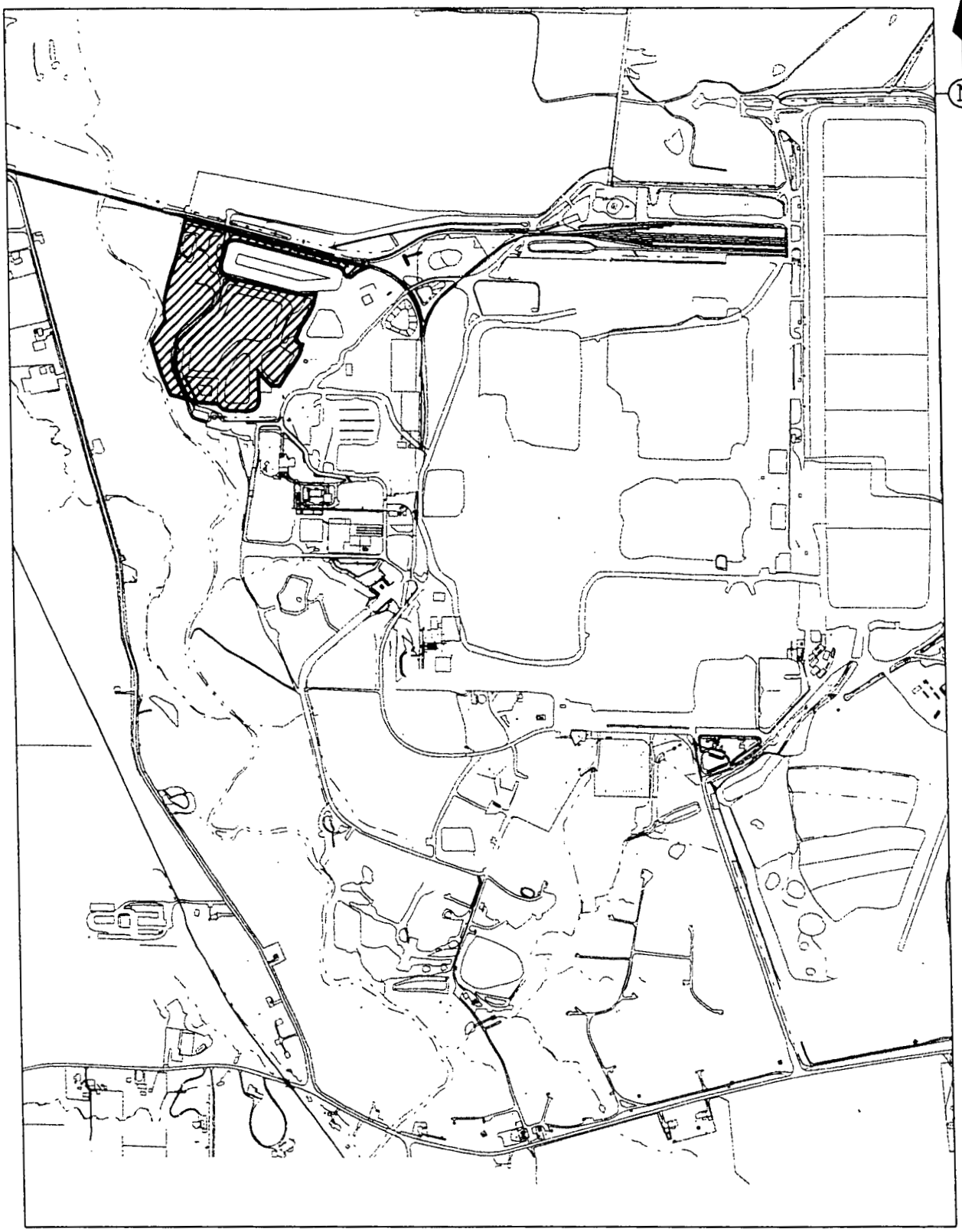
STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 1-1. AREA 6 LOCATION MAP

21-NOV-2006



LEGEND:

A6 WASTE PITS 1, 2, & 3
CERTIFICATION BOUNDARY

SCALE

1000 500 0 1000 FEET

FIGURE 1-2. AREA 6 CERTIFICATION AREA FOR THE REMAINING WASTE PITS AND THE AREAS WEST AND NORTH OF THE WASTE PITS

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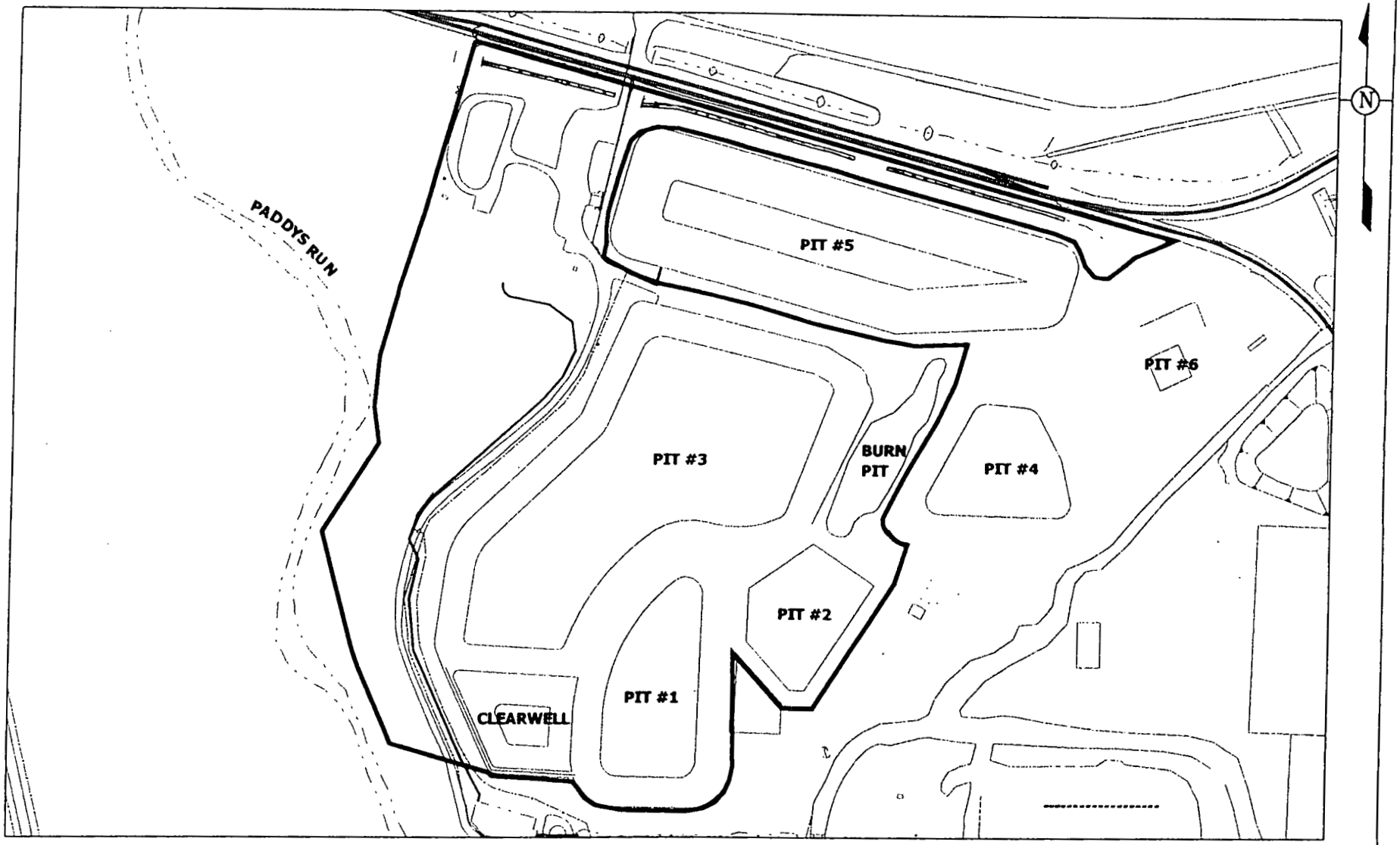
STATE PLANAR COORDINATE SYSTEM 1983
21-NOV-2006



LEGEND:

A6 WASTE PITS 1, 2, & 3 CERTIFICATION BOUNDARY

SCALE

250 125 0 250 FEET

STATE PLANAR COORDINATE SYSTEM 1983
v:\e2fm12\dgn\wp_123_003.dgn

FIGURE 1-3. AREA 6 REMAINING WASTE PITS AND AREAS WEST AND NORTH OF THE WASTE PITS: CERTIFICATION AREA BOUNDARIES

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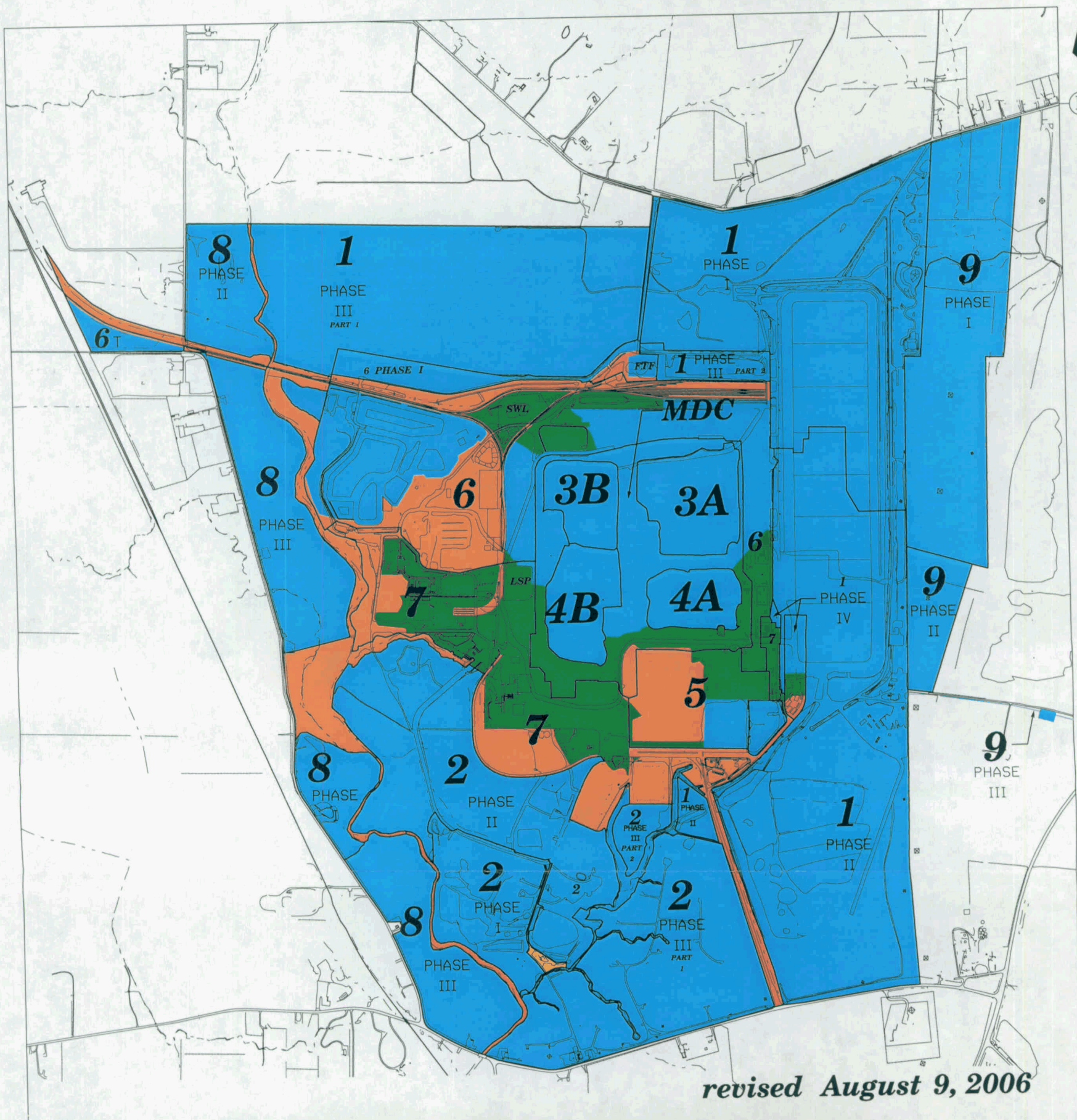

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AREAS	TOTAL ACRES	APPROVED CERT. ACRES	CERT. ACRES IN PROGRESS	REMEDIATION ACRES IN PROGRESS	PREDESIGN ACRES IN PROGRESS	REMAINING ACRES
AREA 1	395.1	394.0	0	1.0	0	0
AREA 2	173.9	173.9	0	0	0	0
AREA 3A/4A	29.3	29.3	0	0	0	0
AREA 3B/4B	25.4	25.4	0	0	0	0
AREA 5	26.9	7.6	12.3	7.0	0	0
AREA 6	148.9	77.3	53.2	18.5	0	0
AREA 7	77.3	0.3	30.6	46.3	0	0
AREA 8	98.9	98.9	0	0	0	0
MDC	39.8	24.2	1.6	14.0	0	0
PR/SSOD/PPDD	33.3	7.0	26.3	0.0	0	0
TOTAL ON SITE	1048.8	837.9	124.1	86.8	0	0
AREA 9	85.6	85.6	0	0	0	0
TOTAL OFF SITE	85.6	85.6	0	0	0	0

AREA 10 INCLUDES PIPELINES RELATED TO GROUNDWATER REMEDIATION AND OTHER UTILITIES NOT SPECIFICALLY LISTED.

SCALE

1100 550 0 1100 FEET

FIGURE 1-4. FCP CONTROLLED CERTIFICATION MAP

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STATE PLANAR COORDINATE SYSTEM 1983

21-NOV-2006

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 specific strategy for areas under this certification report is described in the CDL and Certification Sampling PSP for Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling.

An exception to the certification strategy was implemented for CUs 10, 11 and 16 to address failure of the certification criteria for radium-226. As discussed in the CDL and Sections 3.1 and 3.2 of this Certification Report, extensive excavation beyond the design grade was performed in these CUs to chase radium-226 contamination and, for this isolated case, additional chasing of the contamination was abandoned in favor of performing a risk calculation to demonstrate that residual radium-226 levels remain protective of human health and the environment. This approach is consistent with Section 10.1.1 of the OU5 ROD if the risk calculation demonstrates that the cumulative risk is below 1×10^{-4} and the hazard index is less than one. Results presented in Section 5.2 confirm that the OU5 ROD criteria are met.

2.1.1 Area-Specific Constituents of Concern

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary constituents of concern (COCs) and were retained as ASCOCs for this remediation effort. Secondary and ecological ASCOCs for Area 6 are listed in the SEP; all of these COCs were retained for Waste Pits 1, 2, and 3, the Burn Pit, and the Clearwell, however, some COCs were not retained for the Areas West and North of the Waste Pits based on the area investigations. Table 2-1 lists the secondary ASCOCs identified in the SEP. Table 2-2 presents justification for retaining or not retaining the ASCOCs and the ecological COCs for each CU covered in this certification report.

2.1.2 ASCOC Selection Criteria

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

- It is listed as a soil COC in the OU5 ROD and, it is listed as an ASCOC in Table 2-7 of the SEP for the Remediation Area of interest;
- It is listed as a COC for a hazardous waste management unit or underground storage tank that lies within the certification area boundary;
- It can be traced to site use in the remediation area of interest, either through process knowledge or known release of the constituent to the environment;

- Analytical results indicate that a contaminant is present above its FRL, and the above-FRL concentrations are not attributed to false positives or elevated Contract Required Detection Limits (CRDLs);
- Physical characteristics of the contaminant, such as degradation rate or volatility, indicate it is likely to persist in the soil between time of release and remediation; or
- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-238, and thorium-232).

Table 2-1 lists the secondary ASCOCs identified in Table 2-7 of the SEP. Using the above process, the ASCOCs were refined to those listed in Table 2-2, which presents all of the ASCOCs listed in Table 2-1. Additionally, Table 2-2 lists the justification for retaining or not retaining the ASCOCs and the ecological COCs for each CU in Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits.

2.1.3 ASCOC Selection Process

As was committed to the agencies in DOE's response to Ohio Environmental Protection Agency's (OEPA's) Comment Number 4 of the PSP for Investigating Subsurface Material from Waste Pits 4 through 6, and the Burn Pit (DOE 2004a), all of the Area 6 ASCOCs were retained for certification of Waste Pits 1, 2, and 3, the Burn Pit, and the Clearwell. Table 2-2 presents the reasoning for retaining each ASCOC and ecological COCs listed in Table 2-1.

2.2 CERTIFICATION APPROACH

The certification design for areas in this certification report followed the general approach outlined in Section 3.4 of the SEP. The design for Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits is depicted on Figure 2-1 and the sample locations are depicted on Figures 2-2 through 2-7. The five primary ASCOCs (total uranium, radium-226, radium-228, thorium-228, and thorium-232) were retained in each CU. Additional secondary COCs are identified for specific CUs within the certification area.

Factors that were taken into consideration when determining the boundaries for each CU in this report include: historical land use, proximity to other areas of the site, and residual COC data. Additionally, it was an impacted area and Group 1 CUs were used to allow for more concentrated certification sampling.

2.2.1 Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Unit Design

Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits consists of eighteen Group 1 CUs that are numbered in a consecutive sequence starting with CU 9, which is where the Certification of Waste Pits 4, 5, and 6 left off.

As stated in Section 2.1.2 of the CDL/PSP for this area, in addition to the 18 Group 1 CUs, the southwest berm of Waste Pit 3 was sampled under the approved variances 20600-PSP-0016-41 and 20600-PSP-0016-44 so that the overburden material could be excavated to gain access to the radium-226 seam. Also, the northwest corner of Waste Pit 3 was sampled according to variance 20600-PSP-0016-41 to provide a 'clean' footprint to stage this overburden soil. The data for these sampling activities are provided as CU 27 of this Certification Report.

The Certification area, as shown on Figure 2-1, consists of the following:

- CU 9 through CU 12 — Group 1 CUs in Waste Pit 3
- CU 13 — Group 1 CU in the Clearwell
- CU 14 and CU 15 — Group 1 CUs in Waste Pit 1
- CU 16 — Group 1 CU in Waste Pit 2
- CU 17 — Group 1 CU in the Burn Pit
- CU 18 — Group 1 CU covering the berms around Waste Pit 3 and the Burn Pit
- CU 19 — Group 1 CU covering the berms around the Clearwell, between Waste Pit 1 and Waste Pit 3, Waste Pit 2 and Waste Pit 3, and Waste Pit 2 and the Burn Pit
- CU 20 — Group 1 CU covering the berms west of Waste Pit 3 and the Clearwell
- CU 21 — Group 1 CU north of Waste Pit 5
- CU 22 through 26 — Group 1 CUs west of the Waste Pits
- CU 27 — Southwest berm and the footprint for the northwest corner of Waste Pit 3 (Figure 2-7)

2.2.2 Sample Selection Process

The selection of certification sampling locations was conducted according to Section 3.4.2 of the SEP. Each CU was first divided into 16 approximately equal sub-CUs. Sample locations were then generated by randomly selecting an easting and northing coordinate within the boundaries of each sub-CU, then testing those locations against the minimum distance 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 all 16 random locations met the minimum distance criteria.

The sub-CUs and planned certification sampling locations are shown on Figures 2-2 through 2-6. Four of the 16 sample locations (one location from each quadrant of the CU) were designated with a "V," indicating archive sample locations, which were not collected unless they were needed for additional analysis. One sample location in the CU was designated with a "D," indicating a field duplicate sample collection location. Eleven of the sub-CUs had both random and biased sample locations because Phase 2 Precertification by a high-purity Germanium (HPGe) detector could not be preformed to verify Phase 1 Precertification results due to wet field conditions. The biased locations were identified as being the worse case for each of the sub-CUs; therefore they were sampled for all of the specific CU ASCOCs. The random locations were only sampled for the real-time COCs (total uranium, radium-226, and thorium-232) to verify whether these COCs were widespread within the sub-CU. The biased locations are identified on Figures 2-2, 2-3, and 2-4.

Prior to commencement of certification sampling field activities, all certification sample locations were surveyed and field verified to make sure no surface obstacles would prevent sample collection at the planned location. It was not necessary to move any planned certification sample locations.

2.2.3 Certification Sampling

In CUs 9 through 26, samples were collected for analysis from 0 to 6 inches at 12 of the 16 sub-CUs in each Group 1 CU. The four samples designated as "archive" were not collected unless they were needed for additional analysis. In CU 27, samples were collected for analysis from 0 to 6 inches from 16 locations because this CU is made up of two areas, the overburden material from the southwest berm of Waste Pit 3 where the radium-226 seam was identified and the northwest corner of Waste Pit 3 where the overburden material was to be placed. This CU is discussed further in Section 2.2.1. The sample locations are illustrated on Figure 2-7.

2.2.4 Statistical Analysis

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 UCL on the mean of each primary ASCOC 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 first 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 hotspot criterion, which states that primary or secondary ASCOC concentrations must not exceed two times the FRL. Per Section 3.4.6 of the SEP, if an individual secondary COC concentration does exceed two times its FRL, the area will be further delineated. Following the delineation the affected area must be greater than 10 square meters (m^2) or the

result must exceed three times the FRL before excavation will take place. When the given UCL on the mean for each ASCOC is less that its FRL and the hotspot criterion is met, the CU will be considered certified.

In the event that a CU passes the *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.

TABLE 2-1
AREA 6 ASCOC LIST[a]

ASCOC	SOIL FRL / *(BTV)*[b]
PRIMARY	
Radium-226	1.7 pCi/g
Radium-228	1.8 pCi/g
Thorium-228	1.7 pCi/g
Thorium-232	1.5 pCi/g
Total Uranium	82 mg/kg
SECONDARY	
Fluoride	78000 mg/kg
Arsenic	12 mg/kg
Beryllium	1.5 mg/kg
Aroclor-1254	0.13 mg/kg
Aroclor-1260	0.13 mg/kg
Dieldrin	0.015 mg/kg
Benzo(a)pyrene	2.0 mg/kg / *(1.0 mg/kg)*
Benzo(b)floranthene	20 mg/kg / *(1.0 mg/kg)*
Dibenzo(a,h)anthracene	2.0 mg/kg / *(0.088 mg/kg)*
Indeno(1,2,3-cd)pyrene	20 mg/kg / *(10 mg/kg)*
Bromodichloromethane	4.0 mg/kg
1,1-Dichloroethene	0.41 mg/kg
Tetrachloroethene	3.6 mg/kg
Heptachloradibenzo-p-dioxin	0.00088 mg/kg
Octochlorodibenzo-p-dioxin	0.0088 mg/kg
Cesium-137	1.4 pCi/g
Technetium-99	30.0 pCi/g
Thorium-230	280 pCi/g
ECOLOGICAL	
Antimony	96 mg/kg / *(10 mg/kg)*
Cadmium	82 mg/kg / *(5 mg/kg)*
Silver	29,000 mg/kg / *(10 mg/kg)*
Benzo(a)anthracene	20 mg/kg / *(1 mg/kg)*
Benzo(k)fluoranthene	200 mg/kg / *(1 mg/kg)*
Chrysene	2000 mg/kg / *(1 mg/kg)*
Benzo(g,h,i)perylene	*1 mg/kg*
Fluoranthene	*10 mg/kg*
Phenanthrene	*5 mg/kg*
Pyrene	*10 mg/kg*

[a] As listed in Table 2-7 of the SEP.
[b] Benchmark toxicity value (BTV) applies to Ecological COCs.
mg/kg - milligrams per kilogram
pCi/g - picoCuries per gram

TABLE 2-2
ASCOC LIST FOR AREA 6 WASTE PITS 4, 5, AND 6

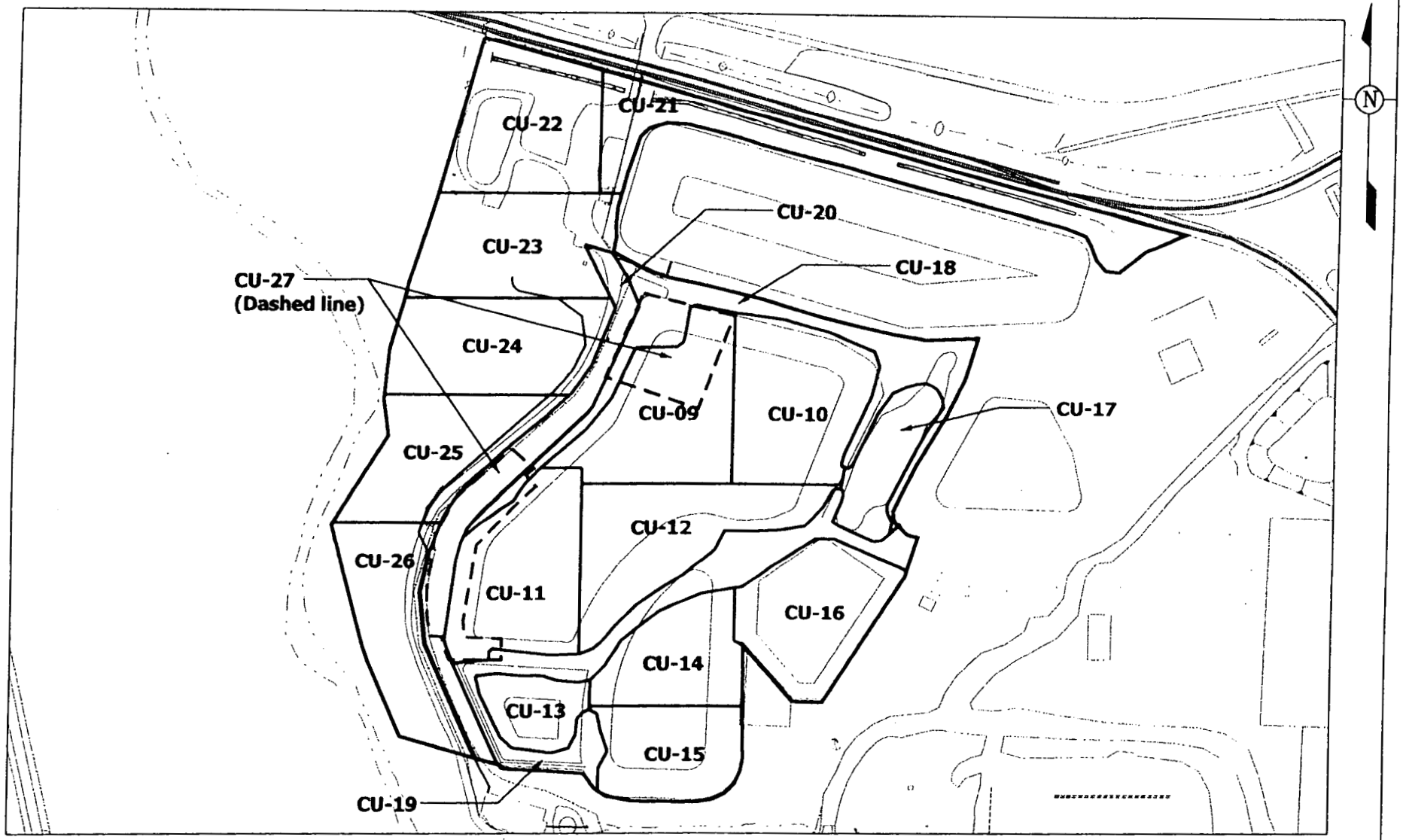
ASCOC	Retained as ASCOC?	Justification	CU(s)
Radionuclides			
Total Uranium	Yes	Primary Radionuclide	All
Radium-226	Yes	Primary Radionuclide	All
Radium-228	Yes	Primary Radionuclide	All
Thorium-228	Yes	Primary Radionuclide	All
Thorium-232	Yes	Primary Radionuclide	All
Cesium-137	Yes	* Above-FRL concentrations within the Clearwell	9-20, 27
Technetium-99	Yes	* Above-FRL concentrations detected within the Clearwell that may have impacted CU 26, which is west of the Clearwell	9-20, 26, 27
Thorium-230	Yes	* Above-FRL concentrations within Waste Pit 3	9-20, 27
Organic			
1,1-Dichloroethene	Yes	*	9-20, 27
1,2-Dichloroethene	Yes	Although this is not a COC for Area 6 as defined in the SEP nor was it identified in the characterization of the waste pit material, it was prevalent across the site and has been identified in some of the water monitoring wells in the Waste Pit area.	9-20, 27
Aroclor-1254	Yes	* Above-FRL concentrations within Waste Pit 3	9-20, 27
Aroclor-1260	Yes	* Above-FRL concentrations within Area 6	9-20, 27
Benzo(a)pyrene	Yes	*	9-20, 27
Benzo(b)fluoranthene	Yes	*	9-20, 27
Bromodichloromethane	Yes	*	9-20, 27
Dibenzo(a,h)anthracene	Yes	*	9-20, 27
Dieldrin	Yes	*	9-20, 27
Fluoride	Yes	*	9-20, 27
Heptachloradibenzo-p-dioxin	Yes	*	9-20, 27
Indeno(1,2,3-cd)pyrene	Yes	*	9-20, 27
Octochlorodibenqo-p-dioxin	Yes	*	9-20, 27
Tetrachloroethene	Yes	*	9-20, 27
Trichloroethene	Yes	Although this is not a COC for Area 6 as defined in the SEP nor was it identified in the characterization of the waste pit material, it was prevalent across the site and has been identified in some of the water monitoring wells in the Waste Pit area.	9-20, 27

TABLE 2-2
ASCOC LIST FOR AREA 6 WASTE PITS 4, 5, AND 6

ASCOC	Retained as ASCOC?	Justification	CU(s)
Metals			
Arsenic	Yes	* Above-FRL concentrations detected within Waste Pit 3	9-20, 27
Barium	Yes	* Above-FRL concentrations detected within Area 6	9-20, 27
Molybdenum	Yes	Although this is not a COC for Area 6 as defined in the SEP nor was it identified in the characterization of the waste pit material, it has been identified in Water Monitoring Well 2649, which was located between Waste Pit 1 and the Clearwell.	13-15, 19
Ecological			
Antimony	Yes	Is an ECOC in Area 6 per Appendix C of the SEP	All
Cadmium	Yes	Is an ECOC in Area 6 per Appendix C of the SEP	All
Silver	Yes	Is an ECOC in Area 6 per Appendix C of the SEP	All
Benzo(a)anthracene	No	Not an ECOC in Area 6 per Appendix C of the SEP	None
Benzo(k)fluoranthene	No	Not an ECOC in Area 6 per Appendix C of the SEP	None
Chrysene	No	Not an ECOC in Area 6 per Appendix C of the SEP	None
Benzo(g,h,i)perylene	No	Not an ECOC in Area 6 per Appendix C of the SEP	None
Fluoranthene	No	Not an ECOC in Area 6 per Appendix C of the SEP	None
Phenanthrene	No	Not an ECOC in Area 6 per Appendix C of the SEP	None
Pyrene	No	Not an ECOC in Area 6 per Appendix C of the SEP	None

*This COC was not detected at concentrations above the FRL within Area 6 Waste Pits 1, 2, and 3, the Burn Pit, or the Clearwell; however DOE's response to OEPA's Comment Number 4 to the PSP for Investigating Subsurface Material from Waste Pits 4 through 6, and the Burn Pit agreed to retaining all COCs for the certification of the Waste Pits.

ECOC - ecological constituent of concern



LEGEND:

CU BOUNDARY

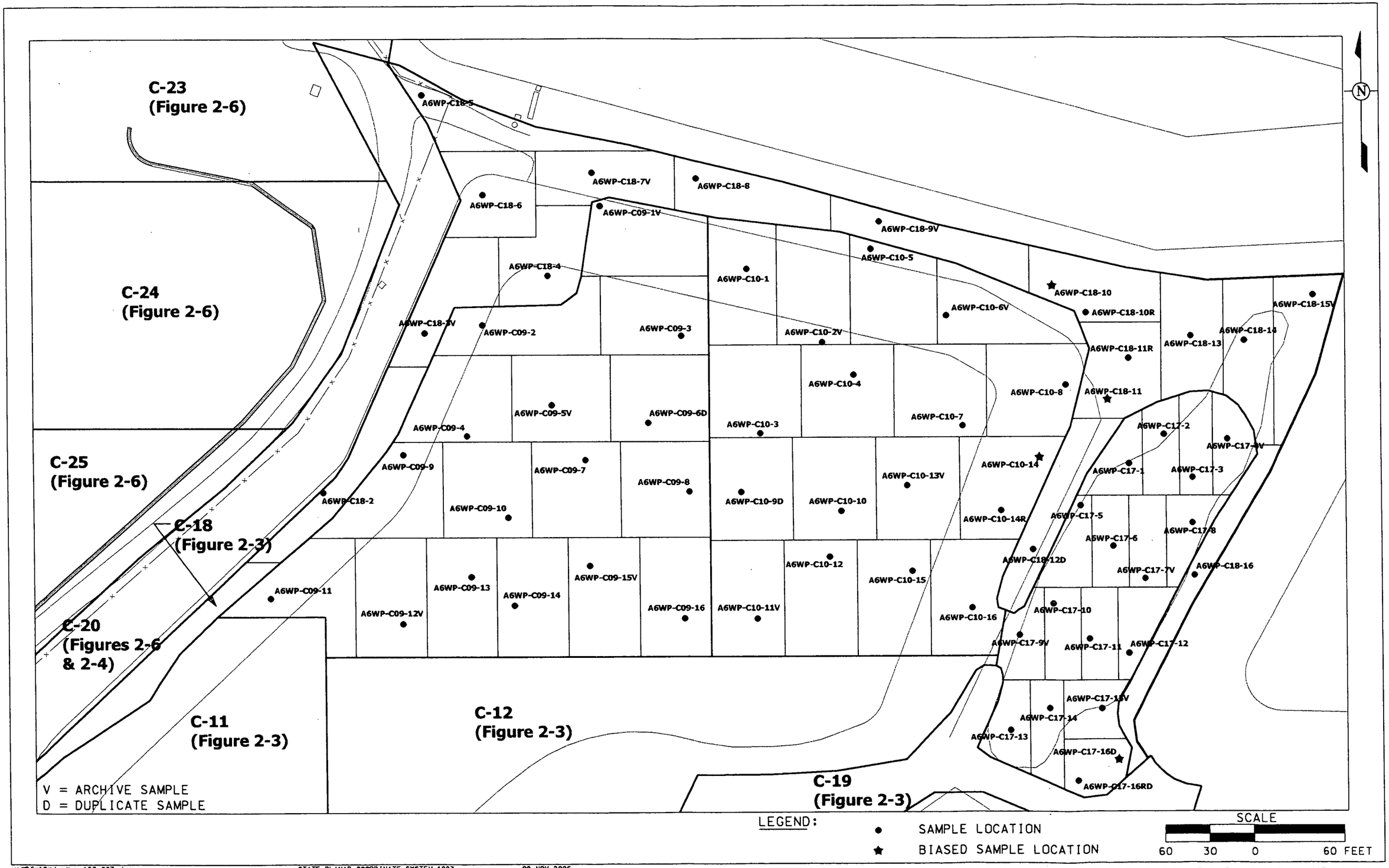
SCALE

250 125 0 250 FEET

v1:\2fm12\dgn\wp_123_005.dgn
STATE PLANAR COORDINATE SYSTEM 1983

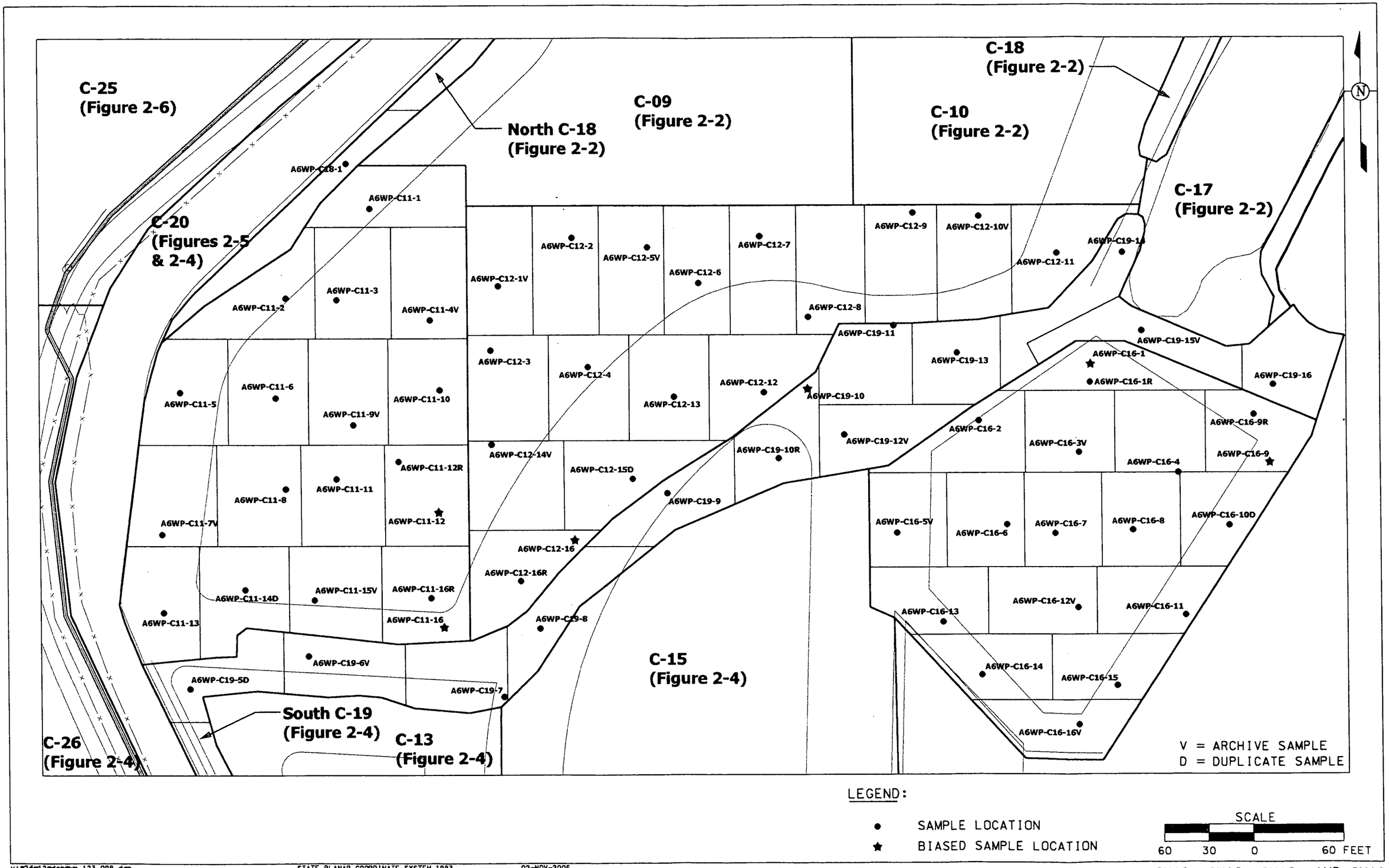
FIGURE 2-1. AREA 6 CERTIFICATION UNIT BOUNDARIES FOR THE REMAINING WASTE PITS AND THE AREAS WEST AND NORTH OF THE WASTE PITS

02-NOV-2006



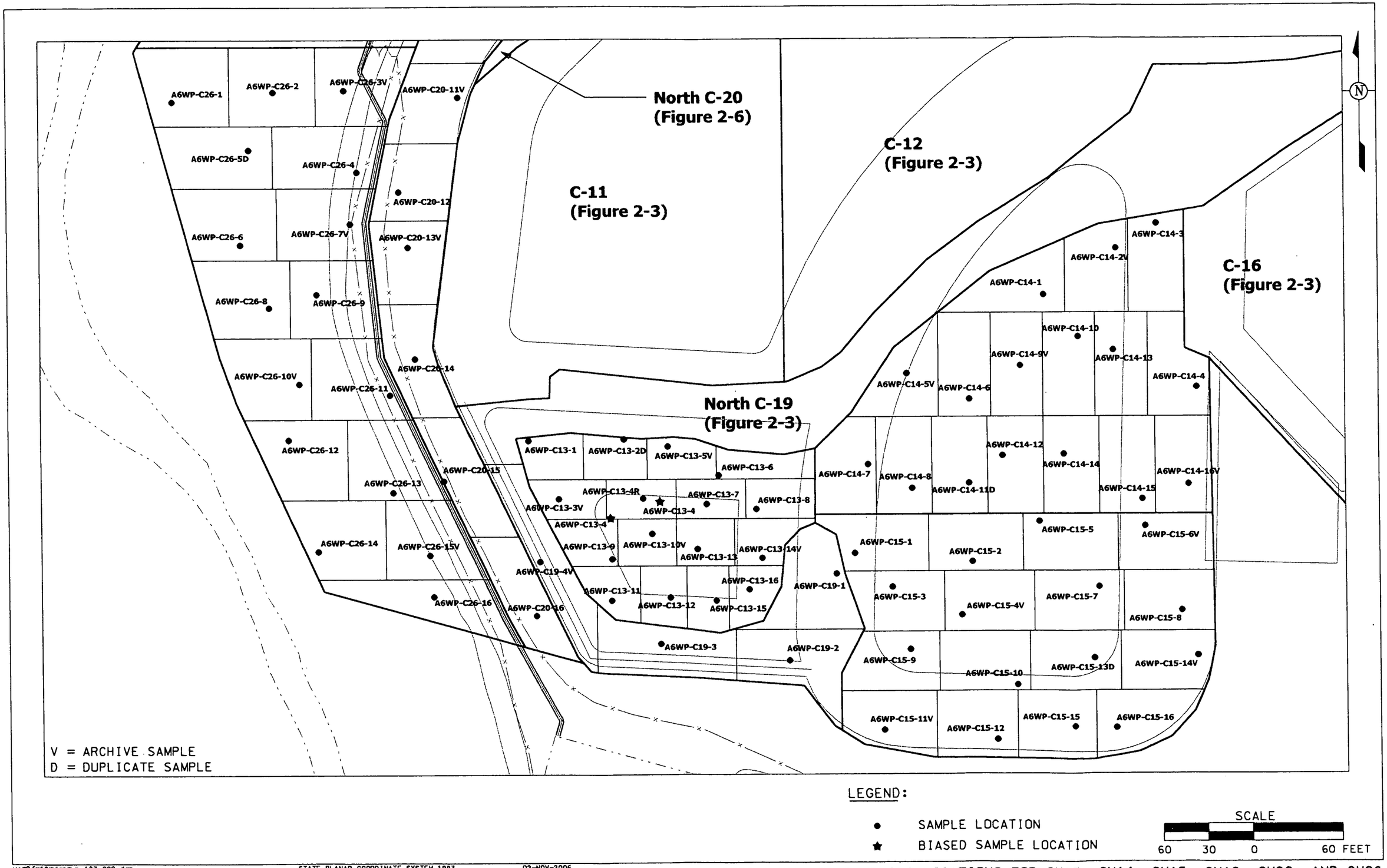
v:\2fm12\dgn\wp_123_007.dgn STATE PLANAR COORDINATE SYSTEM 1983 02-NOV-2006

FIGURE 2-2. CERTIFICATION SAMPLING LOCATIONS FOR CU09, CU10, CU17, AND CU18.



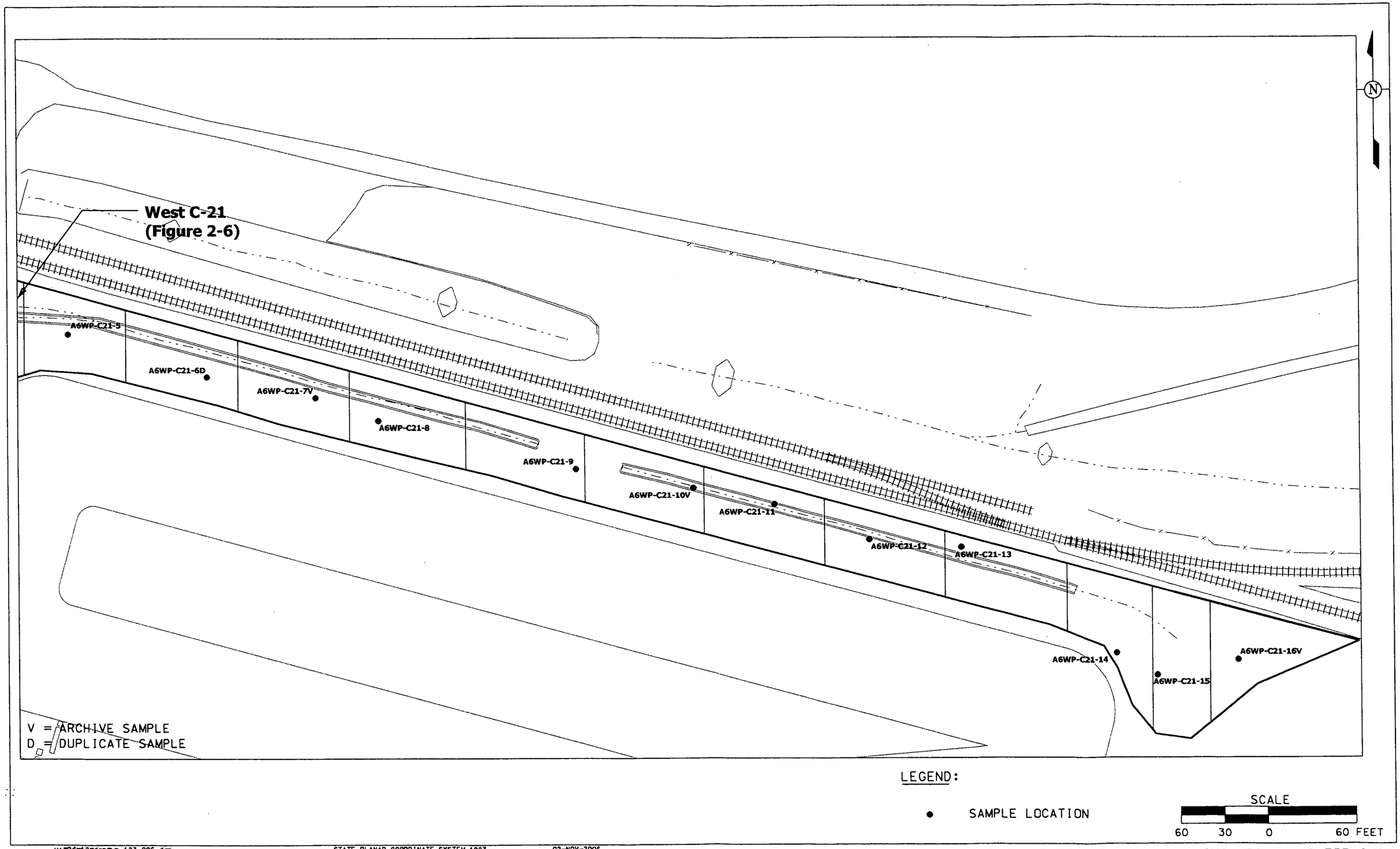
v:\2fm12\dgn\wp_123_008.dgn STATE PLANAR COORDINATE SYSTEM 1983 02-NOV-2006

FIGURE 2-3. CERTIFICATION SAMPLING LOCATIONS FOR CU11, CU12, CU16, CU18, AND CU19



v:\2fm12\dgn\wp_123_009.dgn STATE PLANAR COORDINATE SYSTEM 1983 02-NOV-2006

FIGURE 2-4. CERTIFICATION SAMPLING LOCATIONS FOR CU13, CU14, CU15, CU19, CU20, AND CU26



v:\2fm12\dgn\wp_123_006.dgn STATE PLANAR COORDINATE SYSTEM 1983 02-NOV-2006

FIGURE 2-5. CERTIFICATION SAMPLING LOCATIONS FOR CU21

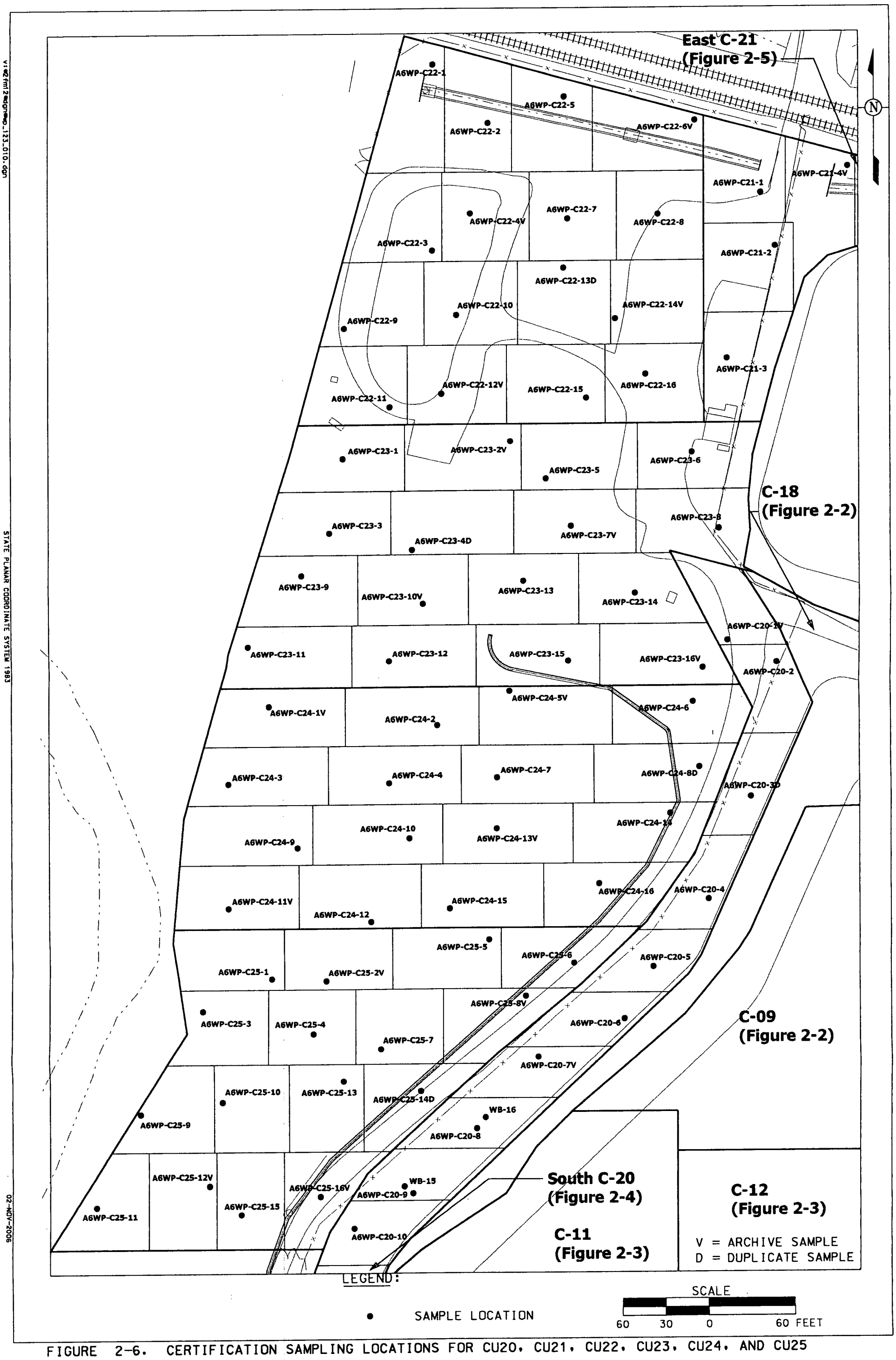
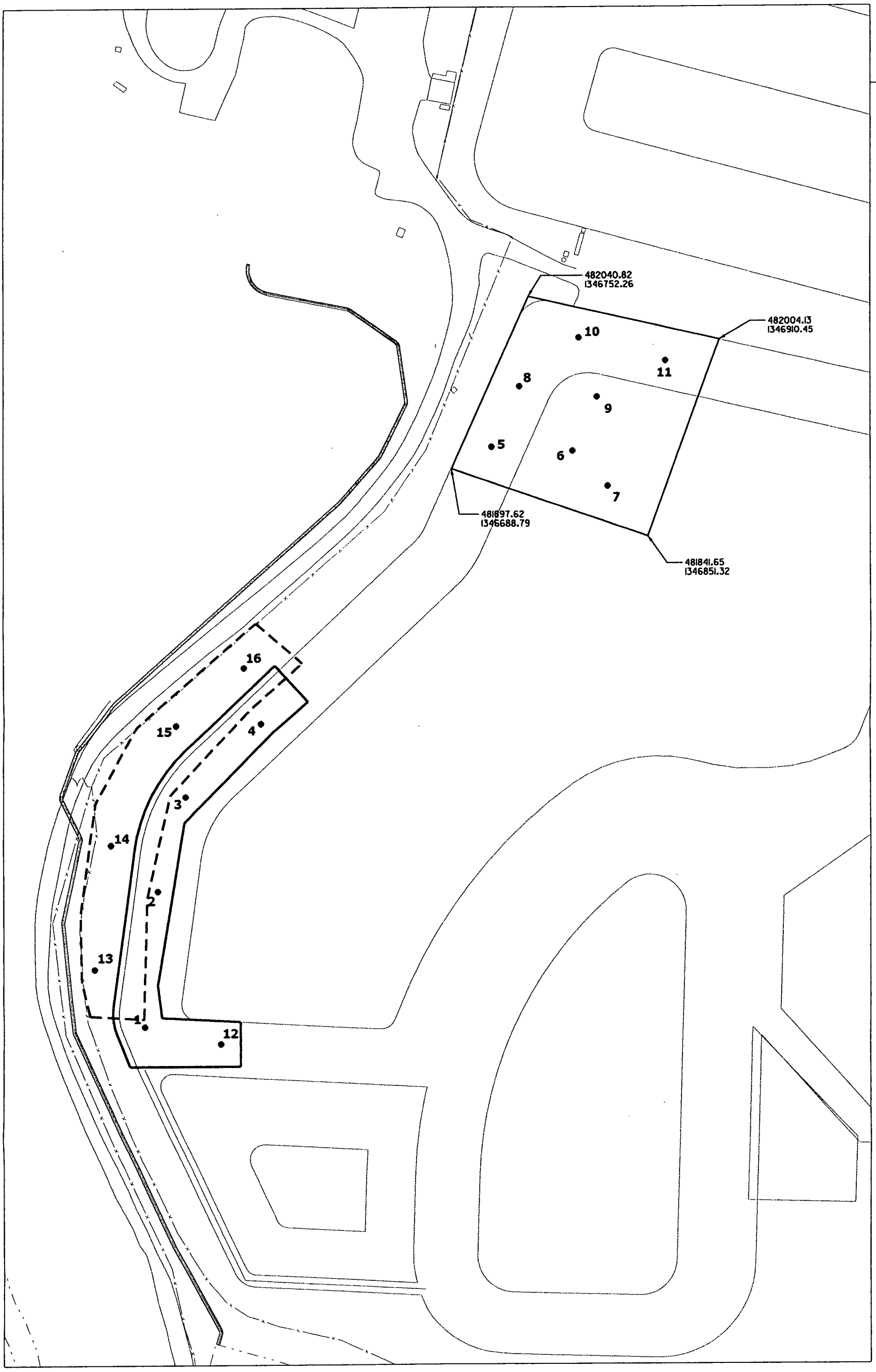


FIGURE 2-6. CERTIFICATION SAMPLING LOCATIONS FOR CU20, CU21, CU22, CU23, CU24, AND CU25



LEGEND:

● SAMPLE LOCATION

SCALE

80 40 0 80 FEET

FIGURE 2-7. A6, WASTE PIT 3 PRECERTIFICATION OF SW BERM AND NW CORNER PRIOR TO SOIL RELOCATION

STATE PLANAR COORDINATE SYSTEM 1983

21-NOV-2006

3.0 OVERVIEW OF FIELD ACTIVITIES

In accordance with the SEP, prior to conducting precertification and certification activities, all soil demonstrated to contain contamination above the associated FRLs or other applicable action levels was removed as part of the excavation remedial action.

In addition to the predesign investigations, the OU3 and OU5 RI Reports (DOE 1995c and 1995a) and Feasibility Study Reports (FS, DOE 1995d and 1995e) were used for remedial design of Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits. Final grade excavation monitoring/sampling and real-time scanning data have been collected pursuant to the RI/FS and remedial activities.

Before initiating the certification process, all historical soil data within the Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits certification area were pulled from the Sitewide Environmental Database (SED). Based on the results of sampling and scanning activities summarized below, it was determined that no further remedial actions were necessary to remove above-FRL or above-WAC soil.

3.1 AREA PREPARATION AND PRECERTIFICATION

All historical data for areas under this certification report are presented in the Excavation Plan for Area 6 Waste Pits and General Area (DOE 2005a). This includes data collected during the RI/FS and during four predesign investigations: PSP for Predesign Characterization of Sediments in Paddys Run and Associated Drainage Features (DOE 2004b), PSP for Investigating Subsurface Material from Waste Pits 4 through 6, and the Burn Pit, PSP for Investigating Subsurface Material from Waste Pits 1 through 3, the Clearwell, and the Biodenitrification Surge Lagoon Berm (DOE 2004c), and PSP for Predesign of Area 6 Subareas 3 and 4 (Supplement to 20300-PSP-0011) (DOE 2005b). Data were also collected during the remediation/excavation activities for excavation control and following the remediation/excavation activities for precertification per the PSP for Excavation Control and Precertification of the Area 6 Waste Pits and General Area (Supplement to 20300-PSP-0011) (DOE 2005c).

Below is a brief discussion of the remediation/excavation activities of above-WAC and above-FRL areas in the Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits.

There were no designed above-WAC excavations for the area in this certification report, based on physical sample data and initial real-time scans, as all visible waste pit material (visible product) and the above-WAC technetium-99 material identified in the north, south, and west sidewalls in the Clearwell was

removed under the OU1 ROD (DOE 1996d). All of this material was removed prior to executing the Excavation Plan for Area 6 Waste Pits and General Area. However, as above-FRL material was excavated, above-WAC material was discovered through visual observations and subsequent real-time scans, and this material was removed and sent to Soil Stockpile (SP) 7 for off-site disposal.

The predesign investigation, PSP for Investigating Subsurface Material from Waste Pits 4 through 6, and the Burn Pit, identified one above-FRL location for total uranium, radium-228, thorium-228, and thorium-232 on the floor of the Burn Pit.

The predesign investigation, PSP for Investigating Subsurface Material from Waste Pits 1 through 3, the Clearwell, and the Biodenitrification Surge Lagoon Berm, identified above-FRL areas in Waste Pits 1, 2, and 3 and the Clearwell. In Waste Pit 1, above-FRL results for uranium were identified at three locations; one on the floor, one on the southwest sidewall, and one on the southeast sidewall, and above-FRL results for uranium, radium-228, thorium-228, and thorium-232 were identified at one location on the floor. In Waste Pit 2, there was an above-FRL uranium result identified at one location on the northeast sidewall. In Waste Pit 3, there were five above-FRL locations identified for uranium, radium-228, thorium-228, and thorium-232, three on the floor, one in the southwest corner, and one on the northeast corner. In the Clearwell there was an above-FRL uranium and cesium-137 result at one location on the east sidewall. There was also an above-FRL result for uranium, radium-228, thorium-228, and thorium-232 at one location on the berm between Waste Pit 1 and Waste Pit 3.

All of the above-FRL areas in Waste Pits 1, 2, and 3, the Burn Pit, and the Clearwell were excavated and real-time scanning and physical sampling were performed to ensure that the above-FRL material was removed consistent with DOE's response to OEPA's Comment Number 3 to the Excavation Plan. These above-FRL areas are discussed in detail in Section 2.3.2 of the Excavation Plan for Area 6 Waste Pits and General Area. Data are presented in Appendix D of the CDL and Certification PSP for Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits.

The predesign investigation, PSP for Characterization of Sediments in Paddys Run and Associated Drainage Features, identified an above-FRL area for thorium-232 in the flood plain area between Paddys Run and Waste Pit 3. The excavation of this area was completed per the specifications in the Excavation Plan and the excavation was controlled per the PSP for Excavation Control and Precertification of the Area 6 Waste Pits and General Area.

Considerable excavation past the design grade was performed in Waste Pit 1, Waste Pit 2, Waste Pit 3, and the Clearwell during remediation. The southwest corner of Waste Pit 1 was excavated approximately 3 feet deeper than the remediation design. Waste Pit 2 was excavated deeper than the remediation design

to the northeast, west, and south approximately 5 feet, 3 feet, and 5 feet respectively. The southwest corner of Waste Pit 3 was excavated approximately 18 feet deeper then the remediation design. And, the northwest corner of the Clearwell was excavated approximately 3 feet deeper than the remediation design. Some of the excavation areas extended so deep that they significantly into the Great Miami Aquifer (GMA).

According to the guidelines established in Section 3.3.3 of the SEP, precertification activities were conducted to evaluate residual radiological contamination patterns as specified in the PSP Guidelines for General Characterization for Sitewide Soil Remediation (DOE 2005d). Following all excavations to the initial design specifications in Waste Pits 1, 2, and 3, the Burn Pit, and the Clearwell real-time scanning was conducted to identify any remaining hotspots. As stated in the previous paragraph, real-time scanning identified above-FRL radium-226 in the southwest corner of Waste Pits 1 and 3 (radium-226 seam) and to the northeast, west, and south of Waste Pit 2. Additional excavations, guided by real-time scans, were performed to remove hotspots, which at some locations extended up to 18 feet deeper than the design and into the GMA. The results of the last real-time scan indicated small isolated locations still above-FRL for radium-226 in both Waste Pit 1 and Waste Pit 3. Numerous physical samples were then collected at the surface and at depth for radium-226 in Waste Pits 1 and 3, with some of the samples from Waste Pit 3 also being analyzed for technetium-99. The physical sample results for radium-226 indicated limited locations above-FRL, and all of the technetium-99 results were below FRL. Statistical analysis was performed on the radium-226 data from the aforementioned physical sampling in Waste Pit 3 and the 95 percent upper confidence level (UCL) on the mean was below FRL. This confirmed that the area was ready for certification. Overall, more than 40,000 cubic yards of soil has been excavated beyond the originally estimated volume and over a duration of more than two months longer than anticipated to complete the remediation in the Waste Pits. This was documented in the CDL.

In addition to the real-time scans, the southwest berm of Waste Pit 3 was sampled under the approved variances 20600-PSP-0016-41 and 20600-PSP-0016-44 so that the overburden material could be excavated to gain access to the radium-226 seam. Also, the northwest corner of Waste Pit 3 was sampled according to variance 20600-PSP-0016-41 to provide a 'clean' footprint to stage this overburden soil. As stated in Section 2.2.1, the data for these sampling activities are provided as CU 27 of this Certification Report.

During Phase 1 Precertification there were eleven isolated areas identified as 'hotspots' (greater than three times the FRL), but Phase 2 Precertification scanning could not be performed due to the wet field conditions. Phase 2 Precertification is performed by using the HPGe detector at the highest Phase 1 Precertification locations. Therefore, both random and physical certification samples were collected within each of these eleven sub-CUs. This is discussed further in Section 2.2.2.

3.2 CHANGES TO SCOPE OF WORK

The scope of work for Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling required nine V/FCNs (see Appendix B), which are discussed in the following paragraphs.

Variance 20600-PSP-0019-1 documents the collection of two total uranium samples from CU A6WP-C17/sub-CU-11, following the excavation of a soil with greater than two times the FRL (205 mg/kg). CU A6WP-C17 encompasses the entire Burn Pit. Due to the topography of the area, it was unsafe for pedestrian traffic and the typical bounding approach was not implemented. Therefore, an area of approximately 5-foot by 5-foot was excavated to remove the known contamination and two samples were collected from an excavator bucket. One sample was collected from the original location and an additional random sample was collected from within the sub-CU to investigate the presence of residual contamination. The newly collected samples replace the previously collected sample and were used in the statistical analysis of this CU.

Variance 20600-PSP-0019-2 documents the collection of six samples for aroclor-1254, aroclor-1260, and total uranium in CU A6WP-C12/sub-CU-11, following the excavation of soil with results greater than three times the FRL for aroclor-1254 [692 micrograms per kilogram (μg/kg)] and aroclor-1260 (506 μg/kg), and a greater than one times the FRL result for total uranium (125 mg/kg). CU 12 encompasses the southeast quadrant of Waste Pit 3, which was the ramp coming out of the Waste Pits. An area of approximately 10-foot by 10-foot was excavated around this location to remove the known contamination. Five samples were collected from the excavated area (one at the original location, and one at each side of the excavation to the north, south, east, and west) and one sample was collected from an additional random location within the sub-CU to investigate for the presence of residual contamination. The newly collected samples replace the previously collected sample and were used in the statistical analysis of this CU. It should be noted that the original sample (A6WP-C12-11) was re-analyzed for aroclor-1254 and aroclor-1260, and the results were 346 mg/kg and 164 mg/kg respectively. Therefore, the original results greater than three times the FRL were qualified with a Z. (See Section 4.2 for additional information about qualifier codes.)

Variance 20600-PSP-0019-3 documents the collection of six samples for the primary radionuclides in CU A6WP-C12/sub-CU-12, following the excavation of soil with results greater than two times the FRL for thorium-228 (3.51 pCi/g) and thorium-232 (3.41 pCi/g) and above-FRL results for total uranium (142 mg/kg). CU A6WP-C12 consists of the southeast corner of Waste Pit 3, which was the ramp coming out of the Waste Pits. An area of approximately 10-foot by 10-foot was excavated around this location to remove the known contamination. Five samples were collected from the excavated area (one at the original location, and one at each side of the excavation to the north, south, east, and west) and one sample

was collected from an additional random location within the sub-CU to investigate for the presence of residual contamination. The random location, A6WP-C12-18, was still above-FRL for total uranium and was excavated and re-sampled per V/FCN 20600-PSP-0016-6. The highest results from the newly collected samples replaced the previously collected sample and were used in the statistical analysis of this CU.

Variance 20600-PSP-0019-4 documents the collection of six total uranium samples from CU A6WP-C21/sub-CU-15, following the excavation of soil with a total uranium result that was greater than two times the FRL (243 mg/kg). CU A6WP-C21 is located north of Waste Pit 5. An area of approximately 10-foot by 10-foot was excavated around this location to remove the known contamination. Five samples were collected from the excavated area (one at the original location, and one at each side of the excavation to the north, south, east, and west) and one sample was collected from an additional random location within the sub-CU to investigate for the presence of residual contamination. The newly collected samples replace the previously collected sample and were used in the statistical analysis of this CU.

Variance 20600-PSP-0019-5 documents the collection of samples from three sub-CUs in CU A6WP-C19 (sub-CUs 7, 11, and 13) following the excavation of soil with total uranium results that were greater than one times the FRL in sub-CUs 7 and 13 (128 mg/kg and 109 mg/kg respectively) and two times the FRL in sub-CU 11 (273 mg/kg). CU A6WP-C19 consists of the haul road that was located between Waste Pits 1, 2, and 3 and around the Clearwell. The preliminary statistics indicated that this CU would fail the UCL on the mean for total uranium unless all three of these FRL exceedences were removed. An area of approximately 10-foot by 10-foot was excavated around each of these three locations to remove the known contamination. In sub-CU 11, where the result was greater than two times the FRL, five samples were collected from the excavated area (one at the original location, and one at each side of the excavation to the north, south, east, and west) and one sample was collected from an additional random location within the sub-CU to investigate for the presence of residual contamination. In sub-CUs 7 and 13, where the results were greater than one times the FRL, two samples were collected in each sub-CU (one from the original location and one from an additional random location within the sub-CU). Two of the archive sample locations, A6WP-C19-12 and A6WP-C19-15, were also sampled for total uranium to comprise a new round of sampling locations for this CU. The newly collected samples replace the previously collected samples and were used in the statistical analysis of this CU.

Variance 20600-PSP-0019-6 documents the collection of samples in CU A6WP-12, following the excavation of soil with preliminary results greater than the FRL for total uranium in sub-CUs A6WP-C12-13 (104 mg/kg) and A6WP-C12-18 (121 mg/kg). (Sub-CU A6WP-C12-18 was originally sub-CU A6WP-C12-12, which was excavated and then sampled under V/FCN 20600-PSP-0019-3.) CU A6WP-12 consists of the southeast corner of Waste Pit 3, which was the ramp coming out of the

Waste Pits. These results were not considered hotspots, but were excavated due to the preliminary statistics indicating failure of the UCL on the mean for total uranium, due to the extreme variability of the data. These above-FRL locations were also in close proximity to the above-FRL sub-CUs A6WP-C19-11 and A6WP-C19-13, which were located on the haul road that runs between Waste Pits 1, 2, and 3, and were excavated and sampled under V/FCN 20600-PSP-0019-5. In sub-CUs 13 and 18, where the results were greater than one times the FRL, two samples were collected in each sub-CU (one from the original location and one from an additional random location within the sub-CU). The newly collected samples replace the previously collected samples and were used in the statistical analysis of this CU.

Variance 20600-PSP-0016-7 documents the collection of samples in CU A6WP-13, following the excavation of soil with results greater than one times the FRL and two times the FRL for technetium-99, which is also above-WAC, in sub-CUs A6WP-C13-1 (148 pCi/g) and A6WP-C13-13 (37.5 pCi/g). CU A6WP-C13 consists of the footprint of the Clearwell. An area of approximately 10-foot by 10-foot was excavated around each of the two locations in CU A6WP-C13 to remove the known above-WAC contamination. Sub-CU A6WP-C13-13 was not a hotspot; however, in order to control the potential spread of above-WAC material, the soil associated with this above-WAC location was removed. Therefore, following the excavation, samples were collected from two locations (one from the original location and one from an additional random location) within sub-CU A6WP-C13-13 to investigate the presence of residual contamination and to ensure that the sub-CU is adequately represented. The sample from sub-CU A6WP-C13-1 was greater than two times the FRL for technetium-99, therefore following the excavation five bounding samples were collected (one at the original location, and one at each side of the excavation to the north, south, east, and west) and one sample was collected from an additional random location within the sub-CU to investigate the presence of residual contamination and to ensure that the sub-CU is adequately represented. The newly collected samples replace the previously collected samples and were used in the statistical analysis of this CU.

Variance 20600-PSP-0019-8 documents the collection of samples in sub-CU A6WP-C19-20, following the excavation of soil with results greater than the FRL (86.5 mg/kg) for total uranium. (Sub-CU A6WP-C-19-20 was originally sub-CU A6WP-19-13, which was excavated and then sampled under V/FCN 20600-PSP-0019-5.) This was the only above-FRL total uranium result in this CU and it was not considered a hotspot, but it was excavated due to the preliminary statistics indicating failure of the UCL on the mean for total uranium. One sample was collected from the original location and one sample was collected from an additional random location within the sub-CU to investigate the presence of residual contamination and to ensure that the sub-CU was adequately represented. The newly collected samples replace the previously collected samples and were used in the statistical analysis of this CU.

Variance 20600-PSP-0019-9 documents the collection of samples in CU A6WP-C13, following the excavation of soil with results greater than the FRL [83.7 micrograms per gram (μg/g)] for total uranium in sub-CU A6WP-C13-4 at location A6WP-C13-4-R, which was collected as a result of the response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1,2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits. This was the only above-FRL total uranium result in CU A6WP-C13 and it was not considered a hotspot, but it was excavated due to the preliminary statistics indicating failure of the UCL on the mean for total uranium. One sample was collected from the original excavated location and one sample was collected from an additional random location within the sub-CU to investigate the presence of residual contamination and to ensure that the sub-CU was adequately represented. The newly collected samples replace the previously collected samples and were used in the statistical analysis of this CU.

4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES, AND DATA REDUCTION

4.1 ANALYTICAL METHODOLOGIES

All samples collected were sent off site for analysis. The laboratories complied with Sitewide Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Quality Assurance Project Plant (SCQ) requirements (DOE 2003). The SCQ is the source for analytical methodologies (Appendix G), data verification and validation, and analytical quality assurance/quality control requirements.

Laboratory analysis of certification samples was conducted using approved analytical methods, as discussed in Appendix H of the SEP. The minimum detection level (MDL) was set at 10 percent of the FRL and analyses were conducted to Analytical Support Level (ASL) D or E, where the MDL of 10 percent of the FRL is above the SCQ ASL detection level, but the analyses meet all other SCQ ASL D criteria. ASL D data packages were provided for all of the analytical data. All data were validated as required and results were entered into the FCP SED. Final certification results are provided in Appendix A, and a summary of the analytical methods follows:

4.1.1 Chemical Methods

Metals

Samples submitted for antimony, arsenic, beryllium, cadmium, molybdenum, and silver analysis were analyzed by inductively coupled plasma-mass spectrometry (ICP-MS) or by inductively coupled plasma-atomic emission spectroscopy (ICP-AES).

Samples submitted for fluoride analysis were analyzed by ion chromatography.

Pesticides and Polychlorinated Biphenyl (PCBs)

Samples submitted for PCB analyses were analyzed by gas chromatography.

Semi-Volatile Organic Compounds (SVOCs)

Samples submitted for SVOC analyses were analyzed by gas chromatography/mass spectrometry.

Volatile Organic Compounds (VOCs)

Samples submitted for VOC analyses were analyzed by gas chromatography/mass spectrometry.

Dioxins

Samples submitted for dioxin analysis were analyzed by high-resolution gas chromatography.

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 ratio for duplicate samples for each analyte. The off-site laboratory was required to meet these specifications using the methodologies described below.

Total Uranium

Samples were analyzed for unaium-238 using gamma spectroscopy, and the results were used to calculate the total uranium value follows:

Total uranium (mg/kg) = [2.998544 (g*mg/(pCi*kg))] * 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

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 an in-growth period before counting for radon-222. The off-site laboratory used the same gamma-ray emission lines and error weighted average methodology to calculate all of the certification results in this report.

Radium-228

Radium-228 was quantified by measuring gamma rays emitted by members of its decay chain. The off-site laboratory used the same gamma-ray emission lines and error-weighted-average methodology to calculate all certification results in this report.

Thorium-228 and Thorium-232

Thorium-228 and thorium-232 were also quantified by measuring gamma rays emitted by members of its decay chain. The off-site laboratory used the same gamma-ray emission lines and error-weighted-average methodology to calculate all certification results in this report.

Thorium-230

Samples were analyzed by alpha spectrometry to quantify thorium-230 by measuring its characteristic alpha rays at 4621-kiloelectron volt (keV) and 4687 keV. The off-site laboratory used the combination of these two alpha lines, with the yield indicator thorium-229, to quantify the thorium-230 results.

Technetium-99

Technetium-99 was quantified by using a liquid scintillation 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 following Section 11.2 and Appendix D of the SCQ.

Specific parameters associated with the data were evaluated during V&V to determine whether or not the data quality objectives were met. Five principal Quality Assurance parameters (i.e., precision, accuracy, completeness, comparability, and representativeness) were addressed during V&V. Field sampling and handling, laboratory analysis and reporting, and 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 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.

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 limits 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 judgment of the interpretation of the supporting data, such as mass spectra. Caution must be exercised with the use of these data

NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration. This qualifier indicates the presumptive presence of the analyte, but the result can only be considered estimated. This qualifier is not used in typical inorganic analyses, but could be used to qualify organic or radiochemistry data due to spectral interpretation problems

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.

4.3 DATA REDUCTION

Each sample used to support the certification decision reached in this report was entered in the SED with the following information:

Field Information

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

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

1. All of the data for each CU were queried from SED.
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 higher of the two duplicate results was used in the statistical calculations.
5. One half on the non-detect (U or UJ) values was 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 minimum detectable concentration, the validation result becomes the minimum detectable concentration 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 AND EVALUATION

Below is a summary of the analytical results and statistical analyses of the data for each CU in Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits.

CU A6WP-C09

CU A6WP-C09 passed all of the certification criteria as discussed in Section 2.2.4. Final certification data are presented in Appendix A.1.

A6WP-C10

CU A6WP-C10, which consists of the northeast corner of Waste Pit 3, passed all of the certification criteria, as discussed in Section 2.2.4, with the exception of radium-226. There was one above-FRL exceedence for radium-226 (5.22 pCi/g), which is greater than two times the FRL. Although this is considered a failure for certification, the UCL on the mean is 1.24 pCi/g, which is less than the FRL of 1.7 pCi/g, and for this special case, a risk assessment was performed on this CU to demonstrate that the residual contamination values in the CU remain protective of human health and the environment, per Section 10.1.1 of the OU5 ROD. This risk assessment, which is discussed in Section 5.2, determined that no further action was needed for this CU.

Per DOE's response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1,2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, CU A6WP-C10 had one biased and one random location in sub-CU A6WP-C10-14. The data from the sample with the highest result of the two locations in this sub-CU was used in the statistical analysis for CU 10. Final certification data are presented in Appendix A.1.

CU A6WP-C11

CU A6WP-C11, which consists of the southwest corner of Waste Pit 3, passed all of the certification criteria, as discussed in Section 2.2.4, with the exception of radium-226. Even after excavations 18 feet deeper than the design, there were five above-FRL exceedences for radium-226 ranging from 1.81 to 9.46 pCi/g. The UCL on the mean was 3.248 pCi/g for radium-226, which is greater than the FRL of 1.7 pCi/g. Although this is considered a failure for certification, for this special case, a risk assessment was performed on this CU to demonstrate that the residual contamination values in the CU remain

protective of human health and the environment, per Section 10.1.1 of the OU5 ROD. This risk assessment, which is discussed in Section 5.2, determined that no further action was needed for this CU.

Per DOE's response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, CU A6WP-C11, had one biased and one random location in sub-CUs A6WP-C11-12 and A6WP-C11-16. The data from the sample with the highest result of the two locations in this sub-CU was used in the statistical analysis for CU 11. Final certification data are presented in Appendix A.1.

CU A6WP-C12

CU A6WP-C12, which consists of the southeast corner of Waste Pit 3, required additional excavation to remove an aroclor-1254 and aroclor-1260 hotspot and total uranium that failed the preliminary certification statistics. Also, per DOE's response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1,2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, CU A6WP-C12 had one biased and one random location in sub-CU A6WP-C12-16. The data from the sample with the highest result of the two locations in this sub-CU was used in the statistical analysis for CU 12.

As discussed in Section 3.2, these additional excavations and sampling events were performed per V/FCNs 20600-PSP-0019-2, 3, and 6. The initial failing data for those COCs are presented in Appendix A.1 and the final certification data are presented in Appendix A.2.

Other than the aroclor-1254, aroclor-1260, and total uranium issue, the remainder of the constituents for A6WP-C12 passed all certification requirements. Therefore, the final certifications data for those COCs are presented in Appendix A.1.

CU A6WP-C13

CU A6WP-C13, which consists of the footprint of the Clearwell, required additional excavation to remove above-WAC technetium-99 and total uranium contamination that failed the preliminary certification statistics. Also, per DOE's response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1,2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, CU A6WP-C13 had one biased and one random location in sub-CU A6WP-C13-4. The data from the sample with the highest result of the two locations in this sub-CU was used in the statistical analysis for CU 13.

As discussed in Section 3.2, these additional excavations and sampling events were performed per V/FCNs 20600-PSP-0019-7 and 9. The initial failing data for those COCs are presented in Appendix A.1 and the final certification data are presented in Appendix A.2.

Other than the technetium-99 and total uranium issues, the remainder of the constituents for A6WP-C13 passed all certification requirements. Therefore, the final certification data for those COCs are presented in Appendix A.1.

CU A6WP-C14 and A6WP-C15

CUs A6WP-C14 and A6WP-C15 passed all of the certification criteria as discussed in Section 2.2.4. Final certification data are presented in Appendix A.1

CU A6WP-C16

CU A6WP-C16 passed all of the certification criteria, as discussed in Section 2.2.4, with the exception of radium-226. There were three above-FRL exceedences for radium-226 (1.81 pCi/g, 2.07 pCi/g, and 3.09 pCi/g) and the UCL on the mean was 1.82 pCi/g, which is greater than the FRL of 1.7 pCi/g. Although this is considered a failure for certification, for this special case, a risk assessment was performed on this CU to demonstrate that the residual contamination values in the CU remain protective of human health and the environment, per Section 10.1.1 of the OU5 ROD. This risk assessment, which is discussed in Section 5.2, determined that no further action was needed for this CU.

Per DOE's response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1,2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, CU A6WP-C16 had one biased and one random location in two sub-CUs, A6WP-C16-1 and A6WP-C16-9. The data from the sample with the highest result of the two locations in each sub-CU was used in the statistical analysis for CU 16. Final certification data are presented in Appendix A.1.

CU A6WP-C17

CU A6WP-C17, which consists of the footprint of the Burn Pit, required additional excavation to remove a total uranium hotspot. Also, per DOE's response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1,2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, CU A6WP-C17 had one biased and one random location in sub-CU A6WP-C17-16. The data from the sample with the highest result of the two locations in this sub-CU was used in the statistical analysis for CU 17.

As discussed in Section 3.2, these additional excavations and sampling events were performed per V/FCN 20600-PSP-0019-1. The initial failing data for those COCs are presented in Appendix A.1 and the final certification data are presented in Appendix A.2.

Other than the total uranium issue, the remainder of the constituents for A6WP-C17 passed all certification requirements. Therefore, the final certifications data for those COCs are presented in Appendix A.1.

CU A6WP-C18

CU A6WP-C18 passed all of the certification criteria as discussed in Section 2.2.4. Per DOE's response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1,2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, CU A6WP-C18, had one biased and one random location in two sub-CUs, A6WP-C18-10 and A6WP-C18-11. The data from the sample with the highest result of the two locations in each sub-CU was used in the statistical analysis for CU 18. Final certification data are presented in Appendix A.1.

CU A6WP-C19

CU A6WP-C19, which consists haul road that was located between Waste Pits 1, 2, and 3, and around the Clearwell, required additional excavation to remove two total uranium hotspots. Following the removal of the hotspots additional excavations for total uranium were necessary because it was still failing the preliminary certification statistics. Also, per DOE's response to OEPA's Comments Numbers 3 & 4 to the Draft CDL/PSP for Area 6 Waste Pits 1,2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits, CU A6WP-C19 had one biased and one random location in sub-CU A6WP-C19-10. The data from the sample with the highest result of the two locations in this sub-CU was used in the statistical analysis for CU 19.

As discussed in Section 3.2, these additional excavations and sampling events were performed per V/FCNs 20600-PSP-0019-5 and 8. The initial failing data for those COCs are presented in Appendix A.1 and the final certification data are presented in Appendix A.2.

Other than the total uranium issues, the remainder of the constituents for A6WP-C19 passed all certification requirements. Therefore, the final certifications data for those COCs are presented in Appendix A.1.

CU A6WP-C20

CU A6WP-20 passed all of the certification criteria as discussed in Section 2.2.4. Final certification data are presented in Appendix A.1.

CU A6WP-C21

CU A6WP-C21, which consists of the area north of Waste Pit 5, required additional excavation to remove one total uranium hotspot.

As discussed in Section 3.2, this additional excavation and sampling event was performed per V/FCN 20600-PSP-0019-4. The initial failing data for total uranium are presented in Appendix A.1 and the final certification data are presented in Appendix A.2.

Other than the total uranium issue, the remainder of the constituents for A6WP-C21 passed all certification requirements. Therefore, the final certifications data for those COCs are presented in Appendix A.1.

CUs A6WP-C22 through A6WP-C26

CUs A6WP-C22, A6WP-C23, A6WP-C24, A6WP-C25, and A6WP-C26 passed all of the certification criteria as discussed in Section 2.2.4. Final certification data are presented in Appendix A.1

CU A6WP-C27 - Radium Seam in Waste Pit 3

In addition to the real-time scans, the southwest berm of Waste Pit 3 was sampled under the approved variances 20600-PSP-0016-41 and 20600-PSP-0016-44 so that overburden material could be excavated to gain access to the radium-226 seam. The radium-226 seam refers to a naturally occurring, 1 to 2 cm clay horizon located approximately one-half meter above the sand and gravel deposits of the GMA. It is hypothesized that radium contaminated fluid from Waste Pit 3 migrated along this impermeable layer and radium-226 was adsorbed to the clay minerals. Also, the northwest corner of Waste Pit 3 was sampled according to variance 20600-PSP-0016-41 to provide a 'clean' footprint to stage this overburden soil. The data for these sampling activities passed all of the certification criteria as discussed in Section 2.2.4 and are provided in App0endix A.1 as CU 27.

5.2 RISK EVALUATIONS FOR CUs 10, 11, AND 16

Although repeated excavation attempts were made to remove residual radium-226 contamination from soil in the waste pits footprints (Section 3.1), CUs 10 and 11 from Waste Pit 3 and CU 16 from Waste Pit 2 did not pass the certification criteria (11 and 16 failed the 95 percent UCL test and 10 contained a sample that exceeded twice the FRL). However, the highest UCL of the mean for radium-226, corrected for background (1.56 pCi/g) is 1.69 pCi/g, which is only one-third of the allowable radium-226 activity of 5 pCi/g above background established in 40 CFR 192 (for inactive uranium tailings sites), as adopted by DOE Order 5400.5, for unrestricted release to the public. Additionally, no single sample result for radium-226 exceeds 30 times the FRL (51 pCi/g), which is the DOE Order 5400.5 hotspot criterion for free release. Therefore, for these special cases, a risk assessment was performed for the former waste pit area (Figure 5-1) to demonstrate that the residual contamination values in the CUs remain protective of human

health and the environment, per Section 10.1.1 of the OU5 ROD.

The area on Figure 5-1 represents the CUs associated with the former waste pits, Area 6 west and four adjacent CUs from Paddys Run that now form the flooding inlet to the restored waste pit areas. This area is taken as the exposure arena because it has been restored as a contiguous wetland. The undeveloped park user is likely to traverse the entire area viewing birds or hiking down to Paddys Run. A site worker, defined as a groundskeeper/sampler, will be active in the area maintaining vegetation and sampling the ponds. Seventeen ponds were sampled to derive an average uranium concentration for surface water.

The exposure parameters for the receptors evaluated in this assessment are provided in Tables 5.1 and 5.2. An undeveloped park user can be a child, youth, adult or senior adult, whereas the site worker is an adult.

TABLE 5-1
EXPOSURE PARAMETERS FOR THE UNDEVELOPED PARK USER

Parameter (units)	Child (1 to 6 yr)	Youth (7 to 18 yr)	Adult (19 to 55 yr)	Senior Adult (56 to 70 yr)
Parameters applicable to all pathways, unless otherwise specified				
EF (day/yr)	20	40	20	40
ED (yr)	3	6	14	6
BW (kg)	15.5	46.9	71.8	71.8
AT_{nc} (day)	2190	4380	13870	5110
AT_c (day)	25550	25550	25550	25550
Pathway: inhalation of dust, volatiles & radon				
IR (m^3/hr)	1.0	1.0	1.0	1.0
ET (hr/day)	2	2	2	2
Pathway: incidental ingestion of soil				
IR (g/day)	0.1	0.075	0.05	0.05
FI (unitless)	0.75	0.75	0.75	0.75
Pathway: dermal contact with soil				
SA (cm^2)	1730	3520	4850	4850
AF (mg/cm^2)	1.9	1.9	0.06	0.06
ABS (unitless)	CSV	CSV	CSV	CSV
Pathway: external radiation				
$ET_{outdoors}$ (hr/day)	2	2	2	2
$ET_{indoors}$ (hr/day)	NA	NA	NA	NA
$SH_{outdoors}$ (unitless)	0.25	0.25	0.25	0.25
$SH_{indoors}$ (unitless)	NA	NA	NA	NA
Pathway: incidental ingestion of surface water				
IR (L/day)	.035	.035	.015	NA
ET (hr/day)	1	1	1	NA
EF (day/yr)	12	12	12	NA
ED (yr)	6	12	20	NA
Pathway: dermal contact with surface water				
SA (cm^2)	2180	4470	6070	NA
DA (mg/cm^2/event)	CSV	CSV	CSV	NA
EF (day/yr)	12	12	12	NA
ED (yr)	6	12	20	NA
ET (hr/day)	1	1	1	NA

EF = exposure frequency
BW = body weight
AT_c = averaging time for carcinogens
ET = exposure time
SA = surface area of skin
ABS = absorption factor
DA = dose absorbed per event
ED = exposure duration
AT_{nc} = averaging time for noncarcinogens
IR = inhalation or ingestion rate
FI = fraction of ingested soil that is contaminated
AF = adherence factor for skin
SH = shielding factor
CSV = chemical specific value

The exposure frequency is taken as 20 days per year, about every other week, for child and adult; and 40 days per year for youth and senior adult. A higher frequency for youth and senior adult is driven by the assumption that these receptors will have extra recreation time available to visit the park.

Default values for exposure duration were adopted from the OU5 CRARE (DOE 1995). The sum across the age groups is 70 years. However, it is recognized by EPA that national trends show individuals do not live in region of the country for more than 30 years. Therefore, the sum for age groups is 30 years.

Body weights are taken from EPA's Exposure Factors Handbook (EFH; EPA 1997). The adult and senior adult reflect the mean value in Table 7-11 of the EFH. Youth represents the mean values reported for ages 7 to 18 in Table 7-3 of the EFH, and child is derived from the mean values reported for ages 0 to 6 in Table 7-3 of the EFH.

The averaging time for non-carcinogens is the exposure duration multiplied by 365 days/yr. For carcinogens, the averaging time is an exposure duration of 70 yrs multiplied by 365 days/yr.

Inhalation rates are obtained from the EFH (EPA 1997). Child, youth, adult and senior adult values represent short-term exposure for light activities (Table 5-23 of the EFH), which are all equivalent in the cited EFH table.The receptor exposure time outdoors is two hours on each day spent at the undeveloped park. Activities include hiking off and on trails, sitting on the ground, and eating snacks.

Ingestion rates for soil are taken from the EFH (EPA 1997). The selected values for child and adult reflect the mean value for children and adult receptors in Table 4-23 of the EFH. A specific value is not reported for the youth receptor, and it is assumed to be 75 mg/day, which is the average of the child and adult values in Table 4-23.

The fraction of contaminated soil that is ingested by a receptor is assumed to be 0.75 of the total amount of soil ingested, as clean top soil and surface water cover the remedial footprint.

The dermal surface area in contact with soil is assumed to be the face, hands, forearms and lower legs. Values in Table 5-1 represent the sum of the surface area for these body parts. All values for the noted body parts were obtained from Exhibit C-1 in EPA Risk Assessment Guidance, Part E (EPA 2004).

The soil adherence factors were taken from Exhibit C-3 in EPA Risk Assessment Guidance, Part E (EPA 2004). Exhibit C-3 reports 95th percentile values for children in dry (0.4 mg/cm2) and wet (3.3 mg/cm2) soil, and these values were averaged to derive the adherence factor of 1.9 for child and youth. The adult and senior were equated to the 95 percentile value for a residential grounds keeper.

An outdoor shielding factor of 0.25 is used to take credit for the shielding provided by the placement of topsoil over the remedial footprint and the presence of water over portions of the exposure area..

The EFH (EPA 1997) does not contain guidance on ingestion rates for surface water. An older version of the handbook (EPA 1989a) assigned 0.05 L/hr for an adult swimmer. However, swimming is not allowed and the incidental ingestion is attributed to wading and splashing in the water. Therefore, a rate of 0.025 L/hr is assumed for the child and youth. The adult receptor is assumed to receive approximately half this dose, or 0.012 L/hr. It is assumed that the senior adult will not go into the water.

For all receptors, an exposure time of one hour is spent wading and splashing on each summer day spent at the undeveloped park. The exposure frequency for these receptors is taken as one day at the park each weekend of the 12 summer weeks (12 day/yr).

Exposure duration to surface water remains the same as soil for child, youth and adult. The senior adult is unlikely to enter the water, and it is assumed that exposure to surface water does not occur. Therefore, this pathway is removed for the senior age group.

The dermal surface area in contact with surface water is assumed to be the face, hands, forearms, feet and lower legs, as swimming is not permitted at the site. Values in Table 5-1 represent the sum of the surface area for these body parts. All values for the noted body parts were obtained from Exhibit C-1 in EPA Risk Assessment Guidance, Part E (EPA 2004).

In Table 5-2, a groundskeeper/sampler receptor is assumed to work 2 days/wk (100 days/yr) mowing, landscaping and collecting soil and water samples. As the site is designated as an undeveloped park, and soil and water samples are collected infrequently, the 100-day exposure frequency is considered reasonable. EPA (1991) has designated the exposure duration of a commercial worker as 25 years, and this is adopted for this assessment.

TABLE 5-2

EXPOSURE PARAMETERS FOR THE GROUNDSKEEPER/SAMPLER

Parameter (units)	Child	Youth	Adult	Sr. Adult
Parameters applicable to all pathways, unless otherwise specified				
EF (day/yr)	NA	NA	100	NA
ED (yr)	NA	NA	25	NA
BW (kg)	NA	NA	71.8	NA
AT_{nc} (day)	NA	NA	9125	NA
AT_c (day)	NA	NA	25550	NA
Pathway: inhalation of dust, volatiles & radon				
IR (m^3/hr)	NA	NA	2.5	NA
ET (hr/day)	NA	NA	7	NA
Pathway: incidental ingestion of soil				
IR (g/day)	NA	NA	0.05	NA
FI (unitless)	NA	NA	0.75	NA
Pathway: dermal contact with soil				
SA (cm^2)	NA	NA	4850	NA
AF (mg/cm^2)	NA	NA	0.5	NA
ABS (unitless)	NA	NA	CSV	NA
Pathway: external radiation				
$ET_{outdoors}$ (hr/day)	NA	NA	7	NA
$ET_{indoors}$ (hr/day)	NA	NA	1	NA
$SH_{outdoors}$ (unitless)	NA	NA	0.25	NA
$SH_{indoors}$ (unitless)	NA	NA	0.5	NA
Pathway: incidental ingestion of surface water				
IR (L/day)	NA	NA	0.01	NA
ET (hr/day)	NA	NA	0.5	NA
EF (day/yr)	NA	NA	12	NA
ED (yr)	NA	NA	25	NA
Pathway: dermal contact with surface water				
SA (cm^2)	NA	NA	5670	NA
DA (mg/cm^2/event)	NA	NA	CSV	NA
EF (day/yr)	NA	NA	12	NA
ED (yr)	NA	NA	25	NA
ET (hr/day)	NA	NA	1	NA

EF = exposure frequency
BW = body weight
AT_c = averaging time for carcinogens
ET = exposure time
SA = surface area of skin exposed to soil or water
ABS = absorption factor
DA = dose absorbed per event
ED = exposure duration
AT_{nc} = averaging time for non-carcinogens
IR = inhalation/ingestion rate
FI = fraction of ingested soil that is contaminated
AF = adherence factor for skin
SH = shielding factor
CSV = chemical specific value

Body weight is taken from Table 7-11 of EPA's Exposure Factors Handbook (EFH; EPA 1997). The averaging time for non-carcinogens is the exposure duration multiplied by 365 days/yr. For carcinogens, the averaging time is an exposure duration of 70 yrs multiplied by 365 days/yr.
Inhalation rates for short-term exposures for outdoor workers are taken from Table 5-23 of the EFH (EPA 1997). The groundskeeper/sampler is assumed to perform heavy activities outdoors 7 hrs/day and 1 hr/day is spent indoors on breaks.

The ingestion rate for soil is taken from Table 4-23 in the EFH (EPA 1997), and the fraction ingested by the groundskeeper is assumed to be 0.75 of total amount of soil ingested, as clean top soil and surface water cover the remedial footprint.

Dermal surface area in contact with soil is assumed to be the face, hands, forearms and lower legs. Values in Table 5-2 represent the sum of the surface area for these body parts. All values for the noted body parts were obtained from Exhibit C-1 in EPA Risk Assessment Guidance, Part E (EPA 2004). The soil adherence factor for the groundskeeper/sampler is equated to the 95 percentile value for a commercial gardener (Exhibit C-3, EPA 2004), which is the most conservative case.

An outdoor shielding factor of 0.25 is used to take credit for the shielding provided by the placement of topsoil over the remedial footprint and the presence of water over portions of the exposure area..

The EFH (EPA 1997) does not contain guidance on ingestion rates for surface water. An older version of the handbook (EPA 1989a) assigned 0.05 L/hr for an adult swimmer. However, swimming is not pertinent to the site workers. The incidental ingestion to the groundskeeper/sampler is attributed to placing hands and arms in the water during sampling events, and repetitive touching of hands to the mouth is assumed to result in an incidental ingestion rate of 0.01 L/hr.

It is assumed that the groundskeeper/sampler spends one hour wading and collecting surface water samples each day that samples are collected, with a sampling frequency of once per month, or 12 days/yr. The sampler is assumed to contact surface water with the hands, forearms, feet and lower legs. Values in Table 5-2 represent the sum of the surface area for these body parts. All values for the noted body parts were obtained from Exhibit C-1 in EPA Risk Assessment Guidance, Part E (EPA 2004).

Risk calculations were performed using the equations in the Comprehensive Response Action Risk

Evaluation (CRARE;Appendix H of the Feasibility Study Report for OU5), which reflect the equations in EPA's Risk Assessment Guidance, Part A (EPA 1989b), the exposure parameters in Tables 5-1 and 5-2, and the November 2006 cancer slope factors and reference doses obtained from the EPA website (radionuclide tables and the Integrated Risk Information System database) and the Oak Ridge Risk Assessment Information System (RAIS). The affected target receptors for these calculations are the undeveloped park user and the groundskeeper/sampler, which is the reasonable maximum exposure for a site worker. All equations, slope factors, reference doses, and contaminant concentrations are provided in Appendix C.

Conservative assumptions were used in the calculations. First, the average soil concentration in the former waste pit area was calculated using results for the 95% UCL or maximum value (if 95% UCL was unavailable) of each CU within the boundary on Figure 5-1. This is conservative because many of the CUs with higher COC concentrations are covered with water, which removes the receptor from exposure to this soil. Second, if all sample results were below the detection limit for a given COC, the detection limit value was used, rather than one-half of the limit. Lastly, cancer slope factors reflect short-lived radioactive daughters in equilibrium with their parent isotope.

Risk calculations for every COC and each pathway are presented in Appendix C, and a summary of the cumulative results are presented in Table 5-3 in terms of the hazard quotient (HQ) and incremental lifetime cancer risk (ILCR) for each pathway and the sum of all pathways. Non-cancer health risks, due to exposure to non-radiological chemicals, are evaluated by application of a reference dose for oral and inhalation exposure routes. A reference dose estimates the upper bound chronic dose of a chemical that a human receptor can be exposed to without suffering ill effects. The contaminant intake for a receptor is divided by the appropriate reference dose factor to yield the HQ. If the HQ is greater than 1, a negative health impact to the receptor is anticipated. Cancer slope factors are published values that specify a cancer morbidity value (risk) to a receptor for a given quantity of contaminant intake, referred to as an ILCR. The resulting value determines whether post-remedial concentrations of contaminants will result in a cancer risk that is in compliance with CERCLA guidance and the OU5 ROD. Results in Table 5-3 indicate receptors in the former waste pit area are in compliance with the CERCLA guidance and OU5 ROD (i.e., cumulative sum for HI is less than 1 and ILCR is less than 10^{-4})

TABLE 5-3
SUMMARY OF RISK TO RECEPTORS IN THE FORMER WASTE PIT AREA

PATHWAY	Undeveloped Park User		Groundskeeper/Sampler	
	HQ	ILCR	HQ	ILCR
Inhale	1.26E-04	4.00E-07	4.47E-04	1.02E-05
Dermal Soil	7.73E-02	4.54E-06	2.42E-02	5.89E-06
Ingest Soil	5.14E-02	1.31E-06	1.42E-02	2.39E-06
Dermal Surface Water	1.57E-03	0.00E+00	3.87E-04	0.00E+00
Ingest Surface Water	1.34E-02	2.60E-08	5.96E-04	1.24E-08
External Radiation	NA	5.38E-06	NA	3.51E-05
SUM OF ALL PATHS	**1.44E-01**	**1.17E-05**	**3.98E-02**	**5.36E-05**

NA = calculation not applicable for indicated pathway

Each pathway in Table 5-3 produces a risk that is dependent on the contaminants present, and the contribution of each contaminant to the risk is provided in Appendix C. For the undeveloped park user, the pathways contributing the most to the sum HQ value are dermal soil, ingest soil and ingest surface water. Arsenic is the primary contaminant responsible for the HQ dermal soil value, uranium and arsenic for the HQ ingest soil, and uranium for the HQ ingest surface water. Total ILCR for the undeveloped park user is driven primarily by exposure to the pathways of external radiation and dermal soil. Dermal soil ILCR is driven by arsenic, and external radiation is dominated by radium-226 and daughters, thorium-228 and daughters, and radium-228 and daughters. The ILCR for dermal surface water is zero because uranium is the only contaminant evaluated for surface water and it does not have a slope factor for this pathway.

The total HQ for the groundskeeper/sampler is driven by the dermal soil and ingest soil pathways, where arsenic is the key contaminant for dermal exposure and uranium for ingestion. Note that the total HQ value for the groundskeeper/sampler is less than the undeveloped park user because of the lower HQ for the pathway associated with ingesting surface water and soil. Recall that the undeveloped park user receptor consists of a child and a youth who play in the water and soil and ingest more than the worker. The total ILCR value for the worker is largely derived from external radiation and inhalation, with most of the remaining contribution coming from the dermal soil and ingest soil paths. Exposure to external radiation is dominated by radium-226 and daughters, thorium-228 and daughters, and radium-228 and daughters. The exposure from inhalation is driven by radon-222 and daughters and radium-226 and daughters. Dermal soil ILCR is driven by arsenic, and ingest soil by lead-210 and daughters, uranium-238 and daughters, and radium-228 and daughters. A higher ILCR value for the groundskeeper/sampler,

relative to the undeveloped park user, is attributed to a longer exposure time (7 hr/day vs 2 hr/day).

5.3 CERTIFICATION CONCLUSIONS

Based on the certification analytical results, precertification data, statistical analysis, and risk assessment calculations, DOE has determined that the remedial objectives in the OU5 ROD have been achieved for Area 6 Waste Pits 1, 2, and 3, the Burn Pit, the Clearwell, and the Areas West and North of the Waste described in this report. Additionally, the Oak Ridge Institute for Science and Education (ORISE) conducted an independent radiological survey of the waste pits and they concluded that the remedial actions were effective in meeting the established FRLs (ORISE 2006). Therefore, no further remedial actions are required and this portion of the FCP will be released for restoration and final land use upon EPA and OEPA concurrence.

6.0 PROTECTION OF CERTIFIED AREAS

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

The procedure is summarized as follows:

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

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

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APPENDIX A

CERTIFICATION SAMPLES, ANALYTICAL RESULTS, STATISTICS TABLES, AND RISK ASSESSMENT

APPENDIX A
STATISTICAL ABBREVIATIONS AND SYMBOLS

The procedure used to determine if the data follow a normal or lognormal distribution 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

SAMPLING RESULTS AND STATISTICS INITIAL SAMPLING

Certification Unit A6WP-C09

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99
A6WP-C09-2	0.648 -	0.566 J	0.556 J	0.566 J	8.27 -	0.0299 U	1.68 U
A6WP-C09-3	0.897 -	0.765 J	0.755 J	0.765 J	9.07 -	0.0445 U	1.66 U
A6WP-C09-4	0.67 -	0.446 J	0.438 J	0.446 J	2.56 J	0.0375 U	1.63 U
A6WP-C09-6	0.841 -	0.664 J	0.686 J	0.664 J	10.8 -	0.0535 U	1.84 U
A6WP-C09-6-D	0.999 -	1.04 J	1.07 J	1.04 J	14.7 -	0.0532 U	1.93 U
A6WP-C09-7	0.743 -	0.538 J	0.53 J	0.538 J	4.46 -	0.0321 U	1.68 U
A6WP-C09-8	0.679 -	0.582 J	0.558 J	0.582 J	4.7 -	0.0394 U	1.77 U
A6WP-C09-9	0.754 -	0.866 J	0.896 J	0.866 J	4.76 -	0.0697 U	1.88 U
A6WP-C09-10	0.713 -	0.498 J	0.473 J	0.498 J	4.34 J	0.0381 U	1.78 U
A6WP-C09-11	1.12 -	0.935 J	0.977 J	0.935 J	10.1 -	0.0609 U	18.7 -
A6WP-C09-13	0.861 -	0.739 J	0.763 J	0.739 J	15.1 -	0.0648 U	1.75 U
A6WP-C09-14	0.823 -	0.693 J	0.708 J	0.693 J	13.7 -	0.0296 U	1.86 U
A6WP-C09-16	0.696 -	0.626 J	0.64 J	0.626 J	6.65 -	0.0396 U	1.75 U
Limit	1.7	1.8	1.7	1.5	82	1.4	30
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%
Max. Result	1.12	1.04	1.07	1.04	15.1	0.0697 U	18.7
Max. >= Limit	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	11
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	91.7%
Est. Mean*	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C09

(continued)

SAMPLE ID	Thorium-232	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene
A6WP-C09-2	2.12 J	0.64 U	4.5 -	0.41 -	0.32 J	0.103 U	3.88 J	35.9 U
A6WP-C09-3	1.96 J	2.38 UJ	6 -	0.44 -	0.595 U	0.119 U	7.8 J	109 -
A6WP-C09-4	1.44 J	0.445 UJ	8.7 -	0.35 -	0.13 J	0.111 U	4.68 J	38.2 U
A6WP-C09-6	4.39 J	0.52 U	5.2 -	0.39 -	0.2 J	0.113 U	4.85 J	38.4 U
A6WP-C09-6-D	4.71 J	0.48 J	5.5 -	0.39 -	0.19 J	0.114 U	5.45 J	38.2 UJ
A6WP-C09-7	2.84 J	0.47 J	5.6 -	0.29 -	0.13 J	0.114 U	9.9 J	257 -
A6WP-C09-8	1.36 U	0.43 J	3.6 -	0.22 -	0.17 J	0.107 U	4.83 J	37.5 U
A6WP-C09-9	1.25 U	0.7 J	6.6 -	0.51 -	0.17 J	0.112 U	5.86 J	37.8 U
A6WP-C09-10	1.76 J	0.427 UJ	4 -	0.24 -	0.16 J	0.107 U	3.74 J	37.4 U
A6WP-C09-11	1.69 J	2.23 UJ	6.6 -	0.68 -	0.557 U	0.111 U	3.12 J	38.1 U
A6WP-C09-13	1.96 J	0.52 J	4.8 -	0.33 -	0.15 J	0.11 U	7.22 J	36.7 U
A6WP-C09-14	1.98 J	0.44 J	5.6 -	0.33 -	0.17 J	0.109 U	7.94 J	38.3 U
A6WP-C09-16	2.48 J	0.45 J	4.6 -	0.27 -	0.17 J	0.108 U	5.71 J	37.1 U
Limit	280	96	12	1.5	82	29000	78000	2000
Units	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	4.71	0 .7	8.7	0 .68	0 .32	0.119 U	9.9	257
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	2	6	0	0	2	0	0	10
% Nondetects	16.7%	50.0%	0.0%	0.0%	16.7%	0.0%	0.0%	83.3%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C09

(continued)

SAMPLE ID	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260
A6WP-C09-2	35.9 U	35.9 U	35.9 U	8.61 J	3.59 U
A6WP-C09-3	40.2 U	40.2 U	40.2 U	4.02 U	4.02 U
A6WP-C09-4	38.2 U	38.2 U	53.2 J	3.82 U	3.82 U
A6WP-C09-6	38.4 U	38.4 U	38.4 U	3.84 U	3.84 U
A6WP-C09-6-D	38.2 UJ	38.2 UJ	38.2 UJ	3.82 UJ	3.82 UJ
A6WP-C09-7	38.5 U	106 -	192 -	3.85 U	3.85 U
A6WP-C09-8	37.5 U	37.5 U	37.5 U	3.75 U	3.75 U
A6WP-C09-9	37.8 U	37.8 U	37.8 U	3.78 U	3.78 U
A6WP-C09-10	37.4 U	37.4 U	37.4 U	3.74 U	3.74 U
A6WP-C09-11	38.1 U	38.1 U	38.1 U	3.81 U	3.81 U
A6WP-C09-13	36.7 U	36.7 U	36.7 U	7.1 J	3.67 U
A6WP-C09-14	38.3 U	38.3 U	38.3 U	5.8 J	3.83 U
A6WP-C09-16	37.1 U	37.1 U	37.1 U	3.71 U	3.71 U
Limit	20000	2000	20000	130	130
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	40.2 U	106	192	8.61	4.02 U
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Nondetects	12	11	10	9	12
% Nondetects	100.0%	91.7%	83.3%	75.0%	100.0%
Est. Mean*	--	--	--	--	--
UCL	--	--	--	--	--
Prob. > Limit	--	--	--	--	--
Pass / Fail	--	--	--	--	--

a posteriori Sample	--	--	--	--	--
Size calculation	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C09

(continued)

SAMPLE ID	Dieldrin	1,1-Dichloroethene	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene
A6WP-C09-2	1.43 U	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C09-3	1.61 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C09-4	1.53 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C09-6	1.54 U	1 U	1 U	1 U	1 U
A6WP-C09-6-D	1.53 UJ	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C09-7	1.54 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C09-8	1.5 U	1 U	1 U	1 U	1 U
A6WP-C09-9	1.51 U	1 U	1 U	1 U	1 U
A6WP-C09-10	1.5 U	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C09-11	1.52 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C09-13	1.47 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C09-14	1.53 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C09-16	1.49 U	1 U	1 U	1 U	1 U
Limit	15	410	160	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	1.61 U	1.1 U	1.1 U	1.1 U	1.1 U
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Nondetects	12	12	12	12	12
% Nondetects	100.0%	100.0%	100.0%	100.0%	100.0%
Est. Mean*	--	--	--	--	--
UCL	--	--	--	--	--
Prob. > Limit	--	--	--	--	--
Pass / Fail	--	--	--	--	--

a posteriori Sample	--	--	--	--	--
Size calculation	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C09

(continued)

SAMPLE ID	Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C09-2	0.8 U	0.0000026 -	0.0000977 -
A6WP-C09-3	0.9 U	0.00000144 U	0.0000218 -
A6WP-C09-4	1.1 U	0.00000138 U	0.0000148 -
A6WP-C09-6	1 U	0.00000714 -	0.0000911 -
A6WP-C09-6-D	0.9 U	0.00000514 -	0.0000827 -
A6WP-C09-7	1.1 U	0.00000138 U	0.0000163 -
A6WP-C09-8	1 U	0.00000137 U	0.000016 -
A6WP-C09-9	1 U	0.00000139 U	0.0000537 -
A6WP-C09-10	0.8 U	0.00000141 U	0.0000438 -
A6WP-C09-11	0.9 U	0.00000141 U	0.000131 -
A6WP-C09-13	4.6 J	0.00000361 -	0.0000797 -
A6WP-C09-14	1.9 J	0.00000382 -	0.0000691 -
A6WP-C09-16	1 U	0.00000264 -	0.00005 -
Limit	25000	0.00088	0.0088
Units	ug/kg	mg/kg	mg/kg
Conf. Level	90%	90%	90%
Max. Result	4.6	0 .00000714	0 .000131
Max. >= Limit	No	No	No
W-statistic Prob. #	- -	- -	- -
Test Procedure	- -	- -	- -
Sample Size	12	12	12
Nondetects	10	6	0
% Nondetects	83.3%	50.0%	0.0%
Est. Mean*	- -	- -	- -
UCL	- -	- -	- -
Prob. > Limit	- -	- -	- -
Pass / Fail	- -	- -	- -

a posteriori Sample	- -	- -	- -
Size calculation	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C10

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230
A6WP-C10-1	0.992 -	0.706 J	0.67 -	0.706 J	5.15 J	0.0393 U	0.806 U	1.27 J
A6WP-C10-3	1.15 -	1.04 J	1.11 -	1.04 J	13.2 J	0.0575 U	0.923 J	5.97 J
A6WP-C10-4	1.19 -	0.908 J	0.853 -	0.908 J	19.2 J	0.0377 U	1.37 -	8.04 J
A6WP-C10-5	1.24 -	1.08 J	1.11 -	1.08 J	5.94 J	0.0631 U	2.85 -	1.94 J
A6WP-C10-7	0.927 -	0.677 J	0.725 -	0.677 J	7.27 J	0.0437 U	0.765 U	2.48 J
A6WP-C10-8	0.969 -	0.659 J	0.665 -	0.659 J	7.01 J	0.0331 U	0.817 U	1.54 J
A6WP-C10-9	1.23 -	1.02 J	1.07 -	1.02 J	19.8 J	0.0805 U	0.901 U	8.79 J
A6WP-C10-9-D	1.41 -	1.24 J	1.3 -	1.24 J	100 J	0.0888 U	1.14 -	10.4 J
A6WP-C10-10	1.08 -	0.615 J	0.576 -	0.615 J	13.1 J	0.0731 U	0.898 U	4.66 J
A6WP-C10-12	1.16 -	0.933 J	0.963 -	0.933 J	19.6 J	0.0825 U	0.868 U	5.28 J
A6WP-C10-14	5.22 -	0.931 J	0.927 -	0.931 J	87.3 J	0.107 U	3.82 -	9.6 J
A6WP-C10-14-R	0.985 -	NA	NA	0.691 J	6 J	NA	NA	NA
A6WP-C10-15	0.822 -	0.499 J	0.451 -	0.499 J	11.9 J	0.0748 U	0.803 U	2.01 J
A6WP-C10-16	1.03 -	0.674 J	0.655 -	0.674 J	4.18 J	0.0392 U	0.913 U	1.31 J
Limit	1.70	1.8	1.7	1.5	82.00	1.4	30	280
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	5.22	1.24	1.3	1.24	100	0.107 U	3.82	10.4
Max. >= Limit	Yes	No	No	No	Yes	No	No	No
W-statistic Prob. #	< 0.01% (LN)	- -	- -	- -	7.9% (LN)	- -	- -	- -
Test Procedure	Median (Sign)	- -	- -	- -	Lognormal	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	7	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	58.3%	0.0%
Est. Mean*	1.115	- -	- -	- -	23.186	- -	- -	- -
UCL	1.240	- -	- -	- -	57.940	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	Pass	- -	- -	- -	pass	- -	- -	- -
a posteriori Sample	7	- -	- -	- -	4	- -	- -	- -
Size calculation	Pass	- -	- -	- -	Pass	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C10

(continued)

SAMPLE ID	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene	Benzo(b)fluoranthene
A6WP-C10-1	0.536 U	4.46 J	0.482 -	0.209 U	1.04 J	1.9 J	37.7 U	37.7 U
A6WP-C10-3	0.658 U	4.21 J	0.386 -	0.257 U	0.616 U	2.85 J	38.3 U	38.3 U
A6WP-C10-4	0.619 U	5.41 J	0.346 -	0.242 U	0.791 J	3.1 J	37.5 U	37.5 U
A6WP-C10-5	0.645 U	6.52 J	0.488 -	0.252 U	1.17 J	2.38 J	39.6 U	39.6 U
A6WP-C10-7	0.718 U	4.3 J	0.209 -	0.28 U	1 J	3.21 J	118 -	106 -
A6WP-C10-8	0.56 U	4.38 J	0.356 -	0.219 U	0.525 U	2.05 J	37.7 U	37.7 U
A6WP-C10-9	0.527 U	5.66 J	0.276 -	0.206 U	0.494 U	4.17 J	37.6 U	37.6 U
A6WP-C10-9-D	0.638 U	4.32 J	0.321 -	0.249 U	0.598 U	5.7 J	37.8 U	37.8 U
A6WP-C10-10	0.646 U	5.09 J	0.3 -	0.252 U	0.606 U	4.14 J	37.2 U	37.2 U
A6WP-C10-12	0.62 U	4.71 J	0.322 -	0.242 U	0.581 U	2.96 J	36.9 U	36.9 U
A6WP-C10-14	0.671 U	6.93 J	0.43 -	0.262 U	0.629 U	4.8 J	38.3 U	38.3 U
A6WP-C10-14-R	NA	NA	NA	NA	NA	NA	NA	NA
A6WP-C10-15	0.545 U	3.78 J	0.232 -	0.213 U	0.511 U	3.81 J	38.6 U	38.6 U
A6WP-C10-16	0.523 U	3.77 J	0.478 -	0.204 U	0.49 U	2.25 J	37.2 U	37.2 U
Limit	96	12	1.5	82	29000	78000	2000	20000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	0.718 U	6.93	0 .488	0.28 U	1.17	5.7	118	106
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	12	0	0	12	8	0	11	11
% Nondetects	100.0%	0.0%	0.0%	100.0%	66.7%	0.0%	91.7%	91.7%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C10

(continued)

SAMPLE ID	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene
A6WP-C10-1	37.7 U	37.7 U	3.77 U	3.77 U	1.51 U	0.8 U
A6WP-C10-3	38.3 U	38.3 U	3.83 U	3.83 U	1.53 U	0.9 U
A6WP-C10-4	37.5 U	37.5 U	3.75 U	3.75 U	1.5 U	0.9 U
A6WP-C10-5	39.6 U	39.6 U	12.9 J	3.96 U	1.58 U	1 U
A6WP-C10-7	38.3 U	38.3 U	3.83 U	3.83 U	1.53 U	1 U
A6WP-C10-8	37.7 U	37.7 U	3.77 U	3.77 U	1.51 U	1 U
A6WP-C10-9	37.6 U	37.6 U	3.76 U	3.76 U	1.5 U	0.9 U
A6WP-C10-9-D	37.8 U	37.8 U	3.78 U	3.78 U	1.51 U	0.9 U
A6WP-C10-10	37.2 U	37.2 U	11 J	6.3 J	1.49 U	0.9 U
A6WP-C10-12	36.9 U	36.9 U	8.7 J	3.69 U	1.48 U	0.8 U
A6WP-C10-14	38.3 U	38.3 U	25.6 -	11.7 J	1.53 U	0.8 U
A6WP-C10-14-R	NA	NA	NA	NA	NA	NA
A6WP-C10-15	38.6 U	38.6 U	3.86 U	3.86 U	1.55 U	0.9 U
A6WP-C10-16	37.2 U	37.2 U	3.72 U	3.72 U	1.49 U	1.1 U
Limit	2000	20000	130	130	15	410
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	39.6 U	39.6 U	25.6	11.7	1.58 U	1.1 U
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12
Nondetects	12	12	8	10	12	12
% Nondetects	100.0%	100.0%	66.7%	83.3%	100.0%	100.0%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--

a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C10

(continued)

SAMPLE ID	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene	Trichloroethene
A6WP-C10-1	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C10-3	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C10-4	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C10-5	1 U	1 U	1 U	1 U
A6WP-C10-7	1 U	1 U	1 U	1 U
A6WP-C10-8	1 U	1 U	1 U	1 U
A6WP-C10-9	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C10-9-D	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C10-10	0.9 U	0.9 U	0.9 U	11.2 J
A6WP-C10-12	0.8 U	0.8 U	0.8 U	4.5 J
A6WP-C10-14	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C10-14-R	NA	NA	NA	NA
A6WP-C10-15	0.9 U	0.9 U	0.9 U	25.5 J
A6WP-C10-16	1.1 U	1.1 U	1.1 U	1.1 U
Limit	160	4000	3600	25000
Units	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	1.1 U	1.1 U	1.1 U	25.5
Max. >= Limit	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -
Sample Size	12	12	12	12
Nondetects	12	12	12	9
% Nondetects	100.0%	100.0%	100.0%	75.0%
Est. Mean*	- -	- -	- -	- -
UCL	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C10

(continued)

Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C10-1	0.00000111 J	0.000056 -
A6WP-C10-3	0.00000668 -	0.000105 -
A6WP-C10-4	0.0000108 -	0.000166 -
A6WP-C10-5	0.00000238 -	0.0000698 -
A6WP-C10-7	0.00000262 -	0.0000442 -
A6WP-C10-8	0.00000129 U	0.0000527 -
A6WP-C10-9	0.00000601 -	0.000143 -
A6WP-C10-9-D	0.00000433 -	0.000107 -
A6WP-C10-10	0.00000478 -	0.0000894 -
A6WP-C10-12	0.000015 -	0.000256 -
A6WP-C10-14	0.00000724 -	0.000132 -
A6WP-C10-14-R	NA	NA
A6WP-C10-15	0.00000134 U	0.0000376 -
A6WP-C10-16	0.00000138 U	0.0000373 -
Limit	0.00088	0.0088
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	0 .000015	0 .000256
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	0	0
% Nondetects	0.0%	0.0%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -

a posteriori Sample	- -	- -
Size calculation	- -	- -

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.
#: 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.

Certification Unit A6WP-C11

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230
A6WP-C11-1	1.06 J	0.825 -	0.88 -	0.825 -	5.64 -	0.0506 U	1.6 -	1.43 J
A6WP-C11-2	1.36 J	0.833 -	0.863 -	0.833 -	14.9 -	0.0322 U	3.03 -	3.51 J
A6WP-C11-3	1.07 J	0.657 -	0.653 -	0.657 -	2.05 U	0.0365 U	2.21 -	0.978 J
A6WP-C11-5	2.08 J	0.484 -	0.489 -	0.484 -	8.42 -	0.161 -	1.54 -	1.17 J
A6WP-C11-6	0.635 J	0.247 -	0.241 -	0.247 -	1.65 U	0.0256 U	0.75 J	1.2 J
A6WP-C11-8	2.2 J	0.338 -	0.341 -	0.338 -	7.57 -	0.0762 J	2.71 -	1.19 J
A6WP-C11-10	1.28 J	0.617 -	0.679 -	0.617 -	14.1 -	0.051 U	1.11 -	3.21 J
A6WP-C11-11	2.08 J	0.335 -	0.365 -	0.335 -	8.29 -	0.0363 U	1.58 -	1.06 J
A6WP-C11-12	9.46 J	1.5 -	1.63 -	1.5 -	10.3 -	0.0966 U	0.78 U	1.38 J
A6WP-C11-12-R	1.3 -	NA	NA	0.521 J	12.1 -	NA	NA	NA
A6WP-C11-13	0.791 J	0.482 -	0.474 -	0.482 -	1.88 U	0.0296 U	0.764 U	0.757 J
A6WP-C11-14	0.898 J	0.322 -	0.319 -	0.322 -	3.99 J	0.0364 U	1.35 -	1.22 J
A6WP-C11-14-D	0.886 J	0.299 -	0.316 -	0.299 -	5.37 -	0.0482 U	1.69 -	1.02 J
A6WP-C11-16	1.81 J	1.35 -	1.31 -	1.35 -	101 -	0.0636 U	3.92 -	18.9 -
A6WP-C11-16-R	1.47 -	NA	NA	0.699 J	23.7 -	NA	NA	NA
Limit	1.70	1.8	1.7	1.5	82.00	1.4	30	280
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	9.46	1.5	1.63	1.5	101	0 .161	3.92	18.9
Max. >= Limit	Yes	No	No	No	Yes	No	No	No
W-statistic Prob. #	6.0% (LN)	- -	- -	- -	23.8% (LN)	- -	- -	- -
Test Procedure	Lognormal	- -	- -	- -	Median (Sign)	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	3	10	2	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	25.0%	83.3%	16.7%	0.0%
Est. Mean*	1.941	- -	- -	- -	7.930	- -	- -	- -
UCL	3.248	- -	- -	- -	14.100	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	FAIL	- -	- -	- -	Pass	- -	- -	- -

a posteriori Sample	231	- -	- -	- -	7	- -	- -	- -
Size calculation	Fail	- -	- -	- -	Pass	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C11

(continued)

SAMPLE ID	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene	Benzo(b)fluoranthene
A6WP-C11-1	0.635 U	4.65 -	0.624 -	0.205 J	0.238 U	1.83 J	37.7 U	37.7 U
A6WP-C11-2	0.66 U	4.26 -	0.576 -	0.23 J	0.247 U	1.81 J	45 J	120 -
A6WP-C11-3	0.714 U	4.43 -	0.606 -	0.162 J	0.268 U	2.31 J	38.5 U	38.5 U
A6WP-C11-5	0.742 U	5.05 -	0.338 -	0.303 J	0.278 U	5.65 J	38.8 U	38.8 U
A6WP-C11-6	0.62 U	3.48 -	0.199 -	0.16 J	0.232 U	2.46 J	34.9 U	34.9 U
A6WP-C11-8	0.615 U	3.4 -	0.203 -	0.37 J	0.231 U	4.12 J	35.4 U	35.4 U
A6WP-C11-10	0.626 U	3.72 -	0.338 -	0.177 J	0.235 U	2.82 J	37.2 U	37.2 U
A6WP-C11-11	0.655 U	2.64 -	0.231 -	0.238 J	0.245 U	5 J	36.1 U	36.1 U
A6WP-C11-12	0.718 U	5.09 -	0.363 -	0.412 J	0.269 U	1.88 J	39.3 U	39.3 U
A6WP-C11-12-R	NA	NA	NA	NA	NA	NA	NA	NA
A6WP-C11-13	0.525 U	4.06 -	0.399 -	0.178 J	0.197 U	1.37 J	36.1 U	36.1 U
A6WP-C11-14	0.602 U	3.64 -	0.253 -	0.151 J	0.226 U	3.25 J	36 U	36 U
A6WP-C11-14-D	0.565 U	3.39 -	0.24 -	0.14 J	0.212 U	3.51 J	36.4 U	36.4 U
A6WP-C11-16	0.709 U	4.38 -	0.635 -	0.221 J	0.266 U	6.22 J	37.5 U	117 -
A6WP-C11-16-R	NA	NA	NA	NA	NA	NA	NA	NA
Limit	96	12	1.5	82	29000	78000	2000	20000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	0.742 U	5.09	0 .635	0 .412	0.278 U	6.22	45	120
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	12	0	0	0	12	0	11	10
% Nondetects	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%	91.7%	83.3%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C11

(continued)

SAMPLE ID	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene
A6WP-C11-1	37.7 U	37.7 U	3.77 U	3.77 U	1.51 U	1 U
A6WP-C11-2	36.4 U	36.4 U	4.6 J	3.64 U	1.45 U	1.1 U
A6WP-C11-3	38.5 U	38.5 U	3.85 U	3.85 U	1.54 U	1.3 U
A6WP-C11-5	38.8 U	38.8 U	3.88 U	3.88 U	1.55 U	1.1 U
A6WP-C11-6	34.9 U	34.9 U	3.49 U	3.49 U	1.39 U	1.1 U
A6WP-C11-8	35.4 U	35.4 U	3.54 U	3.54 U	1.42 U	1.1 U
A6WP-C11-10	37.2 U	37.2 U	3.72 U	3.72 U	1.49 U	0.9 U
A6WP-C11-11	36.1 U	36.1 U	3.61 U	3.61 U	1.45 U	1.1 U
A6WP-C11-12	39.3 U	39.3 U	3.93 U	3.93 U	1.57 U	1.1 U
A6WP-C11-12-R	NA	NA	NA	NA	NA	NA
A6WP-C11-13	36.1 U	36.1 U	3.61 U	3.61 U	1.44 U	1 U
A6WP-C11-14	36 U	36 U	0.108 U	0.108 U	1.44 U	1.1 U
A6WP-C11-14-D	36.4 U	36.4 U	0.109 U	0.109 U	1.46 U	1.2 U
A6WP-C11-16	37.5 U	37.5 U	0.13 J	0.113 U	1.5 U	1.1 U
A6WP-C11-16-R	NA	NA	NA	NA	NA	NA
Limit	2000	20000	130	130	15	410
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	39.3 U	39.3 U	4.6	3.93 U	1.57 U	1.3 U
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12
Nondetects	12	12	10	12	12	12
% Nondetects	100.0%	100.0%	83.3%	100.0%	100.0%	100.0%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--

a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C11

(continued)

SAMPLE ID	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene	Trichloroethene
A6WP-C11-1	1 U	1 U	1 U	1 U
A6WP-C11-2	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C11-3	1.3 U	1.3 U	1.3 U	1.3 U
A6WP-C11-5	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C11-6	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C11-8	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C11-10	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C11-11	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C11-12	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C11-12-R	NA	NA	NA	NA
A6WP-C11-13	1 U	1 U	1 U	1 U
A6WP-C11-14	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C11-14-D	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C11-16	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C11-16-R	NA	NA	NA	NA
Limit	160	4000	3600	25000
Units	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	1.3 U	1.3 U	1.3 U	1.3 U
Max. >= Limit	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -
Sample Size	12	12	12	12
Nondetects	12	12	12	12
% Nondetects	100.0%	100.0%	100.0%	100.0%
Est. Mean*	- -	- -	- -	- -
UCL	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C11

(continued)

Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C11-1	0.00000138 U	0.0000698 -
A6WP-C11-2	0.00000609 -	0.000119 -
A6WP-C11-3	0.0000018 U	0.0000828 -
A6WP-C11-5	0.0000013 U	0.00000204 U
A6WP-C11-6	0.0000012 U	0.0000051 U
A6WP-C11-8	0.00000131 U	0.00000373 U
A6WP-C11-10	0.00000361 U	0.0000871 -
A6WP-C11-11	0.00000131 U	0.00000977 U
A6WP-C11-12	0.000000552 U	0.0000266 -
A6WP-C11-12-R	NA	NA
A6WP-C11-13	0.0000013 U	0.0000305 -
A6WP-C11-14	0.00000125 U	0.00000568 U
A6WP-C11-14-D	0.00000129 U	0.00000545 U
A6WP-C11-16	0.000184 -	0.00223 J
A6WP-C11-16-R	NA	NA
Limit	0.00088	0.0088
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	0 .000184	0 .00223
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	10	5
% Nondetects	83.3%	41.7%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -

a posteriori Sample	- -	- -
Size calculation	- -	- -

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.
#: 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.

Certification Unit A6WP-C12

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99
A6WP-C12-2	0.839 -	0.711 J	0.727 J	0.711 J	9.43 J	0.059 U	1.8 U
A6WP-C12-3	1.62 -	1.59 J	1.6 J	1.59 J	40 J	0.0731 U	1.83 U
A6WP-C12-4	0.884 -	0.817 J	0.822 J	0.817 J	11.9 J	0.0786 U	2.04 U
A6WP-C12-6	0.961 -	0.782 J	0.798 J	0.782 J	19.6 J	0.0483 U	1.88 U
A6WP-C12-7	0.861 -	0.569 J	0.563 J	0.569 J	14.5 J	0.0458 U	1.92 U
A6WP-C12-8	1.01 -	0.978 J	1.02 J	0.978 J	16.1 J	0.0381 U	14.8 -
A6WP-C12-9	0.866 -	0.718 J	0.735 J	0.718 J	16.7 J	0.0612 U	1.85 U
A6WP-C12-11	1.32 -	0.819 J	0.818 J	0.819 J	106 J	0.0527 U	2.17 U
A6WP-C12-12	2.52 -	3.4 J	4.23 J	3.4 J	175 J	0.0846 U	1.88 U
A6WP-C12-13	1.18 -	0.971 J	0.99 J	0.971 J	91.2 J	0.0508 U	1.96 U
A6WP-C12-15	1.21 -	1.04 J	1.1 J	1.04 J	59.2 J	0.0698 U	2.01 U
A6WP-C12-15-D	1.15 -	0.919 J	0.94 J	0.919 J	45.3 J	0.137 J	1.89 U
A6WP-C12-16	0.657 -	0.49 J	0.557 J	0.49 J	1.56 U	0.0407 U	2.01 U
A6WP-C12-16-R	1.95 -	NA	NA	0.933 J	15.2 -	NA	NA
Limit	1.70	1.80	1.70	1.50	82.00	1.40	30.00
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%
Max. Result	2.52	3.4	4.23	3.4	175	0.137	14.8
Max. >= Limit	Yes	Yes	Yes	Yes	Yes	No	No
W-statistic Prob. #	9.3% (LN)	4.9% (LN)	< 0.01% (LN)	< 0.01% (LN)	12.2% (LN)	- -	- -
Test Procedure	Lognormal	Median (Sign)	Median (Sign)	Median (Sign)	Lognormal	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	11	11
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	91.7%	91.7%
Est. Mean*	1.268	0.818	0.820	0.876	48.458	- -	- -
UCL	1.570	1.040	1.100	1.040	113.598	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	pass	Pass	Pass	Pass	FAIL	- -	- -
a posteriori Sample	8	7	7	12	8	- -	- -
Size calculation	Pass	Pass	Pass	Pass	Pass	- -	- -

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.
#: 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.

Certification Unit A6WP-C12

(continued)

SAMPLE ID	Thorium-230	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene
A6WP-C12-2	2.97 J	0.434 UJ	7 J	0.33 -	0.21 J	0.109 UJ	4.43 J	37.6 U
A6WP-C12-3	9.03 J	0.76 J	4.3 J	0.45 -	0.23 J	0.11 UJ	4.72 J	36.8 U
A6WP-C12-4	1.82 J	2.14 UJ	4.9 J	0.51 -	0.536 UJ	0.107 UJ	1.56 J	37.4 U
A6WP-C12-6	3.21 J	0.428 UJ	5.1 J	0.51 -	0.19 J	0.107 UJ	3.58 J	37.1 U
A6WP-C12-7	15.5 J	0.56 J	5.2 J	0.37 -	0.17 J	0.11 UJ	4.97 J	37.7 U
A6WP-C12-8	4.13 J	0.55 J	5.2 J	0.43 -	0.17 J	0.11 UJ	4.41 J	37.4 U
A6WP-C12-9	3.67 J	0.54 J	5 J	0.37 -	0.18 J	0.109 UJ	4.34 J	37.4 U
A6WP-C12-11	9.01 J	2.27 UJ	10.9 J	0.73 -	0.568 UJ	0.114 UJ	16.6 J	38.8 U
A6WP-C12-12	16.8 J	2.31 UJ	7.5 J	0.64 -	0.577 UJ	0.115 UJ	6.21 J	40.3 U
A6WP-C12-13	5.49 J	0.428 UJ	5.4 J	0.53 -	0.19 J	0.107 UJ	7.92 J	37.2 U
A6WP-C12-15	7.43 J	1.1 J	5.1 J	0.58 -	0.29 J	0.118 UJ	9.55 J	40.1 U
A6WP-C12-15-D	2.9 J	2.37 UJ	8.5 J	0.69 -	0.593 UJ	0.119 UJ	10.8 J	40 U
A6WP-C12-16	0.853 U	0.54 J	3.6 J	0.23 -	0.15 J	0.103 UJ	3.06 J	35.7 U
A6WP-C12-16-R	NA	NA	NA	NA	NA	NA	NA	NA
Limit	280.00	96.00	12.00	1.50	82.00	29000.00	78000.00	2000.00
Units	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	16.8	1.1	10.9	0.73	0.29	0.119 U	16.6	40.3 U
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	1	6	0	0	3	12	0	12
% Nondetects	8.3%	50.0%	0.0%	0.0%	25.0%	100.0%	0.0%	100.0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C12

(continued)

SAMPLE ID	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin
A6WP-C12-2	37.6 U	37.6 U	37.6 U	5.7 J	3.76 U	1.5 U
A6WP-C12-3	36.8 U	36.8 U	36.8 U	6.3 J	3.68 U	1.47 U
A6WP-C12-4	37.4 U	37.4 U	37.4 U	3.74 U	3.74 U	1.5 U
A6WP-C12-6	37.1 U	37.1 U	37.1 U	9.1 J	5.2 J	1.48 U
A6WP-C12-7	37.7 U	37.7 U	37.7 U	6.3 J	3.77 U	1.51 U
A6WP-C12-8	37.4 U	37.4 U	37.4 U	6.6 J	3.74 U	1.5 U
A6WP-C12-9	37.4 U	37.4 U	37.4 U	7 J	3.8 J	1.49 U
A6WP-C12-11	38.8 U	38.8 U	38.8 U	346 J	164 J	1.55 U
A6WP-C12-12	40.3 U	40.3 U	40.3 U	67.6 J	38.1 J	1.61 U
A6WP-C12-13	37.2 U	37.2 U	37.2 U	62.4 J	29.9 J	1.49 U
A6WP-C12-15	40.1 U	40.1 U	40.1 U	67 J	40.9 J	1.6 U
A6WP-C12-15-D	40 U	40 U	40 U	109 J	61.9 J	1.6 U
A6WP-C12-16	35.7 U	35.7 U	35.7 U	3.57 U	3.57 U	1.43 U
A6WP-C12-16-R	NA	NA	NA	NA	NA	NA
Limit	20000.00	2000.00	20000.00	130.00	130.00	15.00
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	40.3 U	40.3 U	40.3 U	346	164	1.61 U
Max. >= Limit	No	No	No	Yes	Yes	No
W-statistic Prob. #	- -	- -	- -	9.9% (LN)	< 0.01% (LN)	- -
Test Procedure	- -	- -	- -	Median (Sign)	Median (Sign)	- -
Sample Size	12	12	12	12	12	12
Nondetects	12	12	12	2	6	12
% Nondetects	100.0%	100.0%	100.0%	16.7%	50.0%	100.0%
Est. Mean*	- -	- -	- -	6.800	2.843	- -
UCL	- -	- -	- -	62.400	29.900	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	Pass	Pass	- -
a posteriori Sample	- -	- -	- -	5	5	- -
Size calculation	- -	- -	- -	Pass	Pass	- -

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.
#: 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.

Certification Unit A6WP-C12

(continued)

SAMPLE ID	1,1-Dichloroethene	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene
A6WP-C12-2	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C12-3	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C12-4	1 U	1 U	1 U	1 U
A6WP-C12-6	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C12-7	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C12-8	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C12-9	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C12-11	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C12-12	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C12-13	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C12-15	1 U	1 U	1 U	1 U
A6WP-C12-15-D	1 U	1 U	1 U	1 U
A6WP-C12-16	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C12-16-R	NA	NA	NA	NA
Limit	410.00	160.00	4000.00	3600.00
Units	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	1.1 U	1.1 U	1.1 U	1.1 U
Max. >= Limit	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -
Sample Size	12	12	12	12
Nondetects	12	12	12	12
% Nondetects	100.0%	100.0%	100.0%	100.0%
Est. Mean*	- -	- -	- -	- -
UCL	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C12

(continued)

SAMPLE ID	Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C12-2	1.1 U	0.00000338 J	0.0000689 J
A6WP-C12-3	1.1 U	0.00000554 J	0.000108 J
A6WP-C12-4	1 U	0.00000308 J	0.0000565 J
A6WP-C12-6	3.5 J	0.00000504 J	0.000111 J
A6WP-C12-7	2.5 J	0.00000641 J	0.000106 J
A6WP-C12-8	0.9 U	0.00000557 J	0.000118 J
A6WP-C12-9	0.9 U	0.00000475 J	0.0000966 J
A6WP-C12-11	0.9 U	0.0000111 J	0.000369 J
A6WP-C12-12	1.1 U	0.0000163 J	0.000256 J
A6WP-C12-13	1.1 U	0.00000582 J	0.000163 J
A6WP-C12-15	1 U	0.00000208 J	0.0000943 J
A6WP-C12-15-D	1 U	0.00000885 J	0.00036 J
A6WP-C12-16	1.1 U	0.00000139 U	0.0000167 J
A6WP-C12-16-R	NA	NA	NA
Limit	25000.00	0.00088	0.0088
Units	ug/kg	mg/kg	mg/kg
Conf. Level	90%	90%	90%
Max. Result	3.5	0.0000163	0.000369
Max. >= Limit	No	No	No
W-statistic Prob. #	- -	- -	- -
Test Procedure	- -	- -	- -
Sample Size	12	12	12
Nondetects	10	11	11
% Nondetects	83.3%	91.7%	91.7%
Est. Mean*	- -	- -	- -
UCL	- -	- -	- -
Prob. > Limit	- -	- -	- -
Pass / Fail	- -	- -	- -
a posteriori Sample	- -	- -	- -
Size calculation	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C13

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230
A6WP-C13-1	0.769 -	0.738 -	0.739 -	0.738 -	6.35 -	0.0525 U	148 -	1.37 -
A6WP-C13-2	0.788 -	0.833 -	0.83 -	0.833 -	4.58 -	0.0662 U	1.71 U	0.924 -
A6WP-C13-2-D	0.909 -	0.967 -	0.944 -	0.967 -	5.6 -	0.0747 U	1.76 U	0.67 -
A6WP-C13-4	1.17 -	0.868 -	0.862 -	0.868 -	46.5 -	0.138 -	11.3 -	3.14 -
A6WP-C13-4-R	2.04 -	NA	NA	1.32 J	82.9 -	NA	NA	NA
A6WP-C13-6	0.844 -	0.722 -	0.734 -	0.722 -	15.6 -	0.0591 U	1.67 U	2.85 -
A6WP-C13-7	1.66 -	1.13 -	1.13 -	1.13 -	71.9 -	0.961 -	24.3 -	18 -
A6WP-C13-8	1.05 -	0.83 -	0.84 -	0.83 -	40 -	0.722 -	6.92 -	4.08 -
A6WP-C13-9	1.29 -	0.857 -	0.906 -	0.857 -	34.1 -	1.94 -	6.56 -	3.02 -
A6WP-C13-11	0.956 -	0.774 -	0.784 -	0.774 -	3.91 -	0.0831 U	1.68 U	0.964 J
A6WP-C13-12	0.938 -	0.734 -	0.74 -	0.734 -	10.9 -	0.441 -	10.1 -	0.881 J
A6WP-C13-13	1.43 -	1.16 -	1.13 -	1.16 -	54.3 -	0.93 -	37.5 -	7.82 -
A6WP-C13-15	0.881 -	0.724 -	0.719 -	0.724 -	4.51 -	0.0457 U	28.5 -	0.905 -
A6WP-C13-16	1.17 -	0.918 -	0.898 -	0.918 -	39.4 -	0.301 -	11.1 -	4.61 -
Limit	1.70	1.8	1.7	1.5	82.00	1.40	30.00	280
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	95%	90%	90%
Max. Result	2.04	1.16	1.13	1.32	82.9	1.94	148	18
Max. >= Limit	Yes	No	No	No	Yes	Yes	Yes	No
W-statistic Prob. #	38.0% (LN)	- -	- -	- -	21.5% (LN)	9.9% (LN)	33.4% (LN)	- -
Test Procedure	Lognormal	- -	- -	- -	Lognormal	Median (Sign)	Median (Sign)	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	5	3	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	41.7%	25.0%	0.0%
Est. Mean*	1.163	- -	- -	- -	35.504	0.220	10.600	- -
UCL	1.382	- -	- -	- -	104.467	0.930	24.300	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	pass	- -	- -	- -	FAIL	Pass	Pass	- -

a posteriori Sample	5	- -	- -	- -	5	7	9	- -
Size calculation	Pass	- -	- -	- -	Pass	Pass	Pass	- -

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.
#: 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.

Certification Unit A6WP-C13

(continued)

SAMPLE ID	Antimony	Arsenic	Beryllium	Cadmium	Molybdenum	Silver	Fluoride	Benzo(a)pyrene	Benzo(b)fluoranthene
A6WP-C13-1	0.445 UJ	6.2 J	0.49 -	0.24 J	4.8 J	0.111 U	3.41 U	37.3 U	37.3 U
A6WP-C13-2	0.419 UJ	4.1 J	0.68 -	0.105 U	1.1 J	0.105 U	1.7 J	35.2 U	35.2 U
A6WP-C13-2-D	0.417 UJ	5.5 J	0.66 -	0.104 U	1.2 J	0.104 U	2.86 J	36 U	36 U
A6WP-C13-4	0.57 J	6.3 J	0.5 -	0.27 J	2.6 J	0.108 U	4.58 J	37.1 U	37.1 U
A6WP-C13-4-R	NA	NA	NA	NA	NA	NA	NA	NA	NA
A6WP-C13-6	0.416 UJ	4.9 J	0.41 -	0.15 J	2.1 J	0.104 U	2.57 U	35 U	35 U
A6WP-C13-7	0.436 UJ	2.5 J	0.35 -	0.25 J	1.7 J	0.109 U	2.35 U	36.4 U	36.4 U
A6WP-C13-8	0.437 UJ	5.9 J	0.63 -	0.22 J	7.2 J	0.109 U	2.11 U	37.2 U	37.2 U
A6WP-C13-9	0.86 J	5.6 J	0.49 -	0.29 J	7.4 J	0.109 U	1.67 U	36.5 U	36.5 U
A6WP-C13-11	0.51 J	5.4 J	0.52 -	0.23 J	1.8 J	0.114 U	1.01 U	38.5 U	38.5 U
A6WP-C13-12	0.56 J	5.2 J	0.48 -	0.26 J	2.4 J	0.111 U	1.31 U	37.4 U	37.4 U
A6WP-C13-13	2.26 UJ	5.9 J	0.68 -	0.565 U	3.5 J	0.113 U	2.92 U	39.4 U	39.4 U
A6WP-C13-15	0.59 J	5.6 J	0.42 -	0.22 J	6.6 J	0.105 U	2.43 U	36.6 U	36.6 U
A6WP-C13-16	0.45 J	6.4 J	0.52 -	0.27 J	1.7 J	0.106 U	2.97 U	37 U	37 U
Limit	96	12	1.5	82	2900	29000	78000	2000	20000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	0 .86	6.4	0 .68	0 .29	7.4	0.114 U	4.58	39.4 U	39.4 U
Max. >= Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	0	0	0	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C13

(continued)

SAMPLE ID	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene
A6WP-C13-1	37.3 U	37.3 U	3.73 U	3.73 U	1.49 U	0.9 U
A6WP-C13-2	35.2 U	35.2 U	3.52 U	3.52 U	1.41 U	1.2 U
A6WP-C13-2-D	36 U	36 U	3.6 U	3.6 U	1.44 U	1.2 U
A6WP-C13-4	37.1 U	37.1 U	11.1 J	4.1 J	1.48 U	1.2 U
A6WP-C13-4-R	NA	NA	NA	NA	NA	NA
A6WP-C13-6	35 U	35 U	7 J	3.5 U	1.4 U	0.9 U
A6WP-C13-7	36.4 U	36.4 U	7.6 J	3.64 U	1.45 U	1 U
A6WP-C13-8	37.2 U	37.2 U	9.4 J	4.7 J	1.49 U	0.9 U
A6WP-C13-9	36.5 U	36.5 U	3.65 U	3.65 U	1.46 U	0.8 U
A6WP-C13-11	38.5 U	38.5 U	3.85 U	3.85 U	1.54 U	1 U
A6WP-C13-12	37.4 U	37.4 U	3.74 U	3.74 U	1.5 U	0.9 U
A6WP-C13-13	39.4 U	39.4 U	15.6 -	6.4 J	1.58 U	1 U
A6WP-C13-15	36.6 U	36.6 U	3.66 U	3.66 U	1.46 U	0.8 U
A6WP-C13-16	37 U	37 U	16 -	6.8 J	1.48 U	0.9 U
Limit	2000	20000	130	130	15	410
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	39.4 U	39.4 U	16	6.8	1.58 U	1.2 U
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12
Nondetects	0	0	0	0	0	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--

a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C13

(continued)

SAMPLE ID	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene	Trichloroethene
A6WP-C13-1	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C13-2	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C13-2-D	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C13-4	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C13-4-R	NA	NA	NA	NA
A6WP-C13-6	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C13-7	1 U	1 U	1 U	1 U
A6WP-C13-8	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C13-9	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C13-11	1 U	1 U	1 U	1 U
A6WP-C13-12	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C13-13	1 U	1 U	7 J	1 U
A6WP-C13-15	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C13-16	0.9 U	0.9 U	0.9 U	0.9 U
Limit	160	4000	3600	25000
Units	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	1.2 U	1.2 U	7	1.2 U
Max. >= Limit	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -
Sample Size	12	12	12	12
Nondetects	0	0	0	0
% Nondetects	0.0%	0.0%	0.0%	0.0%
Est. Mean*	- -	- -	- -	- -
UCL	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C13

(continued)

SAMPLE ID	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C13-1	0.00000155 -	0.0000703 -
A6WP-C13-2	0.000000978 J	0.0000459 -
A6WP-C13-2-D	0.000000986 J	0.0000556 -
A6WP-C13-4	0.0000418 -	0.00041 -
A6WP-C13-4-R	NA	NA
A6WP-C13-6	0.00000482 -	0.0000912 -
A6WP-C13-7	0.0000232 -	0.000269 -
A6WP-C13-8	0.0000232 -	0.00025 -
A6WP-C13-9	0.00000343 -	0.000075 -
A6WP-C13-11	0.00000141 -	0.000035 -
A6WP-C13-12	0.00000696 -	0.00012 -
A6WP-C13-13	0.000183 -	0.00145 J
A6WP-C13-15	0.00000348 -	0.00011 -
A6WP-C13-16	0.00000735 -	0.000155 -
Limit	0.00088	0.0088
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	0 .000183	0 .00145
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	0	0
% Nondetects	0.0%	0.0%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -

a posteriori Sample	- -	- -
Size calculation	- -	- -

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.
#: 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.

Certification Unit A6WP-C14

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99
A6WP-C14-1	0.902 -	0.791 J	0.768 -	0.791 -	15.8 -	0.0574 U	1.86 U
A6WP-C14-3	1.2 -	0.964 -	0.975 J	0.964 -	50.1 -	0.0591 U	2.1 U
A6WP-C14-4	0.711 -	0.636 -	0.633 J	0.636 -	2.52 U	0.0608 U	2.04 U
A6WP-C14-6	0.999 -	0.85 -	0.874 J	0.85 -	4.48 J	0.0941 U	2.3 U
A6WP-C14-7	0.849 -	0.754 -	0.753 J	0.754 -	4.07 J	0.0795 U	2.02 U
A6WP-C14-8	1.04 -	0.935 -	0.949 J	0.935 -	7.95 -	0.0493 U	2.06 U
A6WP-C14-10	0.979 -	0.876 -	0.881 J	0.876 -	15 -	0.0452 U	1.82 U
A6WP-C14-11	0.924 -	0.748 -	0.71 J	0.748 -	4.71 J	0.0624 U	1.94 U
A6WP-C14-11-D	1.09 -	0.893 -	0.92 J	0.893 -	4.11 J	0.0939 U	1.75 U
A6WP-C14-12	0.78 -	0.668 -	0.685 J	0.668 -	4.44 J	0.0684 U	1.74 U
A6WP-C14-13	0.883 -	0.884 -	0.913 J	0.884 -	6.16 J	0.0681 U	1.93 U
A6WP-C14-14	0.928 -	0.843 -	0.808 J	0.843 -	8.39 J	0.0715 U	1.93 U
A6WP-C14-15	1 -	0.814 -	0.795 J	0.814 -	5.67 J	0.0933 U	1.91 U
Limit	1.7	1.8	1.7	1.5	82	1.4	30
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%
Max. Result	1.2	0 .964	0 .975	0 .964	50.1	0.0941 U	2.3 U
Max. >= Limit	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	0	0	1	12	12
% Nondetects	0.0%	0.0%	0.0%	0.0%	8.3%	100.0%	100.0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -

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.
#: This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
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Certification Unit A6WP-C14

(continued)

SAMPLE ID	Thorium-230	Antimony	Arsenic	Beryllium	Cadmium	Molybdenum	Silver	Fluoride	Benzo(a)pyrene
A6WP-C14-1	2.58 J	2.27 UJ	4.6 J	0.77 -	0.566 U	1.8 J	0.113 U	1.58 J	38.1 U
A6WP-C14-3	2.84 J	0.56 UJ	9 J	0.28 -	0.11 U	2.2 J	0.11 U	9.55 J	37.2 U
A6WP-C14-4	1.48 J	0.52 U	6.3 J	0.8 -	0.106 U	2 J	0.106 U	3.37 J	36.6 U
A6WP-C14-6	1.24 J	0.62 U	6.4 J	0.45 -	0.11 U	3.6 J	0.107 U	2.64 J	36.3 U
A6WP-C14-7	1.03 J	0.59 U	3.8 J	0.4 -	0.106 U	1.3 J	0.106 U	2.06 J	37 U
A6WP-C14-8	1.03 J	2.14 UJ	12.5 J	0.72 -	0.535 U	2 J	0.107 U	4.44 J	36.6 U
A6WP-C14-10	2.06 J	2.11 UJ	6.2 J	0.7 -	0.528 U	1.8 J	0.106 U	3.41 J	36.9 U
A6WP-C14-11	1.86 J	2.18 UJ	4.7 J	0.64 -	0.544 U	1.3 J	0.109 U	3.77 J	36.8 U
A6WP-C14-11-D	1.02 J	2.19 UJ	8.8 J	0.74 -	0.548 U	1.7 J	0.11 U	3.33 J	36.7 U
A6WP-C14-12	1.31 J	0.424 UJ	5.1 J	0.66 -	0.106 U	1.2 J	0.106 U	3.46 J	36.1 U
A6WP-C14-13	1.06 J	2.1 UJ	6.2 J	0.63 -	0.525 U	1.5 J	0.105 U	3.58 J	36.8 U
A6WP-C14-14	1.72 J	0.57 U	4.7 J	0.58 -	0.111 U	1.5 J	0.111 U	4.89 J	36.9 U
A6WP-C14-15	1.68 J	0.7 U	7 J	0.83 -	0.111 U	1.4 J	0.111 U	4.26 J	37.2 U
Limit	280	96	12.00	1.5	82	2900	29000	78000	2000
Units	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	2.84	2.27 UJ	12.5	0 .83	0.566 U	3.6	0.113 U	9.55	38.1 U
Max. >= Limit	No	No	Yes	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	75.1% (LN)	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	Lognormal	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	12	0	0	12	0	12	0	12
% Nondetects	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%
Est. Mean*	- -	- -	6.733	- -	- -	- -	- -	- -	- -
UCL	- -	- -	7.781	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	pass	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	3	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	Pass	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C14

(continued)

SAMPLE ID	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260
A6WP-C14-1	38.1 U	38.1 U	38.1 U	4.5 J	3.81 U
A6WP-C14-3	37.2 U	37.2 U	37.2 U	40.8 -	26.9 -
A6WP-C14-4	36.6 U	36.6 U	36.6 U	3.66 U	3.66 U
A6WP-C14-6	36.3 U	36.3 U	36.3 U	3.63 U	3.63 U
A6WP-C14-7	37 U	37 U	37 U	3.7 U	3.7 U
A6WP-C14-8	36.6 U	36.6 U	36.6 U	3.7 J	3.66 U
A6WP-C14-10	36.9 U	36.9 U	36.9 U	5.5 J	3.69 U
A6WP-C14-11	36.8 U	36.8 U	36.8 U	3.68 U	3.68 U
A6WP-C14-11-D	36.7 U	36.7 U	36.7 U	3.67 U	3.67 U
A6WP-C14-12	36.1 U	36.1 U	36.1 U	3.7 J	3.61 U
A6WP-C14-13	36.8 U	36.8 U	36.8 U	3.68 U	3.68 U
A6WP-C14-14	36.9 U	36.9 U	36.9 U	3.69 U	3.69 U
A6WP-C14-15	37.2 U	37.2 U	37.2 U	3.72 U	3.72 U
Limit	20000	2000	20000	130	130
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	38.1 U	38.1 U	38.1 U	40.8	26.9
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Nondetects	12	12	12	7	11
% Nondetects	100.0%	100.0%	100.0%	58.3%	91.7%
Est. Mean*	--	--	--	--	--
UCL	--	--	--	--	--
Prob. > Limit	--	--	--	--	--
Pass / Fail	--	--	--	--	--

a posteriori Sample	--	--	--	--	--
Size calculation	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C14

(continued)

SAMPLE ID	Dieldrin	1,1-Dichloroethene	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene
A6WP-C14-1	1.52 UJ	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C14-3	1.49 UJ	1.5 -	1.2 U	1.2 U	1.2 U
A6WP-C14-4	1.46 UJ	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C14-6	1.45 UJ	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C14-7	1.48 UJ	1.4 U	1.4 U	1.4 U	1.4 U
A6WP-C14-8	1.47 UJ	1 U	1 U	1 U	1 U
A6WP-C14-10	1.48 UJ	2.8 -	1.2 U	1.2 U	1.2 U
A6WP-C14-11	1.47 UJ	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C14-11-D	1.47 UJ	1.3 U	1.3 U	1.3 U	1.3 U
A6WP-C14-12	1.44 UJ	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C14-13	1.47 UJ	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C14-14	1.47 UJ	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C14-15	1.49 UJ	1.3 -	1.1 U	1.1 U	1.1 U
Limit	15	410	160	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	1.52 UJ	2.8	1.4 U	1.4 U	1.4 U
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12
Nondetects	12	9	12	12	12
% Nondetects	100.0%	75.0%	100.0%	100.0%	100.0%
Est. Mean*	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -
a posteriori Sample Size calculation	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C14

(continued)

Trichloroethene	Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C14-1	0.9 U	0.00000177 J	0.0000524 -
A6WP-C14-3	1.2 U	0.00000287 J	0.0000873 -
A6WP-C14-4	0.8 U	0.00000132 J	0.0000238 -
A6WP-C14-6	1.1 U	0.00000217 J	0.000077 -
A6WP-C14-7	1.4 U	0.00000167 J	0.0000397 -
A6WP-C14-8	1 U	0.00000312 J	0.000125 -
A6WP-C14-10	1.2 U	0.00000483 J	0.000116 -
A6WP-C14-11	1.1 U	0.00000191 J	0.000141 -
A6WP-C14-11-D	1.3 U	0.00000303 J	0.000124 -
A6WP-C14-12	1.2 U	0.00000326 J	0.00012 -
A6WP-C14-13	1.2 U	0.00000138 J	0.0000442 -
A6WP-C14-14	1.2 U	0.00000426 J	0.00011 -
A6WP-C14-15	1.1 U	0.00000119 J	0.0000344 -
Limit	25000	0.00088	0.0088
Units	ug/kg	mg/kg	mg/kg
Conf. Level	90%	90%	90%
Max. Result	1.4 U	0 .00000483	0 .000141
Max. >= Limit	No	No	No
W-statistic Prob. #	- -	- -	- -
Test Procedure	- -	- -	- -
Sample Size	12	12	12
Nondetects	12	0	0
% Nondetects	100.0%	0.0%	0.0%
Est. Mean*	- -	- -	- -
UCL	- -	- -	- -
Prob. > Limit	- -	- -	- -
Pass / Fail	- -	- -	- -

a posteriori Sample	- -	- -	- -
Size calculation	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C15

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99
A6WP-C15-1	1.11 -	0.678 -	0.671 -	0.678 -	5.55 J	0.0361 U	0.824 U
A6WP-C15-2	0.715 -	0.466 -	0.463 -	0.466 -	2.11 J	0.0467 U	0.812 U
A6WP-C15-3	0.991 -	0.741 -	0.769 -	0.741 -	9.46 J	0.0644 U	0.804 U
A6WP-C15-5	1.17 -	0.761 -	0.742 -	0.761 -	8.23 J	0.0579 U	0.804 U
A6WP-C15-7	1.09 -	0.841 -	0.866 -	0.841 -	15.7 J	0.0565 U	0.808 U
A6WP-C15-8	0.745 -	0.499 -	0.498 -	0.499 -	2.65 U	0.0443 U	0.876 U
A6WP-C15-9	0.982 -	0.791 -	0.788 -	0.791 -	8.96 J	0.0551 U	0.826 U
A6WP-C15-10	1.25 -	0.837 -	0.84 -	0.837 -	5.42 J	0.0538 U	0.871 U
A6WP-C15-12	0.998 -	0.896 -	0.919 -	0.896 -	3.17 U	0.0533 U	0.823 U
A6WP-C15-13	1.16 -	0.814 -	0.765 -	0.814 -	22.4 J	0.0379 U	0.821 U
A6WP-C15-13-D	1.06 -	0.748 -	0.746 -	0.748 -	16.7 J	0.0342 U	0.838 U
A6WP-C15-15	1.14 -	1.12 -	1.21 -	1.12 -	2.19 U	0.0539 U	0.926 U
A6WP-C15-16	1.69 -	1.02 -	1.05 -	1.02 -	110 J	0.0647 U	0.851 U
Limit	1.7	1.8	1.7	1.5	82.00	1.4	30
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%
Max. Result	1.69	1.12	1.21	1.12	110	0.0647 U	0.926 U
Max. >= Limit	No	No	No	No	Yes	No	No
W-statistic Prob. #	- -	- -	- -	- -	49.3% (LN)	- -	- -
Test Procedure	- -	- -	- -	- -	Median (Sign)	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	0	0	3	12	12
% Nondetects	0.0%	0.0%	0.0%	0.0%	25.0%	100.0%	100.0%
Est. Mean*	- -	- -	- -	- -	6.890	- -	- -
UCL	- -	- -	- -	- -	15.700	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	Pass	- -	- -
a posteriori Sample	- -	- -	- -	- -	7	- -	- -
Size calculation	- -	- -	- -	- -	Pass	- -	- -

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.
#: 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.

Certification Unit A6WP-C15

(continued)

SAMPLE ID	Thorium-230	Antimony	Arsenic	Beryllium	Cadmium	Molybdenum	Silver	Fluoride	Benzo(a)pyrene
A6WP-C15-1	1.57 J	0.654 U	5.11 -	0.413 -	0.137 J	2.33 J	0.613 U	1.72 U	37.4 U
A6WP-C15-2	1.3 J	0.714 U	4.49 -	0.171 J	0.18 J	1.8 J	0.67 U	1.82 U	37.7 U
A6WP-C15-3	1.36 J	0.716 U	5.51 -	0.363 -	0.167 J	2.11 J	0.671 U	1.49 U	38 U
A6WP-C15-5	1.52 J	0.642 U	5.9 -	0.407 -	0.168 J	2.18 J	0.602 U	1.55 U	35.9 U
A6WP-C15-7	1.95 -	0.606 U	6.01 -	0.435 -	0.184 J	2.03 J	0.568 U	2.28 U	38.3 U
A6WP-C15-8	0.886 J	0.612 U	5.6 -	0.277 -	0.208 J	2.4 J	0.573 U	1.42 U	36.6 U
A6WP-C15-9	1.8 J	0.656 U	5.96 -	0.405 -	0.168 J	2.39 J	0.615 U	1.17 U	37.8 U
A6WP-C15-10	1.58 J	0.647 U	4.51 -	0.375 -	0.17 J	1.88 J	0.606 U	1.74 U	36.8 U
A6WP-C15-12	1.2 J	0.609 U	6.93 -	0.468 -	0.16 J	2.11 J	0.571 U	1.3 U	38 U
A6WP-C15-13	2.43 -	0.562 U	7.6 -	0.509 -	0.179 J	1.25 J	0.527 U	1.05 U	90.2 J
A6WP-C15-13-D	2.84 -	0.698 U	6.59 -	0.446 -	0.146 J	1.59 J	0.654 U	0.911 U	37.6 U
A6WP-C15-15	1.7 J	0.608 U	5.64 -	0.293 -	0.125 J	1.17 J	0.57 U	1.61 U	36.5 U
A6WP-C15-16	6.81 -	0.72 U	5.79 -	0.388 -	0.174 J	1.4 J	0.675 U	1.3 U	38.7 U
Limit	280	96	12	1.5	82	2900	29000	78000	2000
Units	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	6.81	0.72 U	7.6	0 .509	0 .208	2.4	0.675 U	2.28 U	90.2
Max. >= Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	12	0	0	0	0	12	12	12
% Nondetects	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	100.0%
Est. Mean*	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C15

(continued)

SAMPLE ID	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260
A6WP-C15-1	37.4 U	37.4 U	37.4 U	3.74 U	3.74 U
A6WP-C15-2	37.7 U	37.7 U	37.7 U	3.77 U	3.77 U
A6WP-C15-3	38 U	38 U	38 U	3.8 U	3.8 U
A6WP-C15-5	35.9 U	35.9 U	35.9 U	3.59 U	3.59 U
A6WP-C15-7	38.3 U	38.3 U	38.3 U	3.83 U	3.83 U
A6WP-C15-8	36.6 U	36.6 U	36.6 U	3.66 U	3.66 U
A6WP-C15-9	37.8 U	37.8 U	37.8 U	3.78 U	3.78 U
A6WP-C15-10	36.8 U	36.8 U	36.8 U	4.7 J	3.68 U
A6WP-C15-12	38 U	38 U	38 U	10.2 J	3.8 U
A6WP-C15-13	38.6 U	38.6 U	38.6 U	3.9 J	3.86 U
A6WP-C15-13-D	37.6 U	37.6 U	37.6 U	3.76 U	3.76 U
A6WP-C15-15	36.5 U	36.5 U	36.5 U	3.7 J	3.65 U
A6WP-C15-16	38.7 U	38.7 U	38.7 U	29.2 -	13.3 -
Limit	20000	2000	20000	130	130
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	38.7 U	38.7 U	38.7 U	29.2	13.3
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12
Nondetects	12	12	12	7	12
% Nondetects	100.0%	100.0%	100.0%	58.3%	100.0%
Est. Mean*	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -
a posteriori Sample Size calculation	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C15

(continued)

SAMPLE ID	Dieldrin	1,1-Dichloroethene	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene
A6WP-C15-1	1.5 U	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C15-2	1.51 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C15-3	1.52 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C15-5	1.44 U	1 U	1 U	1 U	1 U
A6WP-C15-7	1.53 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C15-8	1.47 U	1 U	1 U	1 U	1 U
A6WP-C15-9	1.51 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C15-10	1.47 U	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C15-12	1.52 U	1.3 U	1.3 U	1.3 U	1.3 U
A6WP-C15-13	1.54 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C15-13-D	1.5 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C15-15	1.46 U	1 U	1 U	1 U	1 U
A6WP-C15-16	1.55 U	1 U	1 U	1 U	1 U
Limit	15	410	160	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	1.55 U	1.3 U	1.3 U	1.3 U	1.3 U
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12
Nondetects	12	12	12	12	12
% Nondetects	100.0%	100.0%	100.0%	100.0%	100.0%
Est. Mean*	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C15

(continued)

Trichloroethene	Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C15-1	0.8 U	0.00000112 J	0.0000692 J
A6WP-C15-2	1.1 U	0.000000831 J	0.000026 J
A6WP-C15-3	0.9 U	0.00000198 J	0.0000879 J
A6WP-C15-5	1 U	0.00000219 J	0.0000515 J
A6WP-C15-7	1.1 U	0.00000049 J	0.0000119 J
A6WP-C15-8	1 U	0.00000124 U	0.0000196 J
A6WP-C15-9	0.9 U	0.00000246 J	0.0000907 J
A6WP-C15-10	0.8 U	0.00000361 J	0.000109 J
A6WP-C15-12	1.3 U	0.00000136 U	0.0000261 J
A6WP-C15-13	0.9 U	0.00000681 J	0.000124 J
A6WP-C15-13-D	0.9 U	0.0000187 J	0.000296 J
A6WP-C15-15	1 U	0.00000143 J	0.0000455 J
A6WP-C15-16	1 U	0.00000243 J	0.0000404 J
Limit	25000	0.00088	0.0088
Units	ug/kg	mg/kg	mg/kg
Conf. Level	90%	90%	90%
Max. Result	1.3 U	0 .0000187	0 .000296
Max. >= Limit	No	No	No
W-statistic Prob. #	- -	- -	- -
Test Procedure	- -	- -	- -
Sample Size	12	12	12
Nondetects	12	2	0
% Nondetects	100.0%	16.7%	0.0%
Est. Mean*	- -	- -	- -
UCL	- -	- -	- -
Prob. > Limit	- -	- -	- -
Pass / Fail	- -	- -	- -

a posteriori Sample	- -	- -	- -
Size calculation	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C16

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230
A6WP-C16-1	1.72 J	0.98 J	0.902 J	0.98 J	50 J	0.037 U	0.862 U	6.86 -
A6WP-C16-1-R	3.09 -	NA	NA	0.739 J	12 -	NA	NA	NA
A6WP-C16-2	2.07 J	0.807 J	0.806 J	0.807 J	19.6 J	0.0338 U	0.831 U	3.27 J
A6WP-C16-4	1.2 J	0.817 J	0.854 J	0.817 J	2.14 U	0.0513 U	0.84 U	1.8 J
A6WP-C16-6	1.07 J	0.697 J	0.633 J	0.697 J	10.1 J	0.0705 U	0.926 U	2.98 J
A6WP-C16-7	0.903 J	0.684 J	0.686 J	0.684 J	3 U	0.0659 U	0.848 U	1.52 J
A6WP-C16-8	1.15 J	0.789 J	0.809 J	0.789 J	6.77 J	0.0607 U	0.866 U	3.28 J
A6WP-C16-9	0.955 J	0.817 J	0.768 J	0.817 J	11.9 J	0.0331 U	0.792 U	1.27 J
A6WP-C16-9-R	1.39 -	NA	NA	0.794 J	6.8 -	NA	NA	NA
A6WP-C16-10	0.951 J	0.928 J	0.97 J	0.928 J	4.29 J	0.0515 U	0.812 U	1.21 J
A6WP-C16-10-D	0.867 J	0.74 J	0.738 J	0.74 J	9.2 J	0.0586 U	0.791 U	1.55 J
A6WP-C16-11	1.55 J	1.34 J	1.35 J	1.34 J	3.65 U	0.0662 U	0.854 U	1.63 J
A6WP-C16-13	1.81 J	1.42 J	1.45 J	1.42 J	38.4 J	0.0561 U	0.808 U	8.34 -
A6WP-C16-14	1.38 J	0.971 J	0.982 J	0.971 J	14.9 J	0.0682 U	0.839 U	2.18 J
A6WP-C16-15	1.06 J	0.766 J	0.754 J	0.766 J	16.2 J	0.0586 U	0.779 U	2.32 J
Limit	1.70	1.8	1.7	1.5	82	1.4	30	280
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	3.09	1.42	1.45	1.42	50	0.0705 U	0.926 U	8.34
Max. >= Limit	Yes	No	No	No	No	No	No	No
W-statistic Prob. #	35.3% (LN)	--	--	--	--	--	--	--
Test Procedure	Lognormal	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	2	12	12	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	16.7%	100.0%	100.0%	0.0%
Est. Mean*	1.467	--	--	--	--	--	--	--
UCL	1.817	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	FAIL	--	--	--	--	--	--	--
a posteriori Sample	20	--	--	--	--	--	--	--
Size calculation	Fail	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C16

(continued)

SAMPLE ID	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene	Benzo(b)fluoranthene
A6WP-C16-1	1.81 U	8.37 -	0.558 -	0.283 U	0.68 U	9.43 J	39.9 U	39.9 U
A6WP-C16-1-R	NA	NA	NA	NA	NA	NA	NA	NA
A6WP-C16-2	1.53 U	10 -	0.508 -	0.24 U	0.576 U	6.15 J	39.5 J	38.1 U
A6WP-C16-4	1.73 U	5.74 -	0.331 -	0.27 U	0.649 U	4.08 J	36.8 U	36.8 U
A6WP-C16-6	1.77 U	8.2 -	0.377 -	0.277 U	0.665 U	4.49 J	40.4 U	40.4 U
A6WP-C16-7	1.61 U	3.7 -	0.371 -	0.252 U	0.604 U	2.48 J	36 U	36 U
A6WP-C16-8	1.51 U	5.47 -	0.295 -	0.235 U	0.565 U	3.45 J	69.8 J	62.5 J
A6WP-C16-9	1.76 U	7.32 -	0.52 -	0.275 U	0.66 U	4.9 J	37.9 U	37.9 U
A6WP-C16-9-R	NA	NA	NA	NA	NA	NA	NA	NA
A6WP-C16-10	1.77 U	3.59 -	0.359 -	0.277 U	0.665 U	2.16 J	38.1 U	38.1 U
A6WP-C16-10-D	1.61 U	4.42 -	0.354 -	0.252 U	0.604 U	1.52 J	38.1 U	38.1 U
A6WP-C16-11	0.767 U	4.97 -	0.394 -	0.12 U	0.719 U	4.76 J	40.9 U	40.9 U
A6WP-C16-13	1.92 U	6.32 -	1.14 -	0.3 U	0.72 U	17.1 J	42 J	40.6 U
A6WP-C16-14	1.81 U	6.25 -	0.511 -	0.283 U	0.68 U	3.01 J	41.1 U	41.1 U
A6WP-C16-15	1.51 U	4.87 -	0.302 -	0.236 U	0.567 U	5.35 J	74.7 J	83.5 J
Limit	96	12	1.5	82	29000	78000	2000	20000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	1.92 U	10	1.14	0.3 U	0.72 U	17.1	74.7	83.5
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12
Nondetects	12	0	0	12	12	0	8	10
% Nondetects	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	66.7%	83.3%
Est. Mean*	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C16

(continued)

SAMPLE ID	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene
A6WP-C16-1	39.9 U	39.9 U	92.7 -	43.8 -	1.6 U	0.9 U
A6WP-C16-1-R	NA	NA	NA	NA	NA	NA
A6WP-C16-2	38.1 U	38.1 U	8.7 J	6.4 J	1.52 U	1.1 U
A6WP-C16-4	36.8 U	36.8 U	3.68 U	3.68 U	1.47 U	1.1 U
A6WP-C16-6	40.4 U	40.4 U	11.2 J	6 J	1.61 U	1 U
A6WP-C16-7	36 U	36 U	3.6 U	3.6 U	1.44 U	1.1 U
A6WP-C16-8	38.5 U	41 J	3.85 U	3.85 U	1.54 U	1 U
A6WP-C16-9	37.9 U	37.9 U	3.79 U	3.79 U	1.51 U	1.2 U
A6WP-C16-9-R	NA	NA	NA	NA	NA	NA
A6WP-C16-10	38.1 U	38.1 U	3.81 U	3.81 U	1.52 U	0.8 U
A6WP-C16-10-D	38.1 U	38.1 U	3.81 U	3.81 U	1.52 U	1.1 U
A6WP-C16-11	40.9 U	40.9 U	4.09 U	4.09 U	1.64 U	1 U
A6WP-C16-13	40.6 U	40.6 U	6.3 J	6 J	1.62 U	1.2 U
A6WP-C16-14	41.1 U	41.1 U	4.11 U	4.11 U	1.64 U	1.1 U
A6WP-C16-15	37.7 U	47.9 J	19.3 -	8.6 J	1.51 U	1.1 U
Limit	2000	20000	130	130	15	410
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	41.1 U	47.9	92.7	43.8	1.64 U	1.2 U
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12
Nondetects	12	10	7	7	12	12
% Nondetects	100.0%	83.3%	58.3%	58.3%	100.0%	100.0%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C16

(continued)

SAMPLE ID	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene	Trichloroethene
A6WP-C16-1	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C16-1-R	NA	NA	NA	NA
A6WP-C16-2	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C16-4	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C16-6	1 U	1 U	1 U	1 U
A6WP-C16-7	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C16-8	1 U	1 U	1 U	1 U
A6WP-C16-9	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C16-9-R	NA	NA	NA	NA
A6WP-C16-10	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C16-10-D	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C16-11	1 U	1 U	1 U	1 U
A6WP-C16-13	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C16-14	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C16-15	1.1 U	1.1 U	1.1 U	1.1 U
Limit	160	4000	3600	25000
Units	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	1.2 U	1.2 U	1.2 U	1.2 U
Max. >= Limit	No	No	No	No
W-statistic Prob. #	--	--	--	--
Test Procedure	--	--	--	--
Sample Size	12	12	12	12
Nondetects	12	12	12	12
% Nondetects	100.0%	100.0%	100.0%	100.0%
Est. Mean*	--	--	--	--
UCL	--	--	--	--
Prob. > Limit	--	--	--	--
Pass / Fail	--	--	--	--

a posteriori Sample	--	--	--	--
Size calculation	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C16

(continued)

Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C16-1	0.00000319 J	0.000209 J
A6WP-C16-1-R	NA	NA
A6WP-C16-2	0.0000011 J	0.0000386 J
A6WP-C16-4	0.0000014 U	0.000037 J
A6WP-C16-6	0.0000018 J	0.0000556 J
A6WP-C16-7	0.0000025 J	0.000044 J
A6WP-C16-8	0.00000422 J	0.0000511 J
A6WP-C16-9	0.00000127 U	0.0000413 J
A6WP-C16-9-R	NA	NA
A6WP-C16-10	0.00000142 U	0.0000476 J
A6WP-C16-10-D	0.00000651 J	0.000162 J
A6WP-C16-11	0.00000108 J	0.0000177 J
A6WP-C16-13	0.00000123 J	0.0000144 J
A6WP-C16-14	0.000000908 J	0.0000171 J
A6WP-C16-15	0.00000214 J	0.0000418 J
Limit	0.00088	0.0088
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	0 .00000651	0 .000209
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	2	0
% Nondetects	16.7%	0.0%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -
a posteriori Sample	- -	- -
Size calculation	- -	- -

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.
#: 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.

Certification Unit A6WP-C17

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99
A6WP-C17-1	0.857 -	0.75 J	0.768 J	0.75 J	3.64 J	0.0538 U	1.35 U
A6WP-C17-2	0.575 -	0.406 J	0.418 J	0.406 J	1.65 J	0.0348 U	1.3 U
A6WP-C17-3	1.01 -	0.951 J	0.948 J	0.951 J	13.3 J	0.0618 U	1.16 U
A6WP-C17-5	0.991 -	0.69 J	0.692 J	0.69 J	7.78 J	0.0503 U	2 U
A6WP-C17-6	0.903 -	0.667 J	0.655 J	0.667 J	20.1 J	0.0473 U	1.22 U
A6WP-C17-8	0.976 -	0.874 J	0.899 J	0.874 J	4.36 J	0.0371 U	1.16 U
A6WP-C17-10	0.874 -	0.787 J	0.781 J	0.787 J	13.5 J	0.0553 U	1.45 U
A6WP-C17-11	1.6 -	1.94 J	1.95 J	1.94 J	194 J	0.074 U	1.69 -
A6WP-C17-12	0.908 -	0.776 J	0.757 J	0.776 J	5.65 J	0.0608 U	1.21 U
A6WP-C17-13	0.951 -	0.803 J	0.803 J	0.803 J	7.69 J	0.0816 U	1.27 U
A6WP-C17-14	0.879 -	0.711 J	0.702 J	0.711 J	2.6 J	0.0639 U	1.31 U
A6WP-C17-16	0.883 -	0.762 J	0.747 J	0.762 J	5.55 J	0.0528 U	1.49 U
A6WP-C17-16-D	0.911 -	0.999 J	1.02 J	0.999 J	13.8 J	0.0698 U	1.18 U
A6WP-C17-16-R	1.19 J	NA	NA	0.884 -	42.3 J	NA	NA
Limit	1.7	1.80	1.70	1.50	82.00	1.4	30
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%
Max. Result	1.6	1.94	1.95	1.94	194	0.0816 U	1.69
Max. >= Limit	No	Yes	Yes	Yes	Yes	No	No
W-statistic Prob. #	- -	7.3% (LN)	9.6% (LN)	7.3% (LN)	47.7% (LN)	- -	- -
Test Procedure	- -	Lognormal	Lognormal	Lognormal	Lognormal	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	11
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	91.7%
Est. Mean*	- -	0.862	0.865	0.862	22.711	- -	- -
UCL	- -	1.068	1.071	1.068	90.128	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	pass	pass	pass	FAIL	- -	- -
a posteriori Sample	- -	3	3	4	4	- -	- -
Size calculation	- -	Pass	Pass	Pass	Pass	- -	- -

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.
#: 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.

Certification Unit A6WP-C17

(continued)

SAMPLE ID	Thorium-230	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene
A6WP-C17-1	5.02 -	0.436 UJ	5.3 -	0.37 -	0.66 -	0.109 U	3.97 J	37.5 U
A6WP-C17-2	0.803 -	0.428 UJ	5.1 -	0.69 -	0.93 -	0.107 U	4.69 J	35.8 U
A6WP-C17-3	0.863 -	0.447 UJ	5.9 -	0.45 -	0.8 -	0.112 U	4.02 J	37.4 U
A6WP-C17-5	0.837 -	0.423 UJ	5.3 -	0.53 -	0.77 -	0.106 U	2.68 J	36.8 U
A6WP-C17-6	2.54 -	0.477 UJ	3.9 -	0.55 -	0.79 -	0.119 U	6.18 J	40.7 U
A6WP-C17-8	1.25 -	0.446 UJ	6.4 -	0.6 -	0.9 -	0.112 U	1.96 J	37.6 U
A6WP-C17-10	0.877 J	0.436 UJ	5.3 -	0.6 -	0.83 -	0.109 U	4.09 J	36.9 U
A6WP-C17-11	8.97 -	0.49 UJ	4.9 -	0.71 -	1 -	0.612 U	12.3 J	41.5 U
A6WP-C17-12	1.37 -	0.429 UJ	6 -	0.65 -	1.1 -	0.107 U	3.68 J	36.9 U
A6WP-C17-13	1.68 -	0.483 UJ	5.7 -	0.67 -	0.95 -	0.121 U	2.67 J	40.2 U
A6WP-C17-14	0.694 -	0.462 UJ	4.6 -	0.5 -	1 -	0.115 U	5.91 J	40.4 U
A6WP-C17-16	1.3 -	0.47 UJ	4.6 -	0.54 -	0.96 -	0.117 U	2.1 J	39.5 U
A6WP-C17-16-D	0.999 -	0.461 UJ	5.4 -	0.56 -	0.87 -	0.115 U	3.01 J	39.2 U
A6WP-C17-16-R	NA	NA	NA	NA	NA	NA	NA	NA
Limit	280	96	12	1.5	82	29000	78000	2000
Units	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	8.97	0.49 UJ	6.4	0 .71	1.1	0.612 U	12.3	41.5 U
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	12	0	0	0	12	0	12
% Nondetects	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C17

(continued)

SAMPLE ID	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin
A6WP-C17-1	37.5 U	37.5 U	37.5 U	3.75 U	3.75 U	1.5 U
A6WP-C17-2	35.8 U	35.8 U	35.8 U	3.58 U	3.58 U	1.43 U
A6WP-C17-3	37.4 U	37.4 U	37.4 U	3.74 U	3.74 U	1.5 U
A6WP-C17-5	36.8 U	36.8 U	36.8 U	3.68 U	3.68 U	1.47 U
A6WP-C17-6	40.7 U	40.7 U	40.7 U	4.07 U	4.07 U	1.63 U
A6WP-C17-8	37.6 U	37.6 U	37.6 U	3.76 U	3.76 U	1.51 U
A6WP-C17-10	36.9 U	36.9 U	36.9 U	4.2 J	3.69 U	1.48 U
A6WP-C17-11	41.5 U	41.5 U	41.5 U	9.3 J	5.1 J	1.66 U
A6WP-C17-12	36.9 U	36.9 U	36.9 U	3.69 U	3.69 U	1.48 U
A6WP-C17-13	40.2 U	40.2 U	40.2 U	4.02 U	4.02 U	1.61 U
A6WP-C17-14	40.4 U	40.4 U	40.4 U	8.5 J	6 J	1.62 U
A6WP-C17-16	39.5 U	39.5 U	39.5 U	3.95 U	3.95 U	1.58 U
A6WP-C17-16-D	39.2 U	39.2 U	39.2 U	3.92 U	3.92 U	1.57 U
A6WP-C17-16-R	NA	NA	NA	NA	NA	NA
Limit	20000	2000	20000	130	130	15
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	41.5 U	41.5 U	41.5 U	9.3	6	1.66 U
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12
Nondetects	12	12	12	9	10	12
% Nondetects	100.0%	100.0%	100.0%	75.0%	83.3%	100.0%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--

a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C17

(continued)

SAMPLE ID	1,1-Dichloroethene	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene	Trichloroethene
A6WP-C17-1	0.9 U	0.9 U	0.9 U	0.9 U	3.3 J
A6WP-C17-2	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C17-3	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C17-5	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C17-6	1.1 U	1.1 U	1.1 U	1.1 U	9.9 J
A6WP-C17-8	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C17-10	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C17-11	1.1 U	1.1 U	1.1 U	1.1 U	2.2 J
A6WP-C17-12	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C17-13	1 U	1 U	1 U	1 U	1 U
A6WP-C17-14	1 U	1 U	1 U	1 U	1 U
A6WP-C17-16	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C17-16-D	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C17-16-R	NA	NA	NA	NA	NA
Limit	410	160	4000	3600	25000
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	1.2 U	1.2 U	1.2 U	1.2 U	9.9
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Nondetects	12	12	12	12	0
% Nondetects	100.0%	100.0%	100.0%	100.0%	0.0%
Est. Mean*	--	--	--	--	--
UCL	--	--	--	--	--
Prob. > Limit	--	--	--	--	--
Pass / Fail	--	--	--	--	--
a posteriori Sample	--	--	--	--	--
Size calculation	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C17

(continued)

Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C17-1	0.00000387 -	0.000108 -
A6WP-C17-2	0.0000013 U	0.0000108 -
A6WP-C17-3	0.000000832 J	0.0000488 -
A6WP-C17-5	0.00000133 U	0.0000171 -
A6WP-C17-6	0.0000167 -	0.000176 -
A6WP-C17-8	0.000000876 J	0.0000398 -
A6WP-C17-10	0.00000166 -	0.0000411 -
A6WP-C17-11	0.00000319 -	0.0000451 -
A6WP-C17-12	0.00000111 J	0.0000441 -
A6WP-C17-13	0.00000112 J	0.0000254 -
A6WP-C17-14	0.00000433 -	0.000185 -
A6WP-C17-16	0.00000135 U	0.000024 -
A6WP-C17-16-D	0.00000123 J	0.0000319 -
A6WP-C17-16-R	NA	NA
Limit	0.00088	0.0088
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	0 .0000167	0 .000185
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	2	0
% Nondetects	16.7%	0.0%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -

a posteriori Sample	- -	- -
Size calculation	- -	- -

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.
#: 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.

Certification Unit A6WP-C18

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230
A6WP-C18-1	0.894 -	0.762 -	0.792 -	0.762 -	29.8 J	0.0572 U	4.55 -	1.46 J
A6WP-C18-2	0.809 -	0.752 -	0.767 -	0.752 -	6.21 J	0.0525 U	1.69 U	1.18 J
A6WP-C18-4	0.767 -	0.651 -	0.681 -	0.651 -	8.74 J	0.0469 U	1.67 U	1.2 J
A6WP-C18-5	1.6 -	1.78 -	1.84 -	1.78 -	30.3 J	0.0765 U	1.95 U	3.19 J
A6WP-C18-6	0.692 -	0.702 -	0.681 -	0.702 -	9.58 J	0.0635 U	1.71 U	1.2 J
A6WP-C18-8	1.28 -	1.03 -	1.03 -	1.03 -	17.1 J	0.0789 U	1.71 U	4 J
A6WP-C18-10	0.96 -	0.884 -	0.907 -	0.884 -	7.83 J	0.0412 U	1.7 U	1.34 J
A6WP-C18-10-R	1.33 -	NA	NA	1.3 J	7.1 -	NA	NA	NA
A6WP-C18-11	1.13 -	0.818 -	0.845 -	0.818 -	7.41 J	0.0775 U	1.9 U	10.3 -
A6WP-C18-11-R	1.16 -	NA	NA	0.848 J	16.5 -	NA	NA	NA
A6WP-C18-12	0.916 -	0.742 -	0.768 -	0.742 -	12 J	0.046 U	1.65 U	1.69 -
A6WP-C18-12-D	1.07 -	0.814 -	0.822 -	0.814 -	18.1 J	0.0549 U	1.81 U	1.89 -
A6WP-C18-13	1.04 -	1.13 -	1.13 -	1.13 -	22.9 J	0.0635 U	1.92 U	3.94 J
A6WP-C18-14	0.965 -	0.899 -	0.911 -	0.899 -	22 J	0.0469 U	1.72 U	3.02 -
A6WP-C18-16	0.921 -	0.757 -	0.784 -	0.757 -	14.2 -	0.0462 U	1.78 U	1.97 -
Limit	1.7	1.8	1.70	1.50	82	1.4	30	280
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.6	1.78	1.84	1.78	30.3	0.0789 U	4.55	10.3
Max. >= Limit	No	No	Yes	Yes	No	No	No	No
W-statistic Prob. #	- -	- -	2.0% (LN)	18.1% (LN)	- -	- -	- -	- -
Test Procedure	- -	- -	Median (Sign)	Lognormal	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	11	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	91.7%	0.0%
Est. Mean*	- -	- -	0.834	0.952	- -	- -	- -	- -
UCL	- -	- -	1.030	1.127	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	Pass	pass	- -	- -	- -	- -
a posteriori Sample	- -	- -	7	4	- -	- -	- -	- -
Size calculation	- -	- -	Pass	Pass	- -	- -	- -	- -

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.
#: This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
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Certification Unit A6WP-C18

(continued)

SAMPLE ID	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene	Benzo(b)fluoranthene
A6WP-C18-1	0.49 J	5 J	0.51 -	0.11 J	0.109 U	4.51 J	36.9 U	36.9 U
A6WP-C18-2	0.86 J	3.7 J	0.49 -	0.13 J	0.116 U	2.2 J	38.5 U	38.5 U
A6WP-C18-4	0.67 J	5.8 J	0.39 -	0.11 U	0.11 U	3.6 J	37.3 U	37.3 U
A6WP-C18-5	0.61 J	5.2 J	0.43 -	0.112 U	0.112 U	4.36 J	112 -	93.1 J
A6WP-C18-6	0.46 J	4.6 J	0.45 -	0.109 U	0.109 U	5.05 J	38 U	38 U
A6WP-C18-8	0.52 J	5.3 J	0.5 -	0.112 U	0.112 U	2.96 J	36.9 U	36.9 U
A6WP-C18-10	2.14 UJ	6.2 J	0.6 -	0.535 U	0.107 U	3.77 J	36.6 U	36.6 U
A6WP-C18-10-R	NA	NA	NA	NA	NA	NA	NA	NA
A6WP-C18-11	2.46 UJ	7.9 -	1 -	0.614 U	0.123 U	2.77 J	42.5 UJ	42.5 UJ
A6WP-C18-11-R	NA	NA	NA	NA	NA	NA	NA	NA
A6WP-C18-12	0.5 J	4.7 -	0.45 -	0.19 J	0.109 U	2.37 J	36.6 UJ	36.6 UJ
A6WP-C18-12-D	0.6 J	4.1 -	0.43 -	0.26 J	0.106 U	3.59 J	36.5 UJ	36.5 UJ
A6WP-C18-13	2.29 UJ	5.8 -	0.71 -	0.571 U	0.114 U	2.61 J	39.5 UJ	39.5 UJ
A6WP-C18-14	2.25 UJ	6.3 -	0.67 -	0.563 U	0.113 U	2.31 J	38.9 UJ	38.9 UJ
A6WP-C18-16	2.21 UJ	5.6 -	0.62 -	0.554 U	0.111 U	3.94 J	37.1 UJ	37.1 UJ
Limit	96	12	1.5	82	29000	78000	2000	20000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	0 .86	7.9	1	0 .26	0.123 U	5.05	112	93.1
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	5	0	0	9	12	0	11	11
% Nondetects	41.7%	0.0%	0.0%	75.0%	100.0%	0.0%	91.7%	91.7%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C18

(continued)

SAMPLE ID	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene
A6WP-C18-1	36.9 U	36.9 U	3.69 U	3.69 U	1.48 U	1 U
A6WP-C18-2	38.5 U	38.5 U	3.85 U	3.85 U	1.54 U	1 U
A6WP-C18-4	37.3 U	37.3 U	4.3 J	3.73 U	1.49 U	0.8 U
A6WP-C18-5	37.5 U	37.5 U	6.6 J	5 J	1.5 U	0.8 U
A6WP-C18-6	38 U	38 U	4.4 J	3.8 U	1.52 U	1.2 U
A6WP-C18-8	36.9 U	36.9 U	8.4 J	4.6 J	1.48 U	1 UJ
A6WP-C18-10	36.6 U	36.6 U	3.66 U	3.66 U	1.46 U	1.2 UJ
A6WP-C18-10-R	NA	NA	NA	NA	NA	NA
A6WP-C18-11	42.5 UJ	42.5 UJ	4.25 U	4.25 U	1.7 U	1 U
A6WP-C18-11-R	NA	NA	NA	NA	NA	NA
A6WP-C18-12	36.6 UJ	36.6 UJ	3.66 U	3.66 U	1.46 U	0.9 U
A6WP-C18-12-D	36.5 UJ	36.5 UJ	7.1 J	3.65 U	1.46 U	0.9 U
A6WP-C18-13	39.5 UJ	39.5 UJ	5.6 J	3.95 U	1.58 U	1 U
A6WP-C18-14	38.9 UJ	38.9 UJ	4.8 J	3.89 U	1.55 U	1.1 U
A6WP-C18-16	37.1 UJ	37.1 UJ	5.5 J	4.13 U	1.49 U	1 U
Limit	2000	20000	130	130	15	410
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	42.5 UJ	42.5 UJ	8.4	5	1.7 U	1.2 UJ
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12
Nondetects	12	12	4	10	12	12
% Nondetects	100.0%	100.0%	33.3%	83.3%	100.0%	100.0%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C18

(continued)

SAMPLE ID	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene	Trichloroethene
A6WP-C18-1	1 U	1 U	1 U	1 U
A6WP-C18-2	1 U	1 U	1 U	1 U
A6WP-C18-4	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C18-5	0.8 U	0.8 U	0.8 U	0.8 U
A6WP-C18-6	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C18-8	1 UJ	1 UJ	1 UJ	1 UJ
A6WP-C18-10	1.2 UJ	1.2 UJ	1.2 UJ	1.2 UJ
A6WP-C18-10-R	NA	NA	NA	NA
A6WP-C18-11	1 U	1 U	1 U	1 U
A6WP-C18-11-R	NA	NA	NA	NA
A6WP-C18-12	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C18-12-D	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C18-13	1 U	1 U	1 U	1 U
A6WP-C18-14	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C18-16	1 U	1 U	1 U	1 U
Limit	160	4000	3600	25000
Units	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	1.2 UJ	1.2 UJ	1.2 UJ	1.2 UJ
Max. >= Limit	No	No	No	No
W-statistic Prob. #	--	--	--	--
Test Procedure	--	--	--	--
Sample Size	12	12	12	12
Nondetects	12	12	12	12
% Nondetects	100.0%	100.0%	100.0%	100.0%
Est. Mean*	--	--	--	--
UCL	--	--	--	--
Prob. > Limit	--	--	--	--
Pass / Fail	--	--	--	--

a posteriori Sample	--	--	--	--
Size calculation	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C18

(continued)

Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C18-1	0.0000105 -	0.0000888 -
A6WP-C18-2	0.00000288 U	0.0000762 -
A6WP-C18-4	0.00000349 U	0.0001 -
A6WP-C18-5	0.0000909 -	0.0012 J
A6WP-C18-6	0.00000457 U	0.000129 -
A6WP-C18-8	0.00000569 U	0.000152 -
A6WP-C18-10	0.00000435 U	0.000108 -
A6WP-C18-10-R	NA	NA
A6WP-C18-11	0.00000142 U	0.0000145 -
A6WP-C18-11-R	NA	NA
A6WP-C18-12	0.00000174 U	0.0000359 -
A6WP-C18-12-D	0.00000133 U	0.0000283 -
A6WP-C18-13	0.00000492 U	0.000148 -
A6WP-C18-14	0.00000343 U	0.000222 -
A6WP-C18-16	0.00000186 U	0.0000804 -
Limit	0.00088	0.0088
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	0 .0000909	0 .0012
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	10	0
% Nondetects	83.3%	0.0%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -

a posteriori Sample	- -	- -
Size calculation	- -	- -

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.
#: 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.

Certification Unit A6WP-C19

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99
A6WP-C19-1	0.947 -	0.804 -	0.813 -	0.804 -	6.21 -	0.0507 U	1.93 U
A6WP-C19-2	1.27 -	0.954 -	0.921 -	0.954 -	67.2 -	0.0793 U	1.76 U
A6WP-C19-3	1.17 J	0.939 J	0.923 J	0.939 J	3.84 U	0.0676 U	0.787 U
A6WP-C19-5	0.852 -	0.708 -	0.691 -	0.708 -	4.62 -	0.059 U	1.88 U
A6WP-C19-5-D	0.781 -	0.672 -	0.662 -	0.672 -	4.33 -	0.0431 U	1.48 U
A6WP-C19-7	2.79 -	2.72 -	2.66 -	2.72 -	172 -	0.0747 U	3.06 -
A6WP-C19-8	0.806 -	0.738 -	0.724 -	0.738 -	19.4 -	0.0602 U	1.66 U
A6WP-C19-9	1.01 -	1.15 -	1.2 -	1.15 -	30.8 -	0.0699 U	1.74 U
A6WP-C19-10	0.873 -	0.876 -	0.862 -	0.876 -	10.7 -	0.0731 U	1.78 U
A6WP-C19-10-R	0.923 -	NA	NA	0.602 J	2.62 J	NA	NA
A6WP-C19-11	0.989 -	1.04 -	1.06 -	1.04 -	238 -	0.0563 U	1.79 U
A6WP-C19-13	1.74 -	1.56 -	1.6 -	1.56 -	117 -	0.047 U	1.96 U
A6WP-C19-14	0.942 -	0.905 -	0.91 -	0.905 -	3.52 -	0.056 U	1.88 U
A6WP-C19-16	1.12 -	1.03 -	1.08 -	1.03 -	12.1 -	0.0676 U	1.54 U
Limit	1.70	1.80	1.70	1.50	82.00	1.4	30
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%
Max. Result	2.79	2.72	2.66	2.72	238	0.0793 U	3.06
Max. >= Limit	Yes	Yes	Yes	Yes	Yes	No	No
W-statistic Prob. #	1.1% (LN)	1.7% (LN)	4.5% (LN)	1.7% (LN)	61.1% (LN)	- -	- -
Test Procedure	Median (Sign)	Median (Sign)	Median (Sign)	Median (Sign)	Lognormal	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	0	0	1	12	11
% Nondetects	0.0%	0.0%	0.0%	0.0%	8.3%	100.0%	91.7%
Est. Mean*	1.000	0.947	0.922	0.947	73.078	- -	- -
UCL	1.270	1.150	1.200	1.150	531.382	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	Pass	Pass	Pass	Pass	FAIL	- -	- -

a posteriori Sample	12	7	7	12	10	- -	- -
Size calculation	Pass	Pass	Pass	Pass	Pass	- -	- -

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.
#: 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.

Certification Unit A6WP-C19

(continued)

SAMPLE ID	Thorium-230	Antimony	Arsenic	Beryllium	Cadmium	Molybdenum	Silver	Fluoride	Benzo(a)pyrene
A6WP-C19-1	1.53 J	2.17 UJ	7 J	0.76 -	0.542 U	1.6 J	0.108 U	1.46 J	36.9 U
A6WP-C19-2	4.44 J	2.25 UJ	10.4 J	0.99 -	0.562 U	1.1 J	0.112 U	13.5 J	38.8 U
A6WP-C19-3	1.6 J	1.78 U	6.06 -	0.478 -	0.278 U	1.5 J	0.667 U	1.61 J	39.2 U
A6WP-C19-5	0.711 J	0.428 UJ	8.1 J	0.5 -	0.107 U	2.6 J	0.107 U	2.81 J	36.8 U
A6WP-C19-5-D	1.59 J	0.49 U	8.1 J	0.5 -	0.103 U	1.4 J	0.103 U	2.56 J	35.4 U
A6WP-C19-7	22.9 J	2.5 U	6.5 J	0.74 -	0.548 U	2.4 J	0.12 J	14.7 J	37.5 U
A6WP-C19-8	1.55 J	3.4 U	6.2 J	0.67 -	0.562 U	1.6 J	0.112 U	5.08 J	37.5 U
A6WP-C19-9	2.32 J	2.35 U	6.1 J	0.73 -	0.589 U	1.5 J	0.118 U	4.04 J	39.3 U
A6WP-C19-10	0.917 J	2.25 U	7.2 J	0.75 -	0.562 U	1.2 J	0.112 U	2.22 J	37.6 U
A6WP-C19-10-R	NA	NA	NA	NA	NA	NA	NA	NA	NA
A6WP-C19-11	4.22 J	2.14 U	5 J	0.7 -	0.535 U	0.93 J	0.107 U	7.38 J	36.7 U
A6WP-C19-13	15.2 J	2.3 U	7.6 J	0.71 -	0.557 U	1.8 J	0.111 U	13.6 J	37.3 U
A6WP-C19-14	1.31 J	2.25 U	6.7 J	0.69 -	0.564 U	0.91 J	0.113 U	3.52 J	37.9 U
A6WP-C19-16	3.13 J	0.43 J	5.6 J	0.59 -	0.104 U	1 J	0.104 U	3.08 J	35.5 U
Limit	280	96	12	1.5	82	2900	29000	78000	2000
Units	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	22.9	0.43	10.4	0.99	0.589 U	2.6	0.12	14.7	39.3 U
Max. >= Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	11	0	0	12	0	11	0	12
% Nondetects	0.0%	91.7%	0.0%	0.0%	100.0%	0.0%	91.7%	0.0%	100.0%
Est. Mean*	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C19

(continued)

SAMPLE ID	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin
A6WP-C19-1	36.9 U	36.9 U	36.9 U	12.7 J	3.69 U	1.48 U
A6WP-C19-2	38.8 U	38.8 U	38.8 U	76.6 J	3.88 U	1.55 U
A6WP-C19-3	39.2 U	39.2 U	39.2 U	3.92 U	3.92 U	1.57 U
A6WP-C19-5	36.8 U	36.8 U	36.8 U	3.68 U	3.68 U	1.47 U
A6WP-C19-5-D	35.4 U	35.4 U	35.4 U	3.54 U	3.54 U	1.41 U
A6WP-C19-7	37.5 U	37.5 U	37.5 U	25.8 J	15.3 J	1.5 U
A6WP-C19-8	37.5 U	37.5 U	37.5 U	5.3 J	3.75 U	1.5 U
A6WP-C19-9	39.3 U	39.3 U	39.3 U	4.5 J	3.93 U	1.57 U
A6WP-C19-10	37.6 U	37.6 U	37.6 U	3.76 U	3.76 U	1.5 U
A6WP-C19-10-R	NA	NA	NA	NA	NA	NA
A6WP-C19-11	36.7 U	36.7 U	36.7 U	35.7 J	18.6 J	1.47 U
A6WP-C19-13	37.3 U	37.3 U	37.3 U	22.8 J	16.1 J	1.49 U
A6WP-C19-14	37.9 U	37.9 U	37.9 U	3.79 U	3.79 U	1.52 U
A6WP-C19-16	35.5 U	35.5 U	95.5 J	3.55 U	3.55 U	1.42 U
Limit	20000	2000	20000	130	130	15
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	39.3 U	39.3 U	95.5	76.6	18.6	1.57 U
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12
Nondetects	12	12	11	5	9	12
% Nondetects	100.0%	100.0%	91.7%	41.7%	75.0%	100.0%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--

a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C19

(continued)

SAMPLE ID	1,1-Dichloroethene	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene	Trichloroethene
A6WP-C19-1	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C19-2	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
A6WP-C19-3	1 U	1 U	1 U	1 U	1 U
A6WP-C19-5	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C19-5-D	1 U	1 U	1 U	1 U	1 U
A6WP-C19-7	1 U	1 U	1 U	1 U	1 U
A6WP-C19-8	1 U	1 U	1 U	1 U	1 U
A6WP-C19-9	1 U	1 U	1 U	1 U	1 U
A6WP-C19-10	1 U	1 U	1 U	1 U	1 U
A6WP-C19-10-R	NA	NA	NA	NA	NA
A6WP-C19-11	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C19-13	1 U	1 U	1 U	1 U	1 U
A6WP-C19-14	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C19-16	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Limit	410	160	4000	3600	25000
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Nondetects	12	12	12	12	12
% Nondetects	100.0%	100.0%	100.0%	100.0%	100.0%
Est. Mean*	--	--	--	--	--
UCL	--	--	--	--	--
Prob. > Limit	--	--	--	--	--
Pass / Fail	--	--	--	--	--

a posteriori Sample	--	--	--	--	--
Size calculation	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C19

(continued)

SAMPLE ID	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C19-1	0.00000134 U	0.00000966 -
A6WP-C19-2	0.00000564 -	0.000281 -
A6WP-C19-3	0.00000146 U	0.0000224 J
A6WP-C19-5	0.0000013 U	0.0000576 -
A6WP-C19-5-D	0.00000135 -	0.0000762 -
A6WP-C19-7	0.0000239 -	0.000402 -
A6WP-C19-8	0.00000137 U	0.0000487 -
A6WP-C19-9	0.00000321 -	0.000143 -
A6WP-C19-10	0.00000213 -	0.000075 -
A6WP-C19-10-R	NA	NA
A6WP-C19-11	0.00000417 -	0.000345 -
A6WP-C19-13	0.0000141 -	0.000252 -
A6WP-C19-14	0.00000279 -	0.0000776 -
A6WP-C19-16	0.0000057 -	0.000151 -
Limit	0.00088	0.0088
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	0 .0000239	0 .000402
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	3	0
% Nondetects	25.0%	0.0%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -

a posteriori Sample	- -	- -
Size calculation	- -	- -

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.
#: 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.

Certification Unit A6WP-C20

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99
A6WP-C20-2	0.721 J	1.06 -	1.08 -	1.06 -	55.6 -	0.0541 U	4.23 -
A6WP-C20-3	1.13 J	1.24 -	1.25 -	1.24 -	65.9 -	0.0828 U	1.86 U
A6WP-C20-3-D	1.17 J	1.18 -	1.2 -	1.18 -	70.9 -	0.0638 U	1.91 U
A6WP-C20-4	1.39 J	1.48 -	1.51 -	1.48 -	64.2 -	0.0641 U	4.24 -
A6WP-C20-5	0.954 J	0.83 -	0.822 -	0.83 -	16.8 -	0.0462 U	1.59 U
A6WP-C20-6	1.17 J	1.07 -	1.09 -	1.07 -	17.5 -	0.0495 U	2.02 U
A6WP-C20-8	0.832 J	0.768 -	0.772 -	0.768 -	5.33 J	0.0472 U	1.87 U
A6WP-C20-9	0.866 J	0.739 -	0.765 -	0.739 -	3.96 J	0.0603 U	3.34 -
A6WP-C20-10	0.809 J	0.764 -	0.782 -	0.764 -	2.52 J	0.057 U	1.73 U
A6WP-C20-12	1.19 J	0.714 -	0.728 -	0.714 -	3.23 J	0.0537 U	2 U
A6WP-C20-14	0.713 J	0.686 -	0.71 -	0.686 -	2.08 J	0.0456 U	1.69 U
A6WP-C20-15	0.789 J	0.691 -	0.678 -	0.691 -	3.49 J	0.0625 U	1.78 U
A6WP-C20-16	1.12 J	1.16 -	1.19 -	1.16 -	7.08 J	0.108 U	1.71 U
Limit	1.7	1.8	1.7	1.5	82	1.4	30
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%
Max. Result	1.39	1.48	1.51	1.48	70.9	0.108 U	4.24
Max. >= Limit	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	9
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	75.0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C20

(continued)

SAMPLE ID	Thorium-230	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene
A6WP-C20-2	2.15 J	0.441 UJ	3.5 J	0.52 -	0.11 U	0.11 U	6.47 J	36.8 U
A6WP-C20-3	2.76 -	2.29 UJ	7.4 J	0.78 -	0.61 -	0.115 U	6.67 J	38.9 U
A6WP-C20-3-D	2.59 -	2.33 UJ	6.8 J	0.81 -	0.583 U	0.117 U	7.35 J	39.2 U
A6WP-C20-4	4.92 -	0.85 U	5.7 J	0.66 -	0.116 U	0.116 U	12.5 J	38.7 U
A6WP-C20-5	1.27 J	0.85 U	4.8 J	0.52 -	0.106 U	0.106 U	6.05 J	36.6 U
A6WP-C20-6	1.39 J	2.32 UJ	6.2 J	0.84 -	0.58 -	0.116 U	3.53 J	40.2 U
A6WP-C20-8	1.03 J	0.68 U	5 J	0.56 -	0.115 U	0.115 U	3.49 J	38.6 U
A6WP-C20-9	1.29 J	0.47 U	3.4 J	0.44 -	0.109 U	0.109 U	3.46 J	37.2 U
A6WP-C20-10	0.847 J	0.62 U	5.3 J	0.6 -	0.109 U	0.109 U	3.17 J	37.2 U
A6WP-C20-12	1.53 J	0.441 UJ	4.6 J	0.4 -	0.11 U	0.11 U	4.51 J	37.3 U
A6WP-C20-14	0.973 J	0.69 U	6.4 J	0.36 -	0.109 U	0.109 U	3.2 J	36.9 U
A6WP-C20-15	0.782 J	0.44 UJ	4.8 J	0.62 -	0.13 J	0.11 U	5.9 J	37.5 U
A6WP-C20-16	1.2 J	2.3 UJ	5.1 J	0.99 -	0.576 U	0.115 U	2.85 J	39.6 U
Limit	280	96	12	1.5	82	29000	78000	2000
Units	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	4.92	2.33 UJ	7.4	0 .99	0 .61	0.117 U	12.5	40.2 U
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	12	0	0	9	12	0	12
% Nondetects	0.0%	100.0%	0.0%	0.0%	75.0%	100.0%	0.0%	100.0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C20

(continued)

SAMPLE ID	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260
A6WP-C20-2	36.8 U	36.8 U	36.8 U	3.68 U	3.68 U
A6WP-C20-3	38.9 U	38.9 U	38.9 U	3.89 U	3.89 U
A6WP-C20-3-D	39.2 U	39.2 U	39.2 U	3.92 U	3.92 U
A6WP-C20-4	38.7 U	38.7 U	38.7 U	6.7 J	4.4 J
A6WP-C20-5	36.6 U	36.6 U	36.6 U	8.6 J	5.1 J
A6WP-C20-6	40.2 U	40.2 U	40.2 U	4.02 U	4.02 U
A6WP-C20-8	38.6 U	38.6 U	38.6 U	8.9 J	5.5 J
A6WP-C20-9	37.2 U	37.2 U	37.2 U	3.72 U	3.72 U
A6WP-C20-10	37.2 U	37.2 U	37.2 U	3.72 U	3.72 U
A6WP-C20-12	37.3 U	37.3 U	37.3 U	3.73 U	3.73 U
A6WP-C20-14	36.9 U	36.9 U	36.9 U	3.69 U	3.69 U
A6WP-C20-15	37.5 U	37.5 U	37.5 U	3.75 U	3.75 U
A6WP-C20-16	39.6 U	39.6 U	39.6 U	3.96 U	3.96 U
Limit	20000	2000	20000	130	130
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	40.2 U	40.2 U	40.2 U	8.9	5.5
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Nondetects	12	12	12	9	9
% Nondetects	100.0%	100.0%	100.0%	75.0%	75.0%
Est. Mean*	--	--	--	--	--
UCL	--	--	--	--	--
Prob. > Limit	--	--	--	--	--
Pass / Fail	--	--	--	--	--
a posteriori Sample	--	--	--	--	--
Size calculation	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C20

(continued)

SAMPLE ID	Dieldrin	1,1-Dichloroethene	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene
A6WP-C20-2	1.47 U	1 U	1 U	1 U	1 U
A6WP-C20-3	1.56 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C20-3-D	1.57 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C20-4	1.55 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C20-5	1.46 U	1 U	1 U	1 U	1 U
A6WP-C20-6	1.61 U	1 U	1 U	1 U	1 U
A6WP-C20-8	1.54 U	1.1 U	1.1 U	1.1 U	1.1 U
A6WP-C20-9	1.49 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C20-10	1.49 U	1.2 U	1.2 U	1.2 U	1.2 U
A6WP-C20-12	1.49 U	1 U	1 U	1 U	1 U
A6WP-C20-14	1.48 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C20-15	1.5 U	0.9 U	0.9 U	0.9 U	0.9 U
A6WP-C20-16	1.58 U	1.1 U	1.1 U	1.1 U	1.1 U
Limit	15	410	160	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%
Max. Result	1.61 U	1.2 U	1.2 U	1.2 U	1.2 U
Max. >= Limit	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12
Nondetects	12	12	12	12	12
% Nondetects	100.0%	100.0%	100.0%	100.0%	100.0%
Est. Mean*	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -
a posteriori Sample Size calculation	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C20

(continued)

SAMPLE ID	Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6WP-C20-2	1 U	0.0000359 J	0.000513 -
A6WP-C20-3	1.1 U	0.0000046 J	0.000168 -
A6WP-C20-3-D	1.1 U	0.0000151 J	0.000236 -
A6WP-C20-4	0.9 U	0.00000386 U	0.0000805 -
A6WP-C20-5	1 U	0.0000103 J	0.0000868 -
A6WP-C20-6	1 U	0.00000145 U	0.0000126 -
A6WP-C20-8	1.1 U	0.00000174 U	0.0000593 -
A6WP-C20-9	0.9 U	0.00000198 U	0.0000655 -
A6WP-C20-10	1.2 U	0.00000408 U	0.000149 -
A6WP-C20-12	1 U	0.00000081 U	0.0000717 -
A6WP-C20-14	0.9 U	0.00000136 U	0.00005 -
A6WP-C20-15	0.9 U	0.00000149 U	0.0000856 -
A6WP-C20-16	1.1 U	0.00000196 U	0.0000619 -
Limit	25000	0.00088	0.0088
Units	ug/kg	mg/kg	mg/kg
Conf. Level	90%	90%	90%
Max. Result	1.2 U	0 .0000359	0 .000513
Max. >= Limit	No	No	No
W-statistic Prob. #	- -	- -	- -
Test Procedure	- -	- -	- -
Sample Size	12	12	12
Nondetects	12	9	0
% Nondetects	100.0%	75.0%	0.0%
Est. Mean*	- -	- -	- -
UCL	- -	- -	- -
Prob. > Limit	- -	- -	- -
Pass / Fail	- -	- -	- -

a posteriori Sample	- -	- -	- -
Size calculation	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C21

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Antimony	Cadmium	Silver
A6WP-C21-1	1.1 -	0.63 -	0.622 -	0.63 -	5.33 -	0.603 UJ	0.165 J	0.226 UJ
A6WP-C21-2	1.28 -	0.854 -	0.795 -	0.854 -	7.11 -	0.722 U	0.249 J	0.271 UJ
A6WP-C21-3	1.07 -	0.798 -	0.808 -	0.798 -	14 -	0.74 UJ	0.216 J	0.277 UJ
A6WP-C21-5	1.22 J	0.622 -	0.61 -	0.622 -	4.37 -	0.477 U	0.171 J	0.674 U
A6WP-C21-6	0.988 J	0.882 -	0.887 -	0.882 -	14.5 -	0.457 U	0.202 J	0.645 U
A6WP-C21-6-D	1.06 J	0.884 -	0.908 -	0.884 -	10.1 -	0.51 U	0.175 J	0.72 U
A6WP-C21-8	0.989 J	0.929 -	0.94 -	0.929 -	9.52 -	0.49 U	0.168 J	0.692 U
A6WP-C21-9	1.13 J	1.12 -	1.13 -	1.12 -	4.87 J	0.427 U	0.241 J	0.603 U
A6WP-C21-11	1.13 J	1.05 -	1.07 -	1.05 -	23.7 -	0.554 U	0.16 J	0.783 U
A6WP-C21-12	1.06 J	0.977 -	0.948 -	0.977 -	32.2 -	0.521 U	0.174 J	0.736 U
A6WP-C21-13	1.33 J	1.01 -	1 -	1.01 -	20.7 -	0.452 U	0.234 J	0.639 U
A6WP-C21-14	1.15 J	1.01 -	1.03 -	1.01 -	15.5 -	0.479 U	0.172 J	0.676 U
A6WP-C21-15	1.51 J	1.49 -	1.51 -	1.49 -	266 -	0.47 U	0.199 J	0.664 U
Limit	1.7	1.8	1.7	1.5	82.00	96	82	29000
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.51	1.49	1.51	1.49	266	0.74 UJ	0 .249	0.783 U
Max. >= Limit	No	No	No	No	Yes	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	5.2% (LN)	- -	- -	- -
Test Procedure	- -	- -	- -	- -	Lognormal	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	0	12
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Est. Mean*	- -	- -	- -	- -	27.504	- -	- -	- -
UCL	- -	- -	- -	- -	79.428	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	pass	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -	4	- -	- -	- -
Size calculation	- -	- -	- -	- -	Pass	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C22

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Antimony	Cadmium	Silver
A6WP-C22-1	0.857 -	0.955 -	0.972 -	0.955 -	6.26 -	0.451 UJ	0.16 J	0.113 U
A6WP-C22-2	0.703 -	0.521 -	0.523 -	0.521 -	7.57 -	0.465 UJ	0.116 U	0.116 U
A6WP-C22-3	0.694 -	0.601 -	0.613 -	0.601 -	7.62 -	0.452 UJ	0.113 U	0.113 U
A6WP-C22-5	0.868 -	0.726 -	0.722 -	0.726 -	7.21 -	2.24 UJ	0.56 U	0.112 U
A6WP-C22-7	1 -	0.803 -	0.783 -	0.803 -	10.7 -	0.52 J	0.13 J	0.113 U
A6WP-C22-8	1.04 -	0.91 -	0.932 -	0.91 -	20 -	0.662 UJ	0.23 J	0.248 UJ
A6WP-C22-9	0.912 -	0.453 -	0.453 -	0.453 -	11.7 -	0.451 UJ	0.113 U	0.113 U
A6WP-C22-10	0.808 -	0.46 -	0.476 -	0.46 -	5.7 -	2.18 UJ	0.546 U	0.109 U
A6WP-C22-11	0.724 -	0.631 -	0.626 -	0.631 -	6.63 -	0.446 UJ	0.112 U	0.112 U
A6WP-C22-13	1.09 -	0.979 -	1.02 -	0.979 -	11.3 -	0.64 J	0.16 J	0.13 U
A6WP-C22-13-D	1.09 -	1.11 -	1.15 -	1.11 -	15.2 -	0.66 J	0.128 U	0.128 U
A6WP-C22-15	0.833 -	0.857 -	0.86 -	0.857 -	6.16 -	0.465 UJ	0.116 U	0.116 U
A6WP-C22-16	0.732 -	0.401 -	0.37 -	0.401 -	6.61 -	0.403 UJ	0.101 U	0.101 U
Limit	1.7	1.8	1.7	1.5	82	96	82	29000
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.09	1.11	1.15	1.11	20	0 .66	0 .23	0.248 UJ
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	10	8	12
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	83.3%	66.7%	100.0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C23

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Antimony	Cadmium	Silver
A6WP-C23-1	1.2 -	0.849 -	0.988 -	0.849 -	13.4 J	0.739 U	0.197 J	0.277 U
A6WP-C23-3	1.32 -	1.02 -	1.1 -	1.02 -	21.8 J	0.779 U	0.188 J	0.292 U
A6WP-C23-4	1.11 -	0.846 -	0.864 -	0.846 -	14.1 J	0.635 U	0.167 J	0.247 J
A6WP-C23-4-D	1.12 -	0.837 -	0.824 -	0.837 -	17.9 J	0.745 U	0.173 J	0.28 U
A6WP-C23-5	1.42 -	0.812 -	0.787 -	0.812 -	20 J	0.736 U	0.173 J	0.276 U
A6WP-C23-6	0.664 -	0.377 -	0.38 -	0.377 -	8.93 J	0.642 U	0.169 J	0.241 U
A6WP-C23-8	1.13 -	0.853 -	0.875 -	0.853 -	14.9 J	0.559 U	0.247 J	0.21 U
A6WP-C23-9	0.928 -	0.703 -	0.751 -	0.703 -	8.87 J	0.649 U	0.155 J	0.243 U
A6WP-C23-11	0.959 -	0.863 -	0.848 -	0.863 -	2.95 U	0.613 U	0.16 J	0.23 U
A6WP-C23-12	1.11 -	0.911 -	0.943 -	0.911 -	13 J	0.779 U	0.201 J	0.543 J
A6WP-C23-13	1.19 -	0.891 -	0.911 -	0.891 -	13 -	0.761 U	0.238 U	0.57 U
A6WP-C23-14	1.15 -	0.926 -	0.926 -	0.926 -	20.3 -	0.746 U	0.233 U	0.56 U
A6WP-C23-15	1.01 -	0.774 -	0.808 -	0.774 -	10.1 -	0.561 U	0.175 U	0.421 U
Limit	1.7	1.8	1.7	1.5	82	96	82	29000
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.42	1.02	1.1	1.02	21.8	0.779 U	0 .247	0 .543
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	3	10
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	25.0%	83.3%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -

a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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.
#: 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.

Certification Unit A6WP-C24

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Antimony	Cadmium	Silver
A6WP-C24-2	0.869 -	0.7 -	0.719 -	0.7 -	3.92 J	0.892 U	0.279 U	0.669 U
A6WP-C24-3	0.802 -	0.741 -	0.778 -	0.741 -	7.47 -	0.624 U	0.195 U	1.62 -
A6WP-C24-4	0.959 -	0.797 -	0.775 -	0.797 -	20.2 -	0.827 U	0.258 U	0.62 U
A6WP-C24-6	1.09 -	0.695 -	0.734 -	0.695 -	40.1 -	0.669 U	0.298 J	0.502 U
A6WP-C24-7	0.876 -	0.847 -	0.903 -	0.847 -	46.8 -	0.731 U	0.228 U	0.548 U
A6WP-C24-8	0.788 -	0.705 -	0.772 -	0.705 -	15.9 -	0.572 U	0.179 U	0.429 U
A6WP-C24-8-D	0.88 -	0.676 -	0.652 -	0.676 -	17.1 -	0.626 U	0.196 U	0.47 U
A6WP-C24-9	0.705 -	0.605 -	0.595 -	0.605 -	4.49 -	0.685 U	0.214 U	0.514 U
A6WP-C24-10	0.821 -	0.72 -	0.724 -	0.72 -	22.6 -	0.575 U	0.18 U	0.431 U
A6WP-C24-12	0.569 -	0.518 -	0.518 -	0.518 -	11 -	0.739 U	0.231 U	0.554 U
A6WP-C24-14	1.03 -	0.919 -	0.932 -	0.919 -	20.7 -	0.713 U	0.223 U	0.535 U
A6WP-C24-15	0.955 -	0.95 -	0.945 -	0.95 -	37.1 -	0.767 U	0.24 U	0.575 U
A6WP-C24-16	0.925 -	0.861 -	0.846 -	0.861 -	24.2 -	0.73 U	0.228 U	0.547 U
Limit	1.7	1.8	1.7	1.5	82	96	82	29000
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.09	0 .95	0 .945	0 .95	46.8	0.892 U	0 .298	1.62
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	11	11
% Nondetects	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	91.7%	91.7%
Est. Mean*	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--

a posteriori Sample	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C25

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Antimony	Cadmium	Silver
A6WP-C25-1	0.932 J	0.945 J	0.981 J	0.945 J	3.3 U	0.629 U	0.246 U	0.589 U
A6WP-C25-3	0.803 J	0.88 J	0.889 J	0.88 J	5.99 J	0.681 U	0.266 U	0.638 U
A6WP-C25-4	0.893 J	0.749 J	0.762 J	0.749 J	8.25 -	0.645 U	0.252 U	0.604 U
A6WP-C25-5	0.826 J	0.848 J	0.878 J	0.848 J	27.2 -	0.693 U	0.271 U	0.65 U
A6WP-C25-6	1.15 J	0.718 J	0.717 J	0.718 J	17.2 -	0.706 U	0.276 U	0.662 U
A6WP-C25-7	0.882 J	0.878 J	0.833 J	0.878 J	21.2 -	0.672 U	0.262 U	0.63 U
A6WP-C25-9	0.897 -	0.678 -	0.682 -	0.678 -	11.7 -	0.713 U	0.155 J	0.267 U
A6WP-C25-10	0.831 J	0.726 J	0.767 J	0.726 J	13.5 -	0.676 U	0.264 U	0.634 U
A6WP-C25-11	0.593 -	0.628 -	0.612 -	0.628 -	13.3 -	0.732 U	0.154 J	0.275 U
A6WP-C25-13	0.8 J	0.959 J	0.986 J	0.959 J	19.4 -	0.71 U	0.277 U	0.666 U
A6WP-C25-14	0.935 J	0.678 J	0.71 J	0.678 J	14.6 -	0.647 U	0.253 U	0.606 U
A6WP-C25-14-D	0.726 J	0.533 J	0.521 J	0.533 J	13.9 -	0.61 U	0.238 U	0.572 U
A6WP-C25-15	0.813 J	0.629 J	0.617 J	0.629 J	16 -	0.75 U	0.159 J	0.281 U
Limit	1.7	1.8	1.7	1.5	82	96	82	29000
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.15	0 .959	0 .986	0 .959	27.2	0.75 U	0 .159	0.666 U
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	1	12	9	12
% Nondetects	0.0%	0.0%	0.0%	0.0%	8.3%	100.0%	75.0%	100.0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

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. .
#: 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.

Certification Unit A6WP-C26

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Antimony	Cadmium	Silver
A6WP-C26-1	0.741 -	0.578 -	0.613 -	0.578 -	16.2 -	1.23 -	0.718 U	0.155 J	0.269 U
A6WP-C26-2	1.09 -	0.881 -	0.939 -	0.881 -	21.5 -	2.73 -	0.805 U	0.157 J	0.302 U
A6WP-C26-4	1.04 -	0.478 -	0.476 -	0.478 -	10.1 -	0.864 U	0.619 U	0.118 J	0.232 U
A6WP-C26-5	1.69 -	1.21 -	1.18 -	1.21 -	33 -	2.34 -	0.81 U	0.197 J	0.304 U
A6WP-C26-5-D	1.7 -	1.27 -	1.26 -	1.27 -	30.3 -	2.16 -	0.834 U	0.145 J	0.313 U
A6WP-C26-6	1.1 -	0.857 -	0.854 -	0.857 -	7.29 -	0.861 U	0.745 U	0.145 J	0.28 U
A6WP-C26-8	1.49 -	1.32 -	1.37 -	1.32 -	41 -	2.42 -	0.75 U	0.19 J	0.281 U
A6WP-C26-9	0.947 -	0.755 -	0.773 -	0.755 -	20.7 -	0.926 J	0.703 U	0.132 J	0.264 U
A6WP-C26-11	0.851 -	0.639 -	0.653 -	0.639 -	2.54 U	0.898 U	0.61 U	0.116 J	0.229 U
A6WP-C26-12	0.937 -	0.803 -	0.777 -	0.803 -	17.8 -	0.788 U	0.729 U	0.122 J	0.285 J
A6WP-C26-13	0.794 -	0.568 -	0.572 -	0.568 -	10.2 -	0.867 U	0.562 U	0.102 J	0.215 J
A6WP-C26-14	0.967 -	0.843 -	0.86 -	0.843 -	7.71 -	0.809 U	0.736 U	0.139 J	0.276 U
A6WP-C26-16	0.632 -	0.529 -	0.523 -	0.529 -	5.8 -	0.794 U	0.668 U	0.131 J	0.25 U
Limit	1.70	1.8	1.7	1.5	82	30	96	82	29000
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.7	1.32	1.37	1.32	41	2.73	0.834 U	0.197	0.285
Max. >= Limit	Yes	No	No	No	No	No	No	No	No
W-statistic Prob. #	71.4% (LN)	--	--	--	--	--	--	--	--
Test Procedure	Lognormal	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	1	7	12	0	10
% Nondetects	0.0%	0.0%	0.0%	0.0%	8.3%	58.3%	100.0%	0.0%	83.3%
Est. Mean*	1.026	--	--	--	--	--	--	--	--
UCL	1.203	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--
Pass / Fail	pass	--	--	--	--	--	--	--	--
a posteriori Sample	3	--	--	--	--	--	--	--	--
Size calculation	Pass	--	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C27

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230
A6E-P3-WB-C1	1.15 -	0.933 -	0.969 -	0.933 -	5.21 J	0.0789 U	0.845 U	1.3 J
A6E-P3-WB-C2	0.862 -	0.71 -	0.68 -	0.71 -	2.52 U	0.0407 U	0.836 U	1.13 J
A6E-P3-WB-C3	0.941 -	0.753 -	0.75 -	0.753 -	2.7 J	0.0416 U	0.835 U	1.22 J
A6E-P3-WB-C4	0.829 -	0.774 -	0.813 -	0.774 -	5.34 J	0.0425 U	0.894 U	1.08 J
A6E-P3-WB-C5	1.07 -	0.717 -	0.713 -	0.717 -	3.12 U	0.0678 U	4.76 -	1.07 J
A6E-P3-WB-C6	0.97 -	0.705 -	0.698 -	0.705 -	10.5 J	0.0522 U	0.869 U	1.24 J
A6E-P3-WB-C7	0.866 -	0.623 -	0.602 -	0.623 -	6 J	0.0677 U	0.927 U	1.25 J
A6E-P3-WB-C8	0.816 -	0.737 -	0.734 -	0.737 -	5.82 J	0.0714 U	0.856 U	1.45 J
A6E-P3-WB-C9	1.03 -	0.823 -	0.882 -	0.823 -	6.55 J	0.054 U	0.896 U	1.51 J
A6E-P3-WB-C10	0.933 -	0.734 -	0.738 -	0.734 -	5.19 J	0.0244 U	0.849 U	0.989 J
A6E-P3-WB-C11	0.845 -	0.593 -	0.595 -	0.593 -	3.55 J	0.0263 U	0.903 U	1.26 J
A6E-P3-WB-C12	0.878 -	0.812 -	0.816 -	0.812 -	2.24 U	0.0408 U	1.35 -	1.41 J
A6E-P3-WB-C13	1.06 -	0.872 -	0.888 -	0.872 -	5.51 J	0.0447 U	5.03 -	1.27 J
A6E-P3-WB-C14	1.01 -	0.904 -	0.956 -	0.904 -	2.04 U	0.0547 U	0.848 U	1.07 J
A6E-P3-WB-C15	0.857 -	0.713 -	0.694 -	0.713 -	9.85 J	0.033 U	0.868 U	1.73 J
A6E-P3-WB-C16	0.952 -	0.689 -	0.693 -	0.689 -	15.9 J	0.0551 J	0.919 U	1.56 J
Limit	1.7	1.8	1.7	1.5	82	1.4	30	280
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	pCi/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.15	0.933	0.969	0.933	15.9	0.0551	5.03	1.73
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--
Sample Size	16	16	16	16	16	16	16	16
Nondetects	0	0	0	0	4	15	13	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	25.0%	93.8%	81.3%	0.0%
Est. Mean*	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--

a posteriori Sample	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C27

(continued)

SAMPLE ID	Antimony	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)pyrene	Benzo(b)fluoranthene
A6E-P3-WB-C1	1.31 U	5.62 J	0.6 -	0.334 J	0.49 U	0.963 J	39.6 U	39.6 U
A6E-P3-WB-C2	1.28 U	4.77 J	0.512 -	0.304 J	0.479 U	1.49 J	36.8 U	36.8 U
A6E-P3-WB-C3	1.33 U	6.6 J	0.438 -	0.381 J	0.5 U	0.76 J	36.7 U	36.7 U
A6E-P3-WB-C4	1.37 U	3.42 J	0.496 -	0.339 J	0.516 U	1.1 J	36.4 U	36.4 U
A6E-P3-WB-C5	1.28 U	3.83 J	0.517 -	0.274 J	0.481 U	1.24 J	39.4 U	39.4 U
A6E-P3-WB-C6	1.42 U	5.36 J	0.445 -	0.345 J	0.877 J	1.28 J	36.4 U	36.4 U
A6E-P3-WB-C7	1.45 U	5.49 J	0.276 -	0.289 J	0.544 U	1.47 J	37.7 U	37.7 U
A6E-P3-WB-C8	1.19 U	4.18 J	0.373 -	0.312 J	0.448 U	0.883 J	36.4 U	36.4 U
A6E-P3-WB-C9	1.54 U	5.93 J	0.413 -	0.296 J	0.576 U	2.23 J	40.6 U	40.6 U
A6E-P3-WB-C10	1.26 U	9.01 J	0.426 -	0.32 J	0.472 U	1.38 J	38.1 U	38.1 U
A6E-P3-WB-C11	1.28 U	4.32 J	0.392 -	0.287 J	0.481 U	1.15 J	36.3 U	36.3 U
A6E-P3-WB-C12	1.44 U	9.25 J	0.52 -	0.38 J	0.539 U	0.72 J	37.5 U	37.5 U
A6E-P3-WB-C13	1.44 U	5.58 J	0.528 -	0.238 J	0.541 U	2.06 J	38.6 U	38.6 U
A6E-P3-WB-C14	1.34 U	10.7 J	0.508 -	0.256 J	0.503 U	1.03 J	38.2 U	38.2 U
A6E-P3-WB-C15	1.45 U	5.75 J	0.449 -	0.235 J	0.544 U	1.18 J	38.2 U	38.2 U
A6E-P3-WB-C16	1.38 U	5.15 J	0.49 -	0.215 U	0.517 U	2.37 J	38.9 U	38.9 U
Limit	96	12	1.5	82	29000	78000	2000	20000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	1.54 U	10.7	0.6	0.381	0.877	2.37	40.6 U	40.6 U
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--
Sample Size	16	16	16	16	16	16	16	16
Nondetects	16	0	0	15	15	16	16	16
% Nondetects	100.0%	0.0%	0.0%	93.8%	93.8%	100.0%	100.0%	100.0%
Est. Mean*	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C27

(continued)

SAMPLE ID	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene
A6E-P3-WB-C1	39.6 U	39.6 U	11.7 U	11.7 U	4.8 U	1 U
A6E-P3-WB-C2	36.8 U	36.8 U	10.9 U	10.9 U	4.4 U	5.2 J
A6E-P3-WB-C3	36.7 U	36.7 U	11 U	11 U	4.4 U	1.2 J
A6E-P3-WB-C4	36.4 U	36.4 U	10.8 U	10.8 U	4.4 U	1 U
A6E-P3-WB-C5	39.4 U	39.4 U	11.6 U	11.6 U	4.7 U	1.1 U
A6E-P3-WB-C6	36.4 U	36.4 U	10.8 U	10.8 U	10.7 U	3.6 J
A6E-P3-WB-C7	37.7 U	37.7 U	10.7 U	10.7 U	4.5 U	1 U
A6E-P3-WB-C8	36.4 U	36.4 U	10.8 U	10.8 U	4.4 U	1 U
A6E-P3-WB-C9	40.6 U	40.6 U	11.1 U	11.1 U	4.9 U	4.5 J
A6E-P3-WB-C10	38.1 U	38.1 U	10.5 U	10.5 U	4.6 U	2 J
A6E-P3-WB-C11	36.3 U	36.3 U	10.8 U	10.8 U	4.4 U	3.7 J
A6E-P3-WB-C12	37.5 U	37.5 U	11 U	11 U	4.5 U	1 U
A6E-P3-WB-C13	38.6 U	38.6 U	11.4 U	11.4 U	4.6 U	2.3 J
A6E-P3-WB-C14	38.2 U	38.2 U	11.1 U	11.1 U	4.6 U	1.2 U
A6E-P3-WB-C15	38.2 U	38.2 U	10.9 U	10.9 U	4.6 U	1 U
A6E-P3-WB-C16	38.9 U	38.9 U	11.6 U	11.6 U	4.7 U	1 U
Limit	2000	20000	130	130	15	410
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	40.6 U	40.6 U	11.7 U	11.7 U	10.7 U	5.2
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	16	16	16	16	16	16
Nondetects	16	16	16	16	16	9
% Nondetects	100.0%	100.0%	100.0%	100.0%	100.0%	56.3%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--

a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C27

(continued)

SAMPLE ID	1,2-Dichloroethene (Total)	Bromodichloromethane	Tetrachloroethene	Trichloroethene
A6E-P3-WB-C1	1 U	1 U	1 U	1 U
A6E-P3-WB-C2	1.1 U	1.1 U	1.1 U	1.1 U
A6E-P3-WB-C3	1 U	1 U	1 U	1 U
A6E-P3-WB-C4	1 U	1 U	1 U	1 U
A6E-P3-WB-C5	1.1 U	1.1 U	1.1 U	1.1 U
A6E-P3-WB-C6	1 U	1 U	1 U	1 U
A6E-P3-WB-C7	1 U	1 U	1 U	1 U
A6E-P3-WB-C8	1 U	1 U	1 U	1 U
A6E-P3-WB-C9	1 U	1 U	1 U	1 U
A6E-P3-WB-C10	0.9 U	0.9 U	0.9 U	0.9 U
A6E-P3-WB-C11	0.9 U	0.9 U	0.9 U	0.9 U
A6E-P3-WB-C12	1 U	1 U	1 U	1 U
A6E-P3-WB-C13	1.1 U	1.1 U	1.1 U	1.1 U
A6E-P3-WB-C14	1.2 U	1.2 U	1.2 U	1.2 U
A6E-P3-WB-C15	1 U	1 U	1 U	1 U
A6E-P3-WB-C16	1 U	1 U	1 U	1 U
Limit	160	4000	3600	25000
Units	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	1.2 U	1.2 U	1.2 U	1.2 U
Max. >= Limit	No	No	No	No
W-statistic Prob. #	--	--	--	--
Test Procedure	--	--	--	--
Sample Size	16	16	16	16
Nondetects	16	16	16	16
% Nondetects	100.0%	100.0%	100.0%	100.0%
Est. Mean*	--	--	--	--
UCL	--	--	--	--
Prob. > Limit	--	--	--	--
Pass / Fail	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--

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.
#: 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.

Certification Unit A6WP-C27

(continued)

Trichloroethene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Octachlorodibenzo-p-dioxin
A6E-P3-WB-C1	0.00000148 U	0.0000364 -
A6E-P3-WB-C2	0.000000649 U	0.0000472 -
A6E-P3-WB-C3	0.00000118 U	0.0000507 -
A6E-P3-WB-C4	0.00000231 U	0.0000637 -
A6E-P3-WB-C5	0.00000125 U	0.0000626 -
A6E-P3-WB-C6	0.00000394 -	0.0000982 -
A6E-P3-WB-C7	0.00000132 U	0.000041 -
A6E-P3-WB-C8	0.00000111 U	0.0000599 -
A6E-P3-WB-C9	0.00000254 U	0.0000665 -
A6E-P3-WB-C10	0.00000204 U	0.000114 -
A6E-P3-WB-C11	0.000000919 U	0.0000367 -
A6E-P3-WB-C12	0.00000197 U	0.0000595 -
A6E-P3-WB-C13	0.0000027 U	0.0000975 -
A6E-P3-WB-C14	0.00000289 U	0.000217 -
A6E-P3-WB-C15	0.0000044 -	0.000152 -
A6E-P3-WB-C16	0.0000226 -	0.000291 -
Limit	0.00088	0.0088
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	0 .0000226	0 .000291
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	16	16
Nondetects	13	0
% Nondetects	81.3%	0.0%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -

a posteriori Sample	- -	- -
Size calculation	- -	- -

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.
#: 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.2

SAMPLING RESULTS AND STATISTICS SECONDARY SAMPLING

Certification Unit A6WP-C12

SAMPLE ID	Uranium, Total
A6WP-C12-2	9.43 J
A6WP-C12-3	40 J
A6WP-C12-4	11.9 J
A6WP-C12-6	19.6 J
A6WP-C12-7	14.5 J
A6WP-C12-8	16.1 J
A6WP-C12-9	16.7 J
A6WP-C12-11A-S *	*31 -
A6WP-C12-12A-S *	*51.8 -
A6WP-C12-15	59.2 J
A6WP-C12-15-D	45.3 J
A6WP-C12-16	1.56 U
A6WP-C12-16-R	15.2 -
A6WP-C12-20 *	*68.7 -
Limit	82
Units	ug/g
Conf. Level	95%
Max. Result	68.7
Max. >= Limit	No
W-statistic Prob. #	- -
Test Procedure	- -
Sample Size	12
Nondetects	0
% Nondetects	0.0%
Est. Mean*	- -
UCL	- -
Prob. > Limit	- -
Pass / Fail	- -
a posteriori Sample	- -
Size calculation	- -

SAMPLE ID	Aroclor-1254	Aroclor-1260
A6WP-C12-2	5.7 J	3.76 U
A6WP-C12-3	6.3 J	3.68 U
A6WP-C12-4	3.74 U	3.74 U
A6WP-C12-6	9.1 J	5.2 J
A6WP-C12-7	6.3 J	3.77 U
A6WP-C12-8	6.6 J	3.74 U
A6WP-C12-9	7 J	3.8 J
A6WP-C12-11A *	3.8 U	3.8 U
A6WP-C12-12	67.6 J	38.1 J
A6WP-C12-13	62.4 J	29.9 J
A6WP-C12-15	67 J	40.9 J
A6WP-C12-15-D	109 J	61.9 J
A6WP-C12-16	3.57 U	3.57 U
Limit	130	130
Units	ug/kg	ug/kg
Conf. Level	90%	90%
Max. Result	109	61.9
Max. >= Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	3	7
% Nondetects	25.0%	58.3%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -
a posteriori Sample	- -	- -
Size calculation	- -	- -

* newly collected data after excavation

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.
#: 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.

Certification Unit A6WP-C13

SAMPLE ID	Uranium, Total
A6WP-C13-1	6.35 -
A6WP-C13-2	4.58 -
A6WP-C13-2-D	5.6 -
A6WP-C13-6	15.6 -
A6WP-C13-7	71.9 -
A6WP-C13-8	40 -
A6WP-C13-9	34.1 -
A6WP-C13-11	3.91 -
A6WP-C13-12	10.9 -
A6WP-C13-13	54.3 -
A6WP-C13-15	4.51 -
A6WP-C13-16	39.4 -
A6WP-C13-19 *	70.6 -
Limit	82
Units	ug/g
Conf. Level	95%
Max. Result	71.9
Max. >= Limit	No
W-statistic Prob. #	- -
Test Procedure	- -
Sample Size	12
Nondetects	0
% Nondetects	0.0%
Est. Mean*	- -
UCL	- -
Prob. > Limit	- -
Pass / Fail	- -
a posteriori Sample Size calculation	- -

SAMPLE ID	Technetium-99
A6WP-C13-1A *	0.806 U
A6WP-C13-2	1.71 U
A6WP-C13-2-D	1.76 U
A6WP-C13-4	11.3 -
A6WP-C13-6	1.67 U
A6WP-C13-7	24.3 -
A6WP-C13-8	6.92 -
A6WP-C13-9	6.56 -
A6WP-C13-11	1.68 U
A6WP-C13-12	10.1 -
A6WP-C13-15	28.5 -
A6WP-C13-16	11.1 -
A6WP-C13-17 *	0.899 -
Limit	30
Units	pCi/g
Conf. Level	90%
Max. Result	28.5
Max. >= Limit	No
W-statistic Prob. #	- -
Test Procedure	- -
Sample Size	12
Nondetects	4
% Nondetects	33.3%
Est. Mean*	- -
UCL	- -
Prob. > Limit	- -
Pass / Fail	- -
a posteriori Sample Size calculation	- -

* newly collected data after excavation

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.
#: 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.

Certification Unit A6WP-C17

SAMPLE ID	Uranium, Total
A6WP-C17-1	3.64 J
A6WP-C17-2	1.65 J
A6WP-C17-3	13.3 J
A6WP-C17-5	7.78 J
A6WP-C17-6	20.1 J
A6WP-C17-8	4.36 J
A6WP-C17-10	13.5 J
A6WP-C17-12	5.65 J
A6WP-C17-13	7.69 J
A6WP-C17-14	2.6 J
A6WP-C17-16	5.55 J
A6WP-C17-16-D	13.8 J
A6WP-C17-16-R	42.3 J
A6WP-C17-18 *	29.6 -
Limit	82
Units	ug/g
Conf. Level	95%
Max. Result	42.3
Max. >= Limit	No
W-statistic Prob. #	- -
Test Procedure	- -
Sample Size	12
Nondetects	0
% Nondetects	0.0%
Est. Mean*	- -
UCL	- -
Prob. > Limit	- -
Pass / Fail	- -

a posteriori Sample	- -
Size calculation	- -

* newly collected data after excavation

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.
#: 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.

Certification Unit A6WP-C19

SAMPLE ID	Uranium, Total
A6WP-C19-1	6.21 -
A6WP-C19-2	67.2 -
A6WP-C19-3	3.84 U
A6WP-C19-5	4.62 -
A6WP-C19-5-D	4.33 -
A6WP-C19-8	19.4 -
A6WP-C19-9	30.8 -
A6WP-C19-10	10.7 -
A6WP-C19-10-R	2.62 J
A6WP-C19-11A *	55 -
A6WP-C19-12 **	59.6 -
A6WP-C19-14	3.52 -
A6WP-C19-15 **	22.8 -
A6WP-C19-16	12.1 -
A6WP-C19-18 *	3.92 U
A6WP-C19-21 *	78.7 -
Limit	82
Units	ug/g
Conf. Level	95%
Max. Result	78.7
Max. >= Limit	No
W-statistic Prob. #	- -
Test Procedure	- -
Sample Size	14
Nondetects	2
% Nondetects	14.3%
Est. Mean*	- -
UCL	- -
Prob. > Limit	- -
Pass / Fail	- -

a posteriori Sample	- -
Size calculation	- -

* newly collected data after excavation
** archive location

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.
#: 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.

Certification Unit A6WP-C21

SAMPLE ID	Uranium, Total
A6WP-C21-1	5.33 -
A6WP-C21-2	7.11 -
A6WP-C21-3	14 -
A6WP-C21-5	4.37 -
A6WP-C21-6	14.5 -
A6WP-C21-6-D	10.1 -
A6WP-C21-8	9.52 -
A6WP-C21-9	4.87 J
A6WP-C21-11	23.7 -
A6WP-C21-12	32.2 -
A6WP-C21-13	20.7 -
A6WP-C21-14	15.5 -
A6WP-C21-17 *	54.9 -
Limit	82
Units	ug/g
Conf. Level	95%
Max. Result	54.9
Max. >= Limit	No
W-statistic Prob. #	- -
Test Procedure	- -
Sample Size	12
Nondetects	0
% Nondetects	0.0%
Est. Mean*	- -
UCL	- -
Prob. > Limit	- -
Pass / Fail	- -

a posteriori Sample	- -
Size calculation	- -

* newly collected data after excavation

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.
#: 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 B

VARIANCE/FIELD CHANGE NOTICES

APPENDIX B.1

VARIANCE/FIELD CHANGE NOTICES 20600-PSP-0016-41 AND 20600-PSP-0016-44TO THE PSP FOR EXCAVATION CONTROL AND PRECERTIFICATION OF THE AREA 6 WASTE PITS AND GENERAL AREA

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): YES	V/F: 20600-PSP-0016-41
WBS NO.: PROJECT/DOCUMENT/ECDC # 20600-PSP-0016 Rev.0		Page: 1 of 5
PROJECT TITLE: Project Specific Plan For Excavation Control And Precertification of the Area 6 Waste Pits and General Area		Date: 11/14/05

VARIANCE / FIELD CHANGE NOTICE (Include justification):

EXCAVATION CONTROL SAMPLING

This Variance/Field Change Notice (V/FCN) documents the collection of grab soil samples for precertification on the southwest sidewall and northwest corner (floor and sidewalls) of Waste Pit 3. See Figure 1. Samples will be collected for all of the Area 6 Area Specific Constituents of Concern (ASCOCs) from 12 locations.

See Attachment 1 for the TALs, Attachment 2 for the Sampling and Analytical Requirements, and Attachment 3 for the sample identifiers.

Surveying Required: Yes, the locations will be surveyed prior to sampling.
Field QC samples required: Yes, one trip blank will be collected for TAL R.
Field validation required: Yes
Analytical data validation required: Yes. VSL D
Data package requirements: ASL D Package
Historical data for shipping: Total Uranium = 2450 mg/kg from boring A6WP-3F-02

Justification:
The base of the slope in the southwest corner of Waste Pit 3 is known to be contaminated; however when the area is excavated it will create an unsafe condition resulting in the need to excavate the entire slope. The base of the slope will be taken to the OSDF and the top of the slope will be moved to the northwest corner of Waste Pit 3. This additional excavation outside of the know contamination area (top of slope) has been shown to pass the Real Time Phase I precertification requirements; therefore these samples are being taken to verify that the soil meets all applicable FRLs in order to stage this material in the northwest corner of Waste Pit 3.

Per Section 1.3 of the PSP, the collection of physical samples will be documented with a V/FCN.

REQUESTED BY: Krista Flaugh Date: 11/14/05

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Frisk	11/16/05	X	PROJECT MANAGER: T. Chior	11/20/05
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	11/14/05
X	ANALYTICAL CUSTOMER SUPPORT:	11/14/05		RTIMP Manager	
X	WAO	11/16/05	X	SAMPLING MANAGER: T. Buhrage	11/21/05

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:

TAL D

Component	FRL	MDL
Technetium-99	30.0 pCi/g	2.9 pCi/g

TAL J

Component	FRL	MDL (Soil)
Heptachlorodibenzo-p-dioxin	830 ng/kg	83 ng/kg
Octachlorodibenzo-p-dioxin	8800 ng/kg	880 ng/kg

TAL M

Component	FRL	MDL
Total Uranium	82 mg/kg	8.2 mg/kg
Ra-226	1.7 pCi/g	0.17 pCi/g
Ra-228	1.8 pCi/g	0.18 pCi/g
Th-228	1.7 pCi/g	0.17 pCi/g
Th-232	1.5 pCi/g	0.15 pCi/g

TAL N

Component	FRL	MDL
Cs-137	1.4 pCi/g	0.14 pCi/g
Th-230	280 pCi/g	28 pCi/g

TAL O

Component	FRL	MDL
Antimony	10 mg/kg	1.0 mg/kg
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Cadmium	5.0 mg/kg	0.5 mg/kg
Silver	10 mg/kg	1.0 mg/kg
Fluoride	78,000 mg/kg	7800 mg/kg

TAL P

Component	FRL	MDL
Benzo(a)pyrene	1.0 mg/kg	0.1 mg/kg
Benzo(b)fluoranthene	1.0 mg/kg	0.1 mg/kg
Dibenzo(a,h)anthracene	0.088 mg/kg	0.0088 mg/kg
Indeno(1,2,3-cd)pyrene	1.0 mg/kg	0.1 mg/kg

TAL Q

Component	FRL	MDL
Aroclor-1254	0.13 mg/kg	0.013 mg/kg
Aroclor-1260	0.13 mg/kg	0.013 mg/kg
Dieldrin	150 mg/kg	15 mg/kg

TAL R

Component	FRL	MDL
1,1-Dichloroethene	0.41 mg/kg	0.041 mg/kg
1,2-Dichloroethene	0.16 mg/kg	0.016 mg/kg
Bromodichloromethane	4.0 mg/kg	0.4 mg/kg
Tetrachloroethene	3.6 mg/kg	0.36 mg/kg
Trichloroethene	25 mg/kg	2.5 mg/kg

ATTACHMENT 2

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	ASL	Matrix	Preserve	Hold Time	TAT*	Container[a]	Minimum Mass/Volume
Rads/Metals/PCBs/ SVOCs (TALs DMN/O/Q/P)	Gamma Spec, and LSC	D/E	Solid	Cool, 4° C	12 months	Prelim 10 days Final 30 days	Glass with Teflon-lined Lid	600 g (1500 g)[b]
	ICP or ICP/MS and ISE				6 months	10 days		
	GC				14 days	10 days		
	GC				14 days	10 days		
Dioxins (TAL J)	GC	D	Solids	Cool, 4° C	14 days	14 days	Glass with Teflon-lined lids	50 g (150 g)[b]
VOCs (TAL R)	GC/MS	D	Solid	Cool, 4° C	48 hours	10 days	3 x 1-Encore Sampler[b] plus 1 x 2-oz jar for % moisture	Each full Encore Sampler will hold approx. 5 g[b]
VOCs (TAL R)	GC/MS	D	Liquid (trip blank only)	H_2SO_4 pH<2 Cool, 4° C	14 days	10 days	3 x 40-ml glass with teflon-lined septa	120 ml (no headspace)

* Samples collected for VOC analysis should be shipped to an off-site laboratory within 24 hours of sample collection. As soon as the samples arrive at the laboratory where the analysis will take place, all samples should be prepared for analysis (including homogenization for non-VOC samples), and radiological samples should be sealed to begin the in-growth period for radium analysis. A 10-day turnaround time will be required for all non-radiological analytical data reporting. A 10-day turnaround time will be required for preliminary gamma radiological analytical data reporting followed by a 30 day TAT for the standard in growth gamma analysis and reporting.

[a]Sample container types may be changed at the direction of the Field Sampling Lead, as long as the volume requirements, container compatibility requirements, and SCQ requirements are met.

[b] At the direction of the Field Sampling Lead, triple the specified volume must be collected at one location in order for the contract laboratory to perform the required quality control analysis. The samples shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

GC/MS - gas chromatography mass spectroscopy
LSC - liquid scintillation counting
GC - gas chromatography
ISE - Ion Selective Electrode
ICP/MS - inductively coupled plasma/mass spectroscopy

Locaiton	Depth	Sample ID	TAL	Northing	Easting
A6E-P3-SWB-C1	0-0.5	A6E-P3-WB-C1^RMPS	DMNOPQ	481438.05	1346434.42
		A6E-P3-WB-C1^D	J		
		A6E-P3-WB-C1^L	R		
A6E-P3-SWB-C2	0-0.5	A6E-P3-WB-C2^RMPS	DMNOPQ	481550.18	1346445.29
		A6E-P3-WB-C2^D	J		
		A6E-P3-WB-C2^L	R		
A6E-P3-SWB-C3	0-0.5	A6E-P3-WB-C3-RMPS	DMNOPQ	481627.65	1346468.39
		A6E-P3-WB-C3^D	J		
		A6E-P3-WB-C3^L	R		
A6E-P3-SWB-C4	0-0.5	A6E-P3-WB-C4^RMPS	DMNOPQ	481688.14	1346530.88
		A6E-P3-WB-C4^D	J		
		A6E-P3-WB-C4^L	R		
A6E-P3-SWB-C5	0-0.5	A6E-P3-WB-C5-RMPS	DMNOPQ	481915.88	1346721.88
		A6E-P3-WB-C5^D	J		
		A6E-P3-WB-C5^L	R		
A6E-P3-SWB-C6	0-0.5	A6E-P3-WB-C6^RMPS	DMNOPQ	481912.15	1346789.03
		A6E-P3-WB-C6^D	J		
		A6E-P3-WB-C6^L	R		
A6E-P3-SWB-C7	0-0.5	A6E-P3-WB-C7^RMPS	DMNOPQ	481883.04	1346818.13
		A6E-P3-WB-C7^D	J		
		A6E-P3-WB-C7^L	R		
A6E-P3-SWB-C8	0-0.5	A6E-P3-WB-C8^RMPS	DMNOPQ	481965.9	1346745.01
		A6E-P3-WB-C8^D	J		
		A6E-P3-WB-C8^L	R		
A6E-P3-SWB-C9	0-0.5	A6E-P3-WB-C9^RMPS	DMNOPQ	481956.94	1346809.18
		A6E-P3-WB-C9^D	J		
		A6E-P3-WB-C9^L	R		
A6E-P3-SWB-C10	0-0.5	A6E-P3-WB-C10^RMPS	DMNOPQ	482006.21	1346794.26
		A6E-P3-WB-C10^D	J		
		A6E-P3-WB-C10^L	R		
A6E-P3-SWB-C11	0-0.5	A6E-P3-WB-C11^RMPS	DMNOPQ	481986.8	1346865.89
		A6E-P3-WB-C11^D	J		
		A6E-P3-WB-C11^L	R		
A6E-P3-SWB-C12	0-0.5	A6E-P3-WB-C12^RMPS	DMNOPQ	481423.61	1346497.52
		A6E-P3-WB-C12^D	J		
		A6E-P3-WB-C12^L	R		

Trip Blank ID
A6E-P3-SWB-L-TB

Where:

A6E = Area 6 Excavation
P3 = Waste Pit 3
WB = West Berm
C = Precertification
1, 2, etc = sequential sample location
R = Radiological
M = Metals
P = Pesticides/PCBs
S = Semi-VOCs
D = Dioxins
L = VOCs
TB = Trip Blank

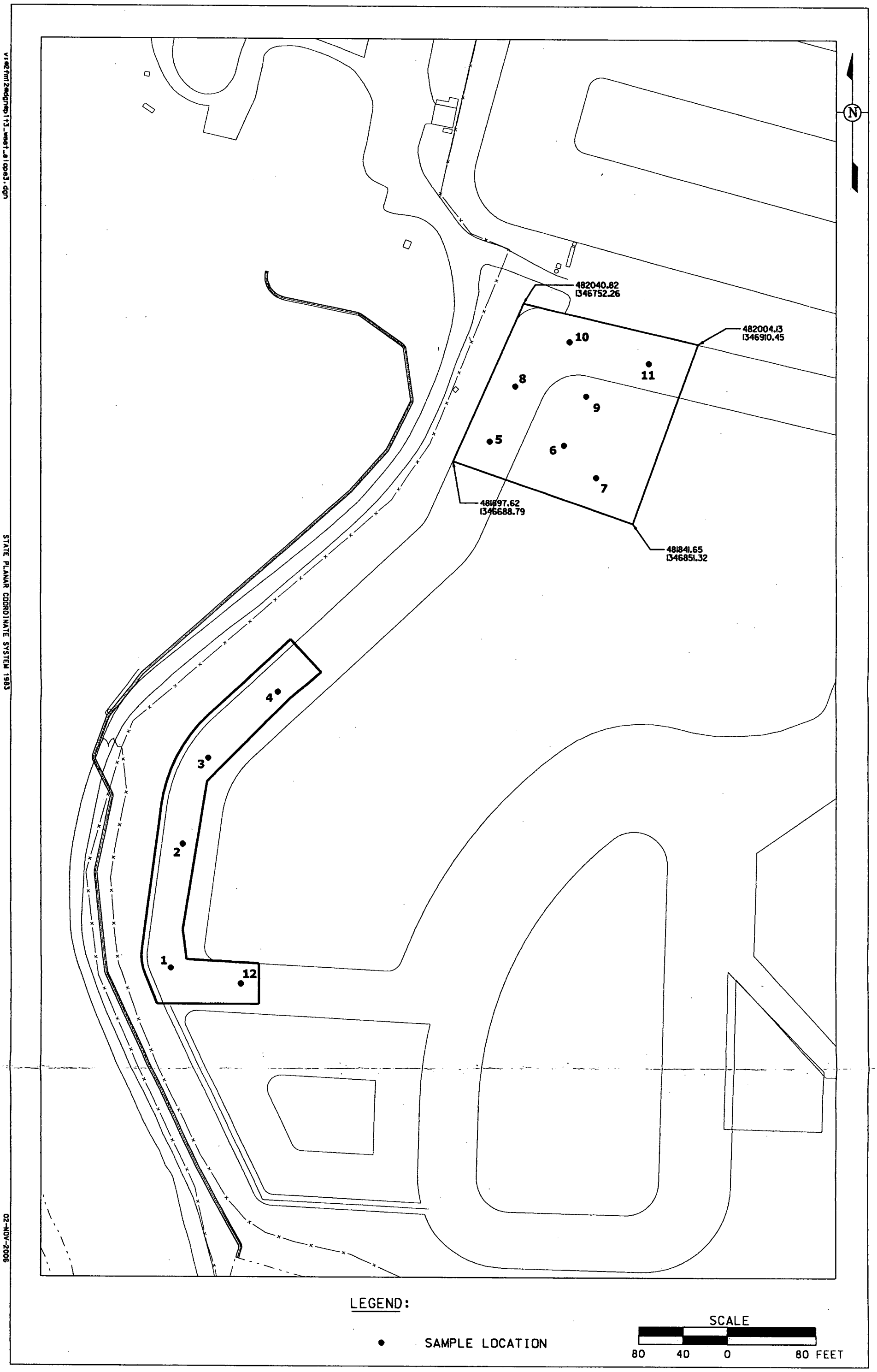

482040.82
1346752.26
482004.13
1346910.45
481897.62
1346688.79
481841.65
1346851.32
1
2
3
4
5
6
7
8
9
10
11
12
N
LEGEND:
SAMPLE LOCATION
SCALE
80 40 0 80 FEET
STATE PLANAR COORDINATE SYSTEM 1983
02-NOV-2006

FIGURE 1.

OhioEPA

State of Ohio Environmental Protection Agency

Southwest District Office

401 East Fifth Street
Dayton, Ohio 45402-2911

TELE: (937) 285-6357 FAX: (937) 285-6404

Bob Taft, Governor
Maureen O'Connor, Lt. Governor
Christopher Jones, Director

MEMO

TO: J.D. Chiou

FROM: Michelle Waller

DATE: November 17, 2005

SUBJECT: **V/FCN 20600-PSP-0016-41** for *PSP for Excavation Control and Precertification of Area 6 Waste Pits and General Area*

This V/FCN documents the collection of 12 surface samples to verify the FRL status of 2 soil areas in Waste Pit 3. Ohio EPA approves this variance.

Q:\femp\ou5\A6\area6wastepitsandgeneralarea\pspexcntroVFCN1.wpd

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0016-44
WBS NO.: PROJECT/DOCUMENT/ECDC # 20600-PSP-0016 Rev.0		Page: 1 of 5
PROJECT TITLE: Project Specific Plan For Excavation Control And Precertification of the Area 6 Waste Pits and General Area		Date: 11/22/05

VARIANCE / FIELD CHANGE NOTICE (Include justification):

EXCAVATION CONTROL SAMPLING

This Variance/Field Change Notice (V/FCN) documents the collection of grab soil samples for precertification on the outside berm (west side) of southwest sidewall of Waste Pit 3. See Figure 1. Samples will be collected for all of the Area 6 Area Specific Constituents of Concern (ASCOCs) from 5 locations. This sampling will coincide with the sampling of V/FCN 20600-PSP-0016-41 as the samples from that variance are in the inside slopes of Waste Pit 3 and the samples from this V/FCN area from the outside of Waste Pit 3.

See Attachment 1 for the TALs, Attachment 2 for the Sampling and Analytical Requirements, and Attachment 3 for the sample identifiers.

Surveying Required: Yes, the locations will be surveyed prior to sampling.
Field QC samples required: Yes, one trip blank will be collected for TAL R.
Field validation required: Yes
Analytical data validation required: Yes. VSL D
Data package requirements: ASL D Package
Historical data for shipping: Total Uranium = 2450 mg/kg from boring A6WP-3F-02

Justification:
The base of the slope in the southwest corner of Waste Pit 3 is known to be contaminated; however when the area is excavated it will create an unsafe condition resulting in the need to excavate the entire slope. The base of the slope will be taken to the OSDF and the top of the slope will be moved to the northwest corner of Waste Pit 3. This additional excavation outside of the know contamination area (top of slope) has been shown to pass the Real Time Phase I precertification requirements; therefore these samples are being taken to verify that the soil meets all applicable FRLs in order to stage this material in the northwest corner of Waste Pit 3.

Per Section 1.3 of the PSP, the collection of physical samples will be documented with a V/FCN.

REQUESTED BY: Krista Flaugh Date: 11/22/05

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Frisk	11/22/05	X	PROJECT MANAGER: J.D. Chiou	11/22/05
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	11/22/05
X	ANALYTICAL CUSTOMER SUPPORT:	11/29/05		RTIMP Manager	
X	WAC	12/12/05	X	SAMPLING MANAGER: T. Burlage	11/22/05

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:

TAL D

Component	FRL	MDL
Technetium-99	30.0 pCi/g	2.9 pCi/g

TAL J

Component	FRL	MDL (Soil)
Heptachlorodibenzo-p-dioxin	830 ng/kg	83 ng/kg
Octachlorodibenzo-p-dioxin	8800 ng/kg	880 ng/kg

TAL M

Component	FRL	MDL
Total Uranium	82 mg/kg	8.2 mg/kg
Ra-226	1.7 pCi/g	0.17 pCi/g
Ra-228	1.8 pCi/g	0.18 pCi/g
Th-228	1.7 pCi/g	0.17 pCi/g
Th-232	1.5 pCi/g	0.15 pCi/g

TAL N

Component	FRL	MDL
Cs-137	1.4 pCi/g	0.14 pCi/g
Th-230	280 pCi/g	28 pCi/g

TAL O

Component	FRL	MDL
Antimony	10 mg/kg	1.0 mg/kg
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Cadmium	5.0 mg/kg	0.5 mg/kg
Silver	10 mg/kg	1.0 mg/kg
Fluoride	78,000 mg/kg	7800 mg/kg

TAL P

Component	FRL	MDL
Benzo(a)pyrene	1.0 mg/kg	0.1 mg/kg
Benzo(b)fluoranthene	1.0 mg/kg	0.1 mg/kg
Dibenzo(a,h)anthracene	0.088 mg/kg	0.0088 mg/kg
Indeno(1,2,3-cd)pyrene	1.0 mg/kg	0.1 mg/kg

TAL Q

Component	FRL	MDL
Aroclor-1254	0.13 mg/kg	0.013 mg/kg
Aroclor-1260	0.13 mg/kg	0.013 mg/kg
Dieldrin	150 mg/kg	15 mg/kg

TAL R

Component	FRL	MDL
1,1-Dichloroethene	0.41 mg/kg	0.041 mg/kg
1,2-Dichloroethene	0.16 mg/kg	0.016 mg/kg
Bromodichloromethane	4.0 mg/kg	0.4 mg/kg
Tetrachloroethene	3.6 mg/kg	0.36 mg/kg
Trichloroethene	25 mg/kg	2.5 mg/kg

ATTACHMENT 2

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	ASL	Matrix	Preserve	Hold Time	TAT*	Container[a]	Minimum Mass/Volume
Rads/Metals/PCBs/ SVOCs (TALs DMN/O/Q/P)	Gamma Spec, Alpha Spec, and LSC	D/E	Solid	Cool, 4° C	12 months	Prelim 10 days Final 30 days	Glass with Teflon-lined Lid	600 g (1500 g)[b]
	ICP or ICP/MS and ISE				6 months	10 days		
	GC				14 days	10 days		
	GC				14 days	10 days		
Dioxins (TAL J)	GC	D	Solids	Cool, 4° C	14 days	14 days	Glass with Teflon-lined lids	50 g (150 g)[b]
VOCs (TAL R)	GC/MS	D	Solid	Cool, 4° C	48 hours	10 days	3 x 1-Encore Sampler[b] plus 1 x 2-oz jar for % moisture	Each full Encore Sampler will hold approx. 5 g[b]
VOCs (TAL R)	GC/MS	D	Liquid (trip blank only)	H_2SO_4 pH<2 Cool, 4° C	14 days	10 days	3 x 40-ml glass with teflon-lined septa	120 ml (no headspace)

* Samples collected for VOC analysis should be shipped to an off-site laboratory within 24 hours of sample collection. As soon as the samples arrive at the laboratory where the analysis will take place, all samples should be prepared for analysis (including homogenization for non-VOC samples), and radiological samples should be sealed to begin the in-growth period for radium analysis. A 10-day turnaround time will be required for all non-radiological analytical data reporting. A 10-day turnaround time will be required for preliminary gamma radiological analytical data reporting followed by a 30 day TAT for the standard in growth gamma analysis and reporting.

[a]Sample container types may be changed at the direction of the Field Sampling Lead, as long as the volume requirements, container compatibility requirements, and SCQ requirements are met.

[b] At the direction of the Field Sampling Lead, triple the specified volume must be collected at one location in order for the contract laboratory to perform the required quality control analysis. The samples shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

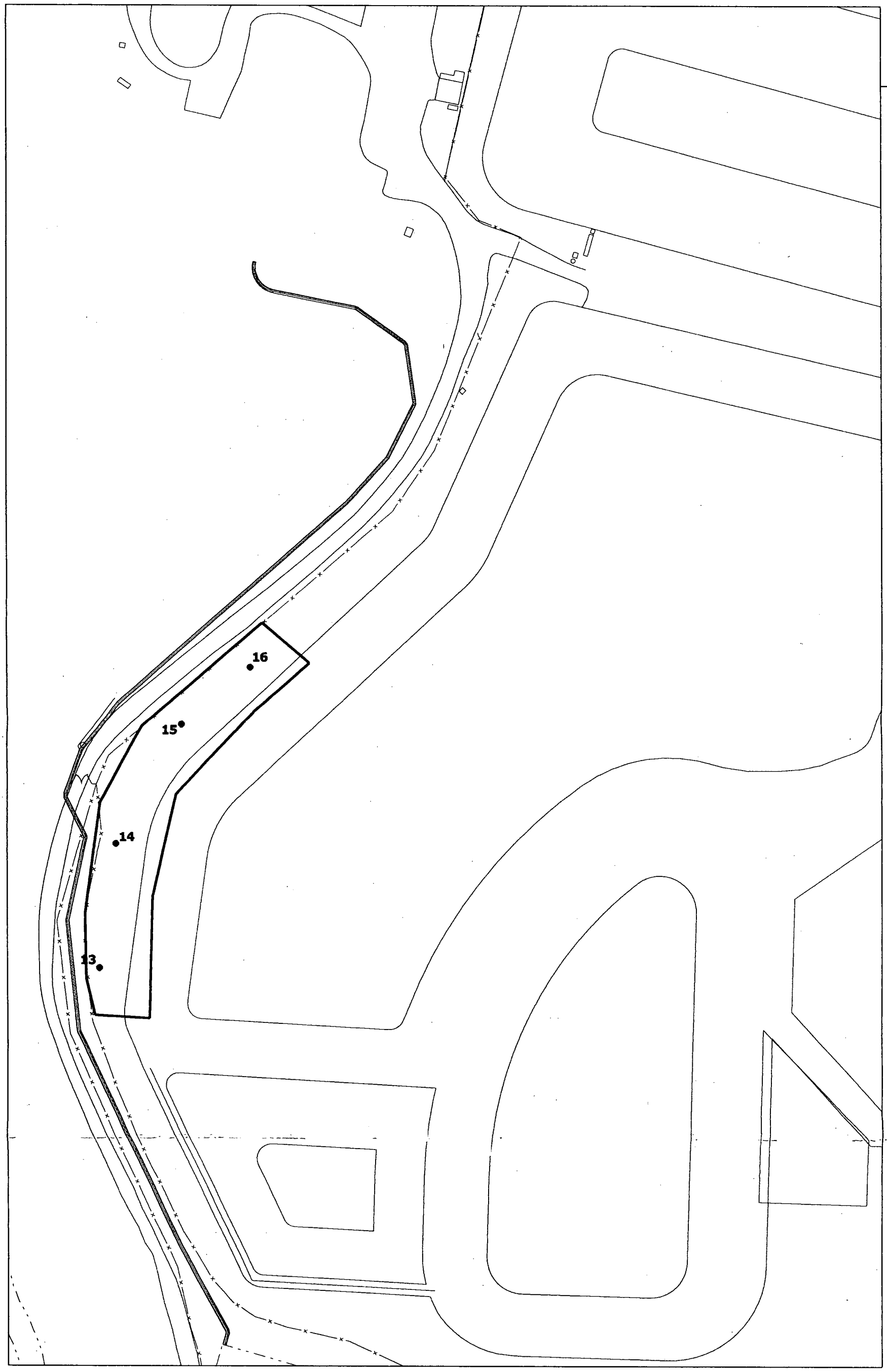
GC/MS - gas chromatography mass spectroscopy
LSC - liquid scintillation counting
GC - gas chromatography
ISE - Ion Selective Electrode
ICP/MS - inductively coupled plasma/mass spectroscopy

Locaiton	Depth	Sample ID	TAL	Northing	Easting
A6E-P3-WB-C13	0-0.5	A6E-P3-WB-C13^RMPS	DMNOPQ	481485.62	1346392.98
		A6E-P3-WB-C13^D	J		
		A6E-P3-WB-C31^L	R		
A6E-P3-WB-C14	0-0.5	A6E-P3-WB-C14^RMPS	DMNOPQ	481588.24	1346406.57
		A6E-P3-WB-C14^D	J		
		A6E-P3-WB-C14^L	R		
A6E-P3-WB-C15	0-0.5	A6E-P3-WB-C15-RMPS	DMNOPQ	481686.78	1346460.24
		A6E-P3-WB-C15^D	J		
		A6E-P3-WB-C15^L	R		
A6E-P3-WB-C16	0-0.5	A6E-P3-WB-C16^RMPS	DMNOPQ	481734.35	1346516.62
		A6E-P3-WB-C16^D	J		
		A6E-P3-WB-C16^L	R		

Trip Blank ID
A6E-P3-WB-L-TB#

Where:

A6E = Area 6 Excavation
P3 = Waste Pit 3
WB = West Berm
C = Precertification
1, 2, etc = sequential sample location
R = Radiological
M = Metals
P = Pesticides/PCBs
S = Semi-VOCs
D = Dioxins
L = VOCs
TB = Trip Blank
# = sequential trip blank number



LEGEND:

• SAMPLE LOCATION

SCALE

80 40 0 80 FEET

FIGURE 1.

STATE PLANAR COORDINATE SYSTEM 1983

02-NOV-2005

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APPENDIX B.2

VARIANCE/FIELD CHANGE NOTICES FOR THE CERTIFICATION DESIGN LETTER AND CERTIFICATION PSP FOR AREA 6 WASTE PITS 1, 2, AND 3, THE BURN PIT, THE CLEARWELL, AND THE AREAS WEST AND NORTH OF THE WASTE PITS

VARIANCE/FIELD CHANGE NOTICE LOG FOR CERTIFICATION DESIGN LETTER AND CERTIFICATION PROJECT SPECIFIC PLAN FOR AREA 6 WASTE PITS 1, 2, AND 3, THE BURN PIT, THE CLEARWELL, AND THE AREAS WEST AND NORTH OF THE WASTE PITS

Variance No.	Variance Date	Variance Description	Significant? (Y or N)	Date Signed	Date Distributed	EPA/OEPA Approval
20600-PSP-0019-1	4/13/06	Documents the collection of a total uranium sample in CU 17, sub-CU 11 following the excavation of above-FRL soil.	N	4/24/06	7/17/06	N/A
20600-PSP-0019-2	4/21/06	Documents the collection of samples for total uranium and PCBs in CU12, sub-CU 11 following the excavation of above-FRL soil.	N	4/26/06	7/17/06	N/A
20600-PSP-0019-3	4/21/06	Documents the collection of samples for radionuclides in CU12, sub-CU 12 following the excavation of above-FRL soil	N	5/17/06	7/17/06	N/A
20600-PSP-0019-4	4/26/06	Documents the collection of samples for total uranium in CU21, sub-CU 15 following the excavation of above-FRL soil.	N	5/17/06	7/17/06	N/A
20600-PSP-0019-5	4/26/06	Documents the collection of samples for total uranium from 3 sub-CUs in CU19 following the excavation of above-FRL soil and from 2 archive locations.	N	5/17/06	7/17/06	N/A
20600-PSP-0019-6	4/26/06	Documents the collection of a total uranium samples in CU 12, sub-CUs 13 and 18 following the excavation of above-FRL soil.	N	5/17/06	7/17/06	N/A
20600-PSP-0019-7	4/26/06	Documents the collection of a technetium-99 samples in CU 13, sub-CUs 1 and 13 following the excavation of above-FRL soil.	N	5/17/06	7/17/06	N/A
20600-PSP-0019-8	5/23/06	Documents the collection of samples in CU 19 following the excavation of soil with above-FRL for total uranium in sub-CU 13 at location A6WP-C19-20.	N	6/1/06	7/17/06	N/A
20600-PSP-0019-9	5/26/06	Documents the collection of samples in CU 13 following the excavation of soil with above-FRL results for total uranium in sub-CU A6WP-C13-4.	N	6/14/06	7/17/06	N/A

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-1
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 1 of 3
OJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/13/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance documents the collection of two total uranium (TAL K) samples in CU 17 following the excavation of a result of greater than 2 x FRL (205 mg/kg) in sub-CU A6WP-C17-11. See Figure 1.

CU 17 encompasses the entire Burn Pit and sub-CU 11 is on the southern end of the floor. Due to the topography of this area, it is unsafe for pedestrian traffic, preventing the typical bounding approach. Therefore, an area of approximately 5'x5' will be excavated around A6WP-C17-11 to remove the known contamination and two samples will be collected from the excavator bucket within this sub-CU for total uranium (TAL K) to investigate for the presence of residual contamination. One sample will be collected from the original sample location where the area was excavated and one sample will be collected from an additional random location within the sub-CU.

The Sampling and Analytical Requirements, TAL K, and the sample identifiers are on Attachment 1.

Surveying required: Yes. Surveyors will survey these locations prior to sampling

Justification:
The total uranium result from A6WP-C17-11 was 205 mg/kg, which is greater than 2 x FRL of 82 mg/kg and is therefore considered a hot spot. Following the excavation of this location, it is necessary to collect samples from the original location and from another random location within the same sub-CU to ensure that the hot spot has been removed.

REQUESTED BY: Krista Flaugh Date: 4/13/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	4-21-06	X	PROJECT MANAGER J.D Chiou	4/21/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER F. Miller	4/13/06
X	ANALYTICAL CUSTOMER SUPPORT	4/19/06		RTIMP Manager	
	WAD		X	Sampling Manager: T. Bourlage for TEB	4/13/06

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

DISTRIBUTION

JECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
ALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Sample Matrix	ASL	TAT	Preservative	Container	Minimum Volume/Mass
A	Gamma Spec.	solid	D	24 hr*	none	Appropriate glass or plastic container	300 g

* CofA due in 24 hours. ASL D package due in 7 days.

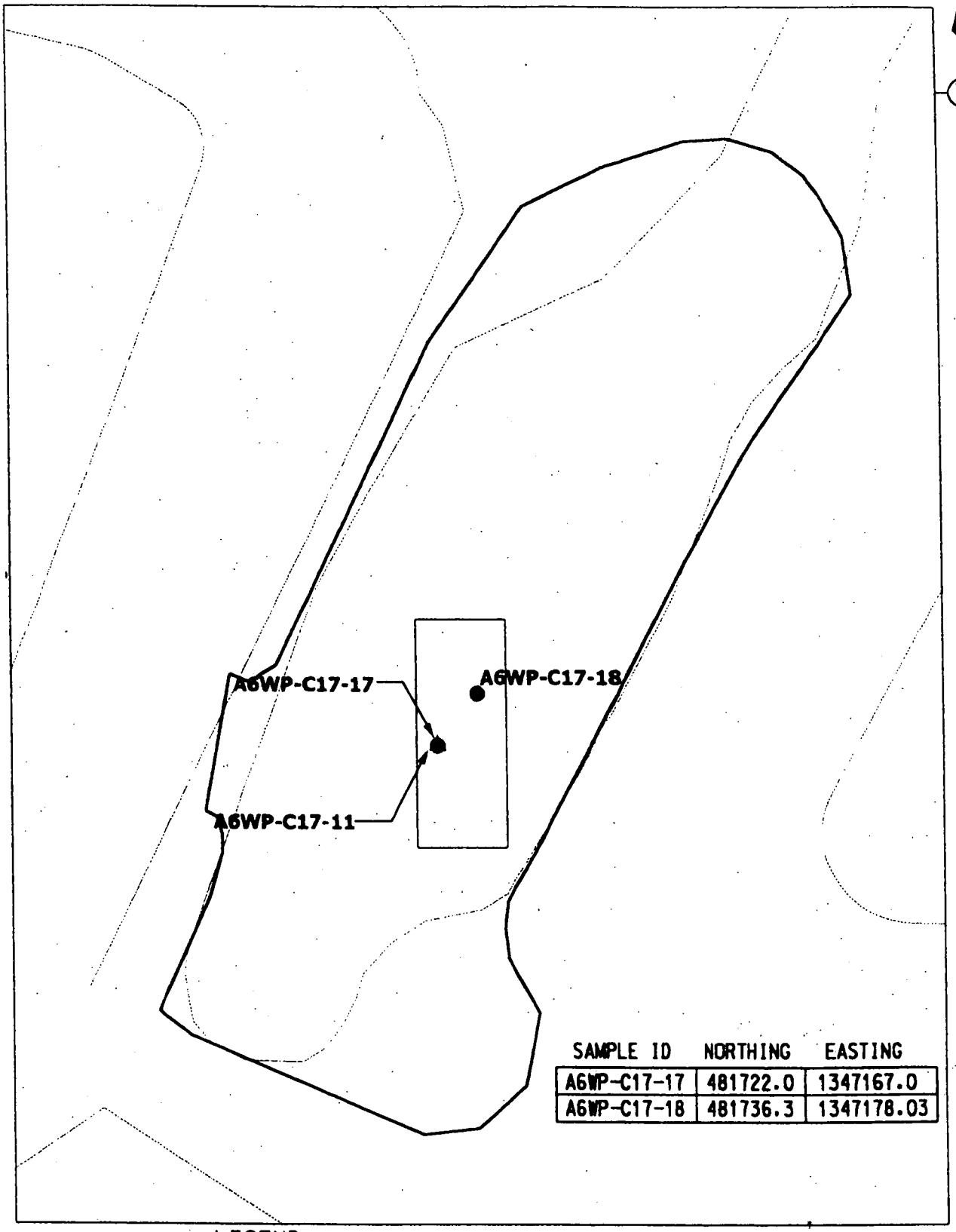
Special Instructions:
No field QC wil be collected under this V/FCN.
Analytical Data Validation is required at VSL D
Data Package Requirement - ASL D
Historical Data for Shipping is 205 mg/kg total uranium from boring A6WP-C17-11

TAL 20600-PSP-0019-K
(2 soil analysis specified in V/FCN)

Component	FRL	MDL (Soil)
Total Uranium	82 mg/kg	8.2 mg/kg

SAMPLE IDENTIFIERS

CU	Locaiton	Depth (feet)	Sample ID	TAL	Northing	Easting	Description
17	CU17-17	0-0.5	A6WP-C17-17^R	K	481722	1347167	Original Location (A6WP-C17-11)
17	CU17-18	0-0.5	A6WP-C17-18^R	K	481736.3	1347178.03	Random Location



SAMPLE ID	NORTHING	EASTING
A6WP-C17-17	481722.0	1347167.0
A6WP-C17-18	481736.3	1347178.03

LEGEND:

▲ ABOVE-FRL SAMPLE

● PROPOSED SAMPLE

SCALE

40 20 0 40 FEET

DRAFT

FIGURE 1.

STATE PLANAR COORDINATE SYSTEM 1983

13-APR-2006

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-2
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 1 of 4
OJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/21/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance documents the collection of six total uranium (TAL K) and PCB (TAL L) samples in CU 12, following the excavation of results greater than 2 x FRL for aroclor-1254 (692 ug/kg) and aroclor-1260 (506 ug/kg) and above-FRL for total uranium (125 mg/kg) in sub-CU A6WP-C12-11. See Figure 1.

CU 12 encompasses the southeast quadrant of Waste Pit 3. An area of approximately 10'x10' was excavated around A6WP-C12-11 to remove the known contamination. Five samples (one at the original location, and one at each side of the excavation area to the north, south, east, and west) will be collected from the excavated area for TALs K and L to investigate the presence of residual contamination. Additionally, one sample will be collected from an additional random location within the sub-CU. The original location and the random location will be surveyed prior to sampling and the four "bounding" sample locations will be field located by the Field Sampling Lead and will be surveyed after sampling.

The Sampling and Analytical Requirements and TALs K and L are on Attachment 1 and the sample identifiers are on Attachment 2.

Surveying required: Yes. Surveyors will survey the original location and the random location prior to sampling and then vey the four field locations after sampling.

Justification:
The aroclor-1254 and aroclor-1260 results were greater than 2 x FRL and the total uranium result was greater than 1 x FRL at A6WP-C12-11. Because the aroclor-1254 and aroclor-1260 results were greater than 2 x FRL, this was considered a hot spot and was excavated. Following the excavation of this location, it is necessary to collect samples from the original location, from four bounding locations, and from another random location within the same sub-CU to ensure that the hot spot has been removed.

REQUESTED BY: Krista Flaugh Date: 4/21/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Frisk	4-24-06	X	PROJECT MANAGER: J.D. Chiou	4/24/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	4/21/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul S. McMorgan	4/26/06		RTIMP Manager	
	WAO		X	Sampling Manager: T. Bubriage for TGB	4/25/06

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

DISTRIBUTION

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

ATTACHMENT 1

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Sample Matrix	ASL	TAT	Preservative	Container	Minimum Volume/Mass
K	Gamma Spec.	solid	D	24 hr[a]	Cool, 4 degrees C	Glass with Teflon lined lid or pastic push tubes	400 g (1000g)[b]
L	GC			7 days			

[a] CofA due in 24 hours. ASL D package due in 7 days.

[b] At the direction of theField Sampling Lead, triple the specified volume must be collected for all samples at one location for the contract laboratory to perform the required quality control analyis. The sample shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

Special Instructions:
No field QC wil be collected under this V/FCN.
Analytical Data Validation is required at VSL D
Data Package Requirement - ASL D
Historical Data for Shipping is 125 mg/kg total uranium from boring A6WP-C12-11

TAL 20600-PSP-0019-K
(6 soil analysis specified in V/FCN)

Component	FRL	MDL (Soil)
Total Uranium	82 mg/kg	8.2 mg/kg

TAL 20600-PSP-0019-L
(6 soil analysis specified in V/FCN)

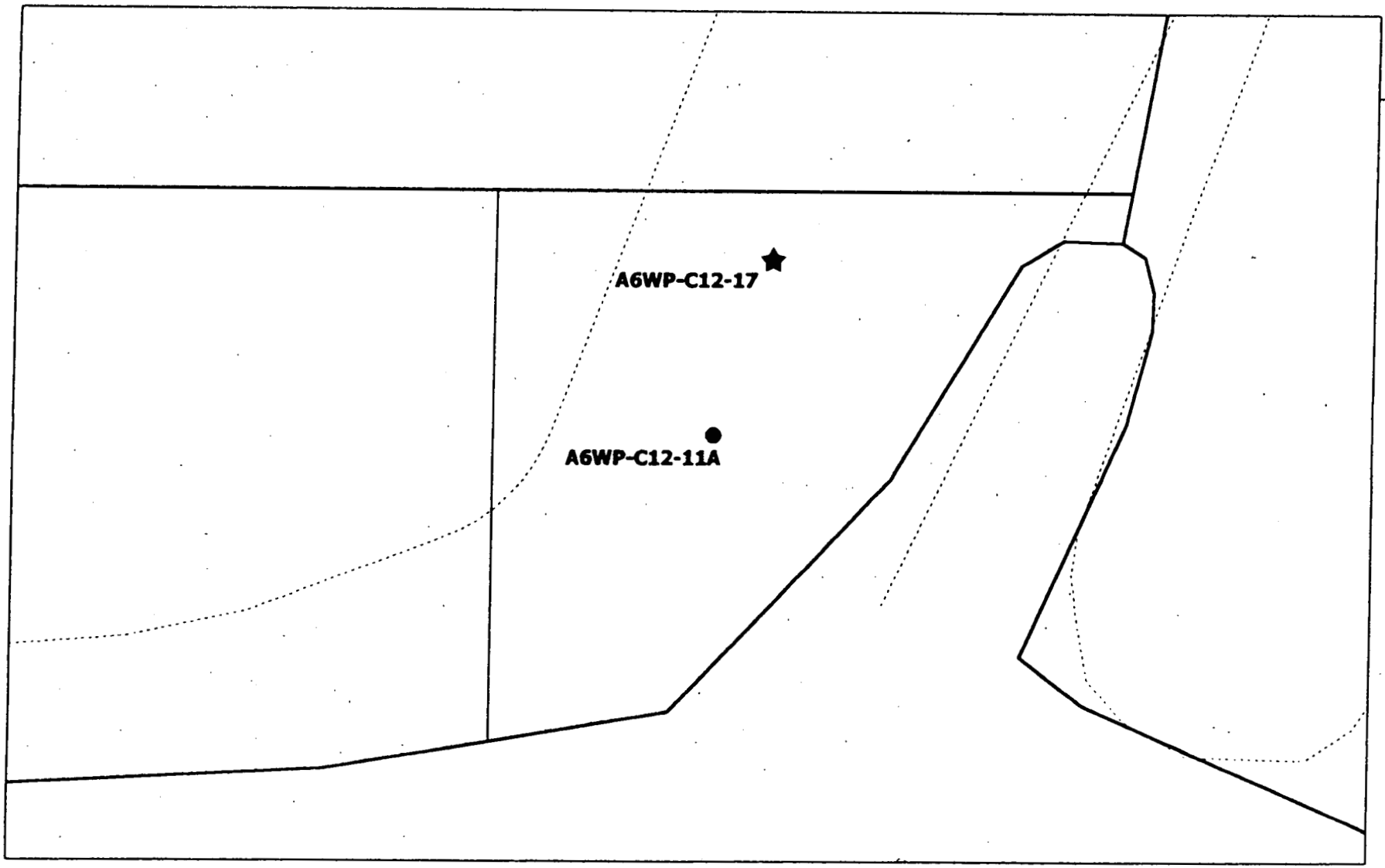
Component	FRL	MDL (Soil)
Aroclor-1254	130 ug/kg	13 ug/kg
Aroclor-1260	130 ug/kg	13 ug/kg

ATTACHMENT 2

SAMPLE IDENTIFIERS

CU	Locaiton	Depth (feet)	Sample ID	TAL	Northing	Easting	Description
12	CU12-11A	0-0.5	A6WP-C12-11A^RP	KL	481677.902	1347048.486	Second Sample (after excavation) at the Original Location (A6WP-C12-11)
12	CU12-11A-N	0-0.5	A6WP-C12-11A-N^RP	KL	TBD	TBD	North of the Excavated Location
12	CU12-11A-S	0-0.5	A6WP-C12-11A-S^RP	KL	TBD	TBD	South of the Excavated Location
12	CU12-11A-E	0-0.5	A6WP-C12-11A-E^RP	KL	TBD	TBD	East of the Excavated Location
12	CU12-11A-W	0-0.5	A6WP-C12-11A-W^RP	KL	TBD	TBD	West of the Excavated Location
12	CU12-17	0-0.5	A6WP-C12-17^RP	KL	481701.19	1347056.19	New Random Location

where: A6WP = Area 6 Waste Pits
C12 = Certification Unit 12
11 = sub-CU 11 (sample location 11)
A = Second Sampling at Location 11
N = North of 11A
S = South of 11A
E = East of 11A
W = West of 11A
17 = next consecutive sample location in CU 12
R = radiological
P = PCBs



LEGEND:

● ORIGINAL SAMPLE LOCATION

★ RANDOM SAMPLE LOCATION

SCALE

20 10 0 20 FEET

DRAFT

V:\62fm12\dgn\ _cu_12_11.dgn
STATE PLANAR (IATE SYSTEM 1983

20-APR-2006

FIGI 1.

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-3
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 1 of 4
OJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/21/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance documents the collection of six samples in CU 12, following the excavation of results greater than 2 x FRL for thorium-228 (3.51 pCi/g) and thorium-232 (3.41 pCi/g) and above-FRL results for total uranium (142 mg/kg), radium-226 (1.84 pCi/g), and radium-228 (3.41 pCi/g), in sub-CU A6WP-C12-12. See Figure 1.

CU 12 consists of the southeast corner of Waste Pit 3, which was the ramp coming out of the Waste Pits. An area of approximately 10'x10' was excavated around A6WP-C12-12 to remove the known contamination. Five samples (one at the original location, and one at each side of the excavation area to the north, south, east, and west) will be collected from the excavated area for TAL A to investigate the presence of residual contamination. Additionally, one sample will be collected from an additional random location within the sub-CU. The original location and the random location will be surveyed prior to sampling and the four "bounding" sample locations will be field located by the Field Sampling Lead and will be surveyed after sampling.

The Sampling and Analytical Requirements and TAL A are on Attachment 1 and the sample identifiers are on Attachment 2.

Surveying required: Yes. Surveyors will survey the original location and the random location prior to sampling and then vey the four field locations after sampling.

Justification:
The thorium-228 and thorium-232 results were greater than 2 x FRL and the total uranium, radium-226, and radium-228 results were greater than 1 x FRL at A6WP-C12-12. Because the thorium-228 and thorium-232 results were greater than 2 x FRL, this was considered a hot spot and was excavated. Following the excavation of this location, it is necessary to collect samples from the original location, from four bounding locations, and from another random location within the same sub-CU to ensure that the hot spot has been removed.

REQUESTED BY: Krista Flaugh Date: 4/21/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	5-1-06	X	PROJECT MANAGER: J.D. Chion	4/28/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	4/28/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul McSurgan	4/28/06		RTIMP Manager	
	WAO		X	Sampling Manager T. Eberlage Mike Frank for TB	5-17-06

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

DISTRIBUTION

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

ATTACHMENT 1

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Sample Matrix	TAT	ASL	Preservative	Container	Minimum Volume/Mass
A	Gamma Spec.	solid	Preliminary gamma 3 days[a] Final Gamma 30 days	D	None	Appropriate Plastic or Glass	300 g (900g)[b]

[a] PEDD due in 3 days (2 day in-growth) at ASL B

[b] At the direction of theField Sampling Lead, triple the specified volume must be collected for all samples at one location for the contract laboratory to perform the required quality control analyis. The sample shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

Special Instructions:
No field QC wil be collected under this V/FCN.
Analytical Data Validation is required
Data Package Requirement - ASL D
Historical Data for Shipping is 142 mg/kg total uranium from boring A6WP-C12-12

TAL 20600-PSP-0019-A
(6 soil analysis specified in V/FCN)

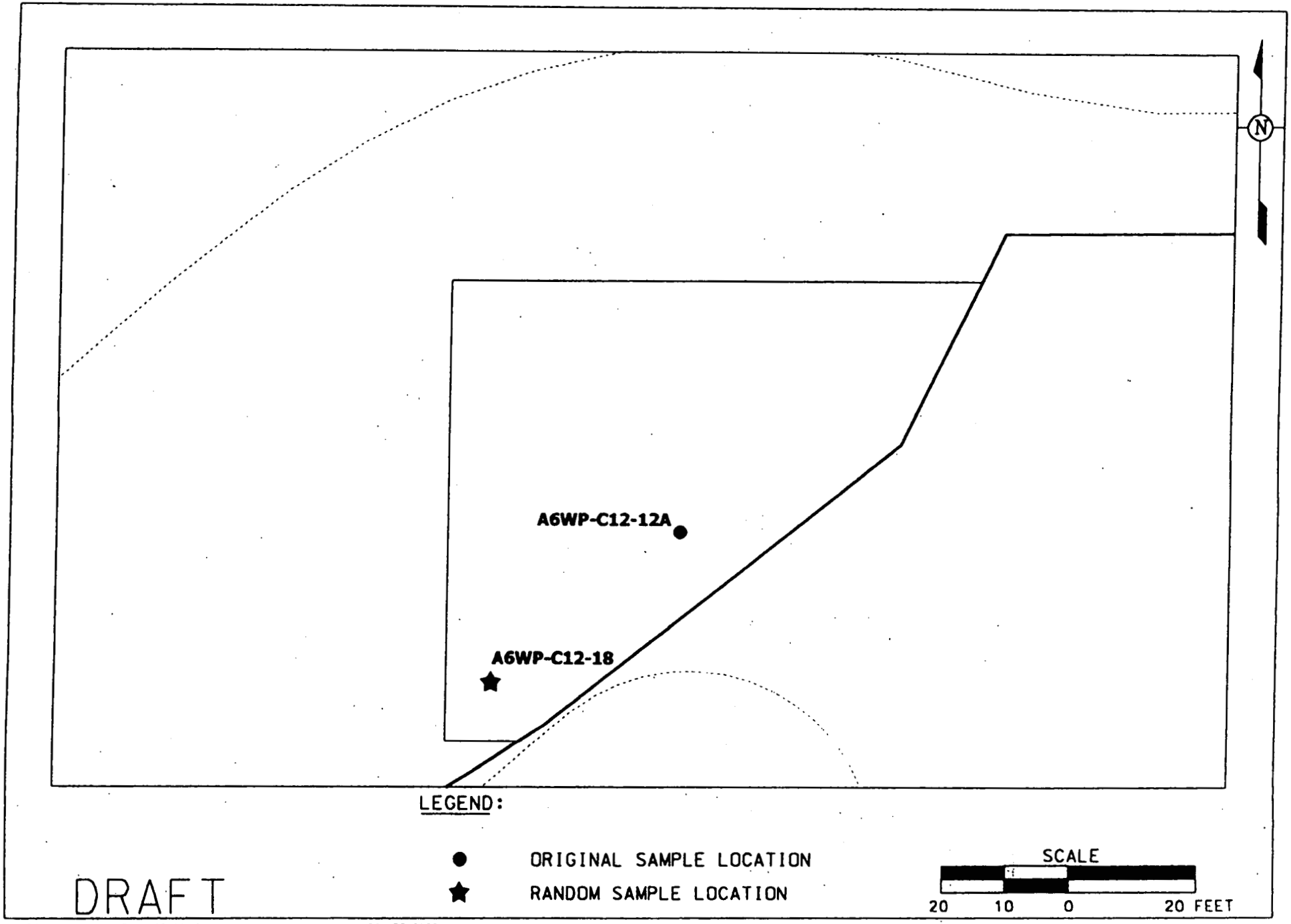
Component	FRL	MDL (Soil)
Total Uranium	82 mg/kg	8.2 mg/kg
Radium-226	1.7 pCi/g	0.17 pCi/g
Radium-28	1.8 pCi/g	0.18 pCi/g
Thorium-228	1.7 pCi/g	0.17 pCi/g
Thorium-232	1.5 pCi/g	0.15 pCi/g

ATTACHMENT 2

SAMPLE IDENTIFIERS

CU	Locaiton	Depth (feet)	Sample ID	TAL	Northing	Easting	Description
12	CU12-12A	0-0.5	A6WP-C12-12A^R	A	481583.83	1346850.743	Second Sample (after excavation) at the Original Location (A6WP-C12-12)
12	CU12-12A-N	0-0.5	A6WP-C12-12A-N^R	A	TBD	TBD	North of the Excavated Location
12	CU12-12A-S	0-0.5	A6WP-C12-12A-S^R	A	TBD	TBD	South of the Excavated Location
12	CU12-12A-E	0-0.5	A6WP-C12-12A-E^R	A	TBD	TBD	East of the Excavated Location
12	CU12-12A-W	0-0.5	A6WP-C12-12A-W^R	A	TBD	TBD	West of the Excavated Location
12	CU12-18	0-0.5	A6WP-C12-18^R	A	481560.44	1346821.35	New Random Location

where: A6WP = Area 6 Waste Pits
C12 = Certification Unit 12
12 = sub-CU 11 (sample location 12)
A = Second Sampling at Location 12
N = North of 12A
S = South of 12A
E = East of 12A
W = West of 12A
18 = next consecutive sample location in CU 12
R = radiological



STATE PLANAR / DATE SYSTEM 1983 20-APR-2006

FIGURE 2.

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-4
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 1 of 3
PROJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/26/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance documents the collection of two total uranium (TAL K) samples in CU 21 following the excavation of a result of greater than 2 x FRL (243 mg/kg) in sub-CU A6WP-C21-15. See Figure 1.

CU 21 is located north and west of Waste Pit 5. An area of approximately 10'x10' was excavated around this location to remove the known contamination. Five samples (one at the original location and one at each side of the excavation area to the north, south, east, and west) will be collected from the excavated area for TAL K to investigate the presence of residual contamination. Additionally, one sample will be collected from an additional random location within this sub-CU. The original location and the random location will be surveyed prior to sampling and the four bounding sample locations will be field located by the Field Sampling Lead and will be surveyed after sampling.

The Sampling and Analytical Requirements, TAL K, and the sample identifiers are on Attachment 1.

Surveying required: Yes. Surveyors will survey the original location and the random location prior to sampling and then survey the four field location after sampling.

Justification:
The total uranium result from A6WP-C21-15 was 243 mg/kg, which is greater than 2 x FRL of 82 mg/kg and is therefore considered a hot spot. Following the excavation of this location, it is necessary to collect samples from the original location, from four bounding locations, and from another random location within the same sub-CU to ensure that the hot spot has been removed and that this sub-CU is adequately investigated and represented.

REQUESTED BY: Krista Flaugh Date: 4/25/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: K. Fiske	5-1-06	X	PROJECT MANAGER: J.D. Chion	4/28/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	4/26/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul McSwigan	4/28/06		RTIMP Manager	
	WAO		X	Sampling Manager / Designee: Mike Frank for TB	5-17-06

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:

ATTACHMENT 1

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Sample Matrix	ASL	TAT	Preservative	Container	Minimum Volume/Mass
K	Gamma Spec.	solid	D	24 hr[a]	None	Glass with Teflon lined lid or plastic push tubes	300 g (900g)[b]

[a] CofA due in 24 hours. ASL D package due in 7 days.

[b] At the direction of theField Sampling Lead, triple the specified volume must be collected for all samples at one location for the contract laboratory to perform the required quality control analyis. The sample shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

Special Instructions:
No field QC will be collected under this V/FCN.
Analytical Data Validation is required.
Analytical Data Validation is required.
Historical Data for Shipping is 243 mg/kg total uranium from boring A6WP-C21-15

TAL 20600-PSP-0019-K
(6 soil analysis specified in V/FCN)

Component	FRL	MDL (Soil)
Total Uranium	82 mg/kg	8.2 mg/kg

SAMPLE IDENTIFIERS

CU	Locaiton	Depth (feet)	Sample ID	K	Northing	Easting	Description
21	CU21-15A	0-0.5	A6WP-C21-15A^R	K	482128.03	1347560	Second Sample (after excavation) at the Original Location (A6WP-C21-15)
21	CU21-15A-N	0-0.5	A6WP-C21-15A-N^R	K	TBD	TBD	In excavated area north of A6WP-C21-15A
21	CU21-15A-S	0-0.5	A6WP-C21-15A-S^R	K	TBD	TBD	In excavated area south of A6WP-C21-15A
21	CU21-15A-E	0-0.5	A6WP-C21-15A-E^R	K	TBD	TBD	In excavated area east of A6WP-C21-15A
21	CU21-15A-W	0-0.5	A6WP-C21-15A-W^R	K	TBD	TBD	In excavated area west of A6WP-C21-15A
21	CU21-17	0-0.5	A6WP-C21-17^R	K	482139	1347576.39	New Random Location

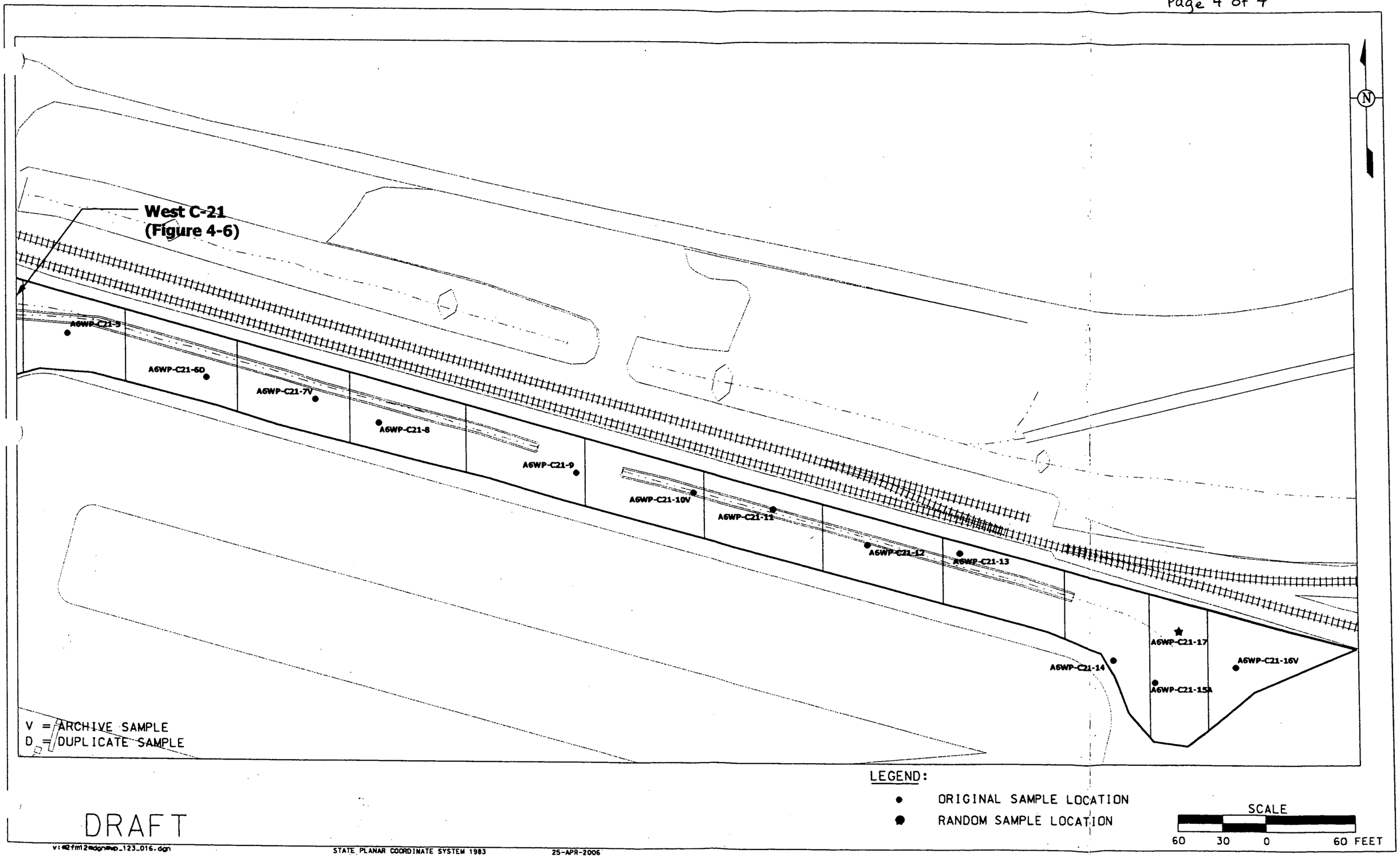


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FIGURE 1.

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-5
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 2 of 5
PROJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/26/06

Justification:

The total uranium result in sub-CU A6WP-C19-11 was greater than 2 x FRL. Because the total uranium result was greater than 2 x FRL, this was considered a hot spot and was excavated. Following the excavation of this location, it is necessary to collect samples from the original location, from four bounding locations, and from another random location within the same sub-CU to ensure that the hot spot has been removed and to ensure this sub-CU is adequately represented.

Preliminary statistics indicated that Certification Unit 19 would fail for total uranium with the UCL on the mean being greater than the FRL due to extreme variability of the data. Therefore, the two areas where the above-FRL samples were collected (A6WP-C19-7 and A6WP-C19-13) were excavated to remove the contamination. Following the excavation, it is necessary to collect samples from the original location and from a random location within each of these sub-CUs to remove the contamination as well as from two of the archive locations in this CU to ensure that this entire CU is adequately represented.

REQUESTED BY: Krista Flaugh Date: 4/26/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Wiste	5-1-06	X	PROJECT MANAGER: J.D. Chico	4/28/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	4/27/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul McSwigan	4/28/06		RTIMP Manager	
	WAO		X	Sampling Manager: T. Bybelage for TB	5-17-06

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:

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-5
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 1 of 5
OJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/26/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance documents the collection of samples in CU 19, following the excavation of results greater than 1 x FRL and 2 x FRL for total uranium in sub-CUs A6WP-C19-7, A6WP-C19-11, and A6SP-C19-13. See Figure 1. CU 19 consists of the haul road that was located between Waste Pits 1, 2, and 3 and around the Clearwell. An area of approximately 10'x10' was excavated around each of the 3 locations in CU 19 to remove the known contamination.

The total uranium result in sub-CU A6WP-C19-11 was 273 mg/kg, which is a hot spot (greater than 2 x FRL), therefore bounding samples will be collected from the excavated area and from one random location in this sub-CU. Five samples (one at the original location, and one at each side of the excavation area to the north, south, east, and west) will be collected from the excavated area for TAL K to investigate the presence of residual contamination. Additionally, one sample will be collected from an additional random location within the sub-CU. The original location and the random location will be surveyed prior to sampling and the four "bounding" sample locations will be field located by the Field Sampling Lead and will be surveyed after sampling.

The total uranium results in sub-CUs A6WP-C19-7 and A6WP-C19-13 were 128 mg/kg and 109 mg/kg respectively. These are not considered hot spots but will be excavated due to the preliminary statistics indicating failure of the UCL on the mean for CU 19. Therefore, following the excavation in these two sub-CUs samples will be collected from 2 locations in each sub-CU for TAL K. In each sub-CU, one sample will be collected from the original location after it has been excavated to investigate the presence of residual contamination and one sample will be collected from a random location TAL K. All four of these locations will be surveyed prior to sampling.

Two of the archive sample locations, A6WP-C19-12V and A6WP-C19-15V, will also be sampled for TAL K in order to demonstrate a new round of sampling coverage for this CU. Both of these locations will be surveyed prior to sampling.

The Sampling and Analytical Requirements and TAL K are on Attachment 1 and the sample identifiers are on Attachment 2.

Surveying required: Yes. Surveyors will survey the original locations, the random locations, and the archive locations prior to sampling and then survey the four field locations after sampling.

BK

ATTACHMENT 1

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Sample Matrix	ASL	TAT	Preservative	Container	Minimum Volume/Mass
K	Gamma Spec.	solid	D	24 hr[a]	none	Appropriate glass or plastic container	300 g (900 g)[b]

[a] CofA due in 24 hours. ASL D package due in 7 days.

[b] At the direction of the Field Sampling Lead, triple the specified volume must be collected for all samples at one location for the contract laboratory to perform the required quality control analysis. The sample shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

Special Instructions:
No field QC wil be collected under this V/FCN.
Analytical Data Validation is required,
Data Package Requirement - ASL D
Historical Data for Shipping is 273 mg/kg total uranium from boring A6WP-C19-11

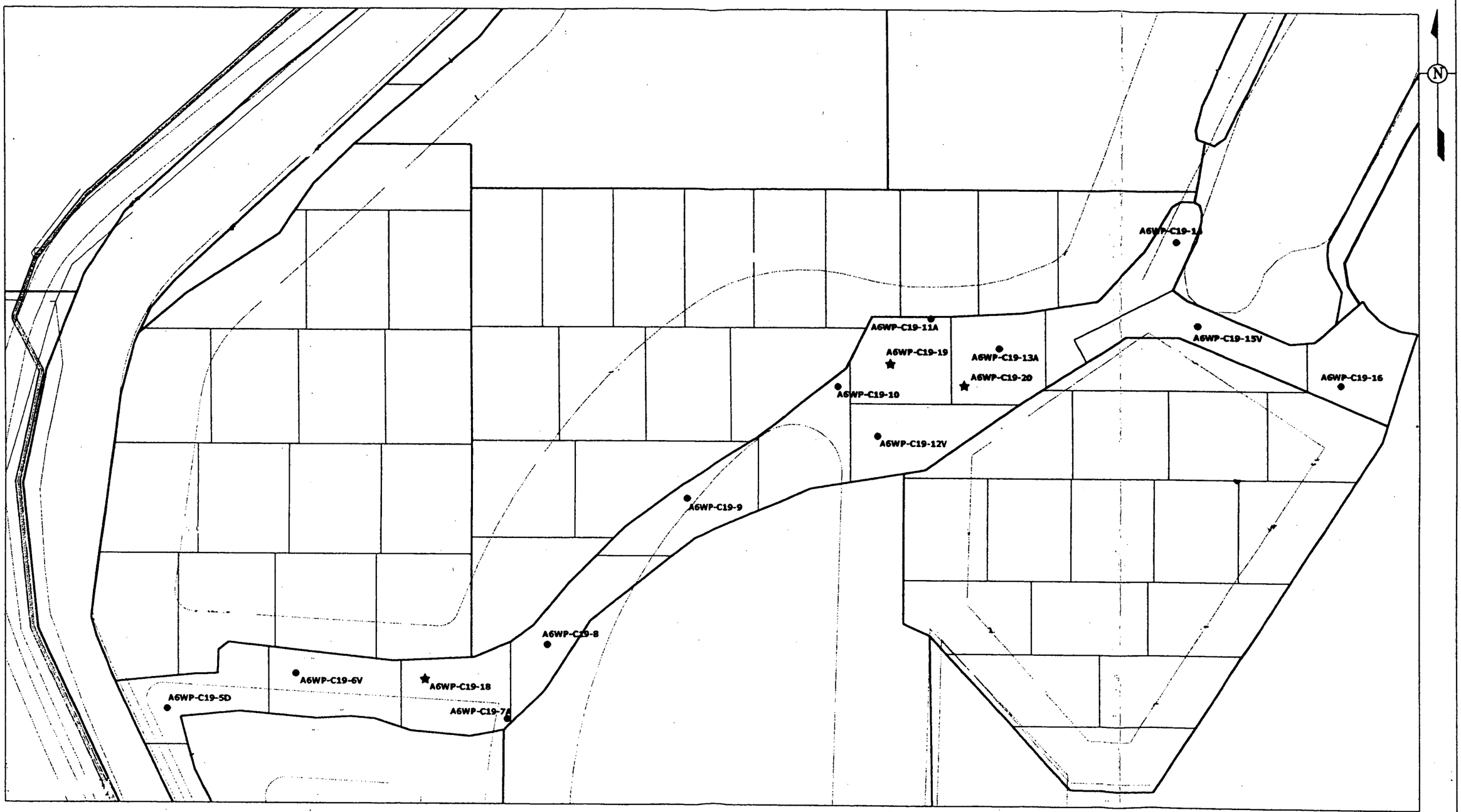
TAL 20600-PSP-0019-K
(12 soil analysis specified in V/FCN)

Component	FRL	MDL (Soil)
Total Uranium	82 mg/kg	8.2 mg/kg

ATTACHMENT 2

SAMPLE IDENTIFIERS

CU	Locaiton	Depth (feet)	Sample ID	TAL	Northing	Easting	Description
19	CU19-7A	0-0.5	A6WP-C19-7A^R	K	481378.039	1346673.892	Original Location (A6WP-C19-7)
19	CU19-18	0-0.5	A6WP-C19-18^R	K	481402.25	1346621.46	Random Location in sub-CU 19-7
19	CU19-11A	0-0.5	A6WP-C19-11A^R	K	481628.526	1346938.86	Original Location (A6WP-C19-11)
19	CU19-11A-N	0-0.5	A6WP-C19-11A-N^R	K	TBD	TBD	In excavated area north of A6WP-C19-11A
19	CU19-11A-S	0-0.5	A6WP-C19-11A-S^R	K	TBD	TBD	In excavated area south of A6WP-C19-11A
19	CU19-11A-E	0-0.5	A6WP-C19-11A-E^R	K	TBD	TBD	In excavated area east of A6WP-C19-11A
19	CU19-11A-W	0-0.5	A6WP-C19-11A-W^R	K	TBD	TBD	In excavated area west of A6WP-C19-11A
19	CU19-19	0-0.5	A6WP-C19-19^R	K	481600.18	1346912.99	Random Location in sub-CU 19-11
19	CU19-13A	0-0.5	A6WP-C19-13A^R	K	481610.649	1346980.674	Original Location (A6WP-C19-13)
19	CU19-20	0-0.5	A6WP-C19-20^R	K	481586.52	1346959.18	Random Location in sub-CU 19-13
19	CU19-12	0-0.5	A6WP-C19-12^R	K	481555.21	1346904.54	Archive Location
19	CU19-15	0-0.5	A6WP-C19-15^R	K	481625.4	1347105.25	Archive Location



LEGEND:

- ● ORIGINAL SAMPLE LOCATION
- ★ RANDOM SAMPLE LOCATION

SCALE

60 30 0 60 FEET

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FIGURE 1.

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-6
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 1 of 3
OJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/26/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance documents the collection of samples in CU 12 following the excavation of results greater than the FRL for total uranium in sub-CUs A6WP-C12-13 and A6WP-C12-18. (Sub-CU A6WP-C12-18 was originally sub-CU A6WP-C12-12, which was excavated and then sampled under V/FCN 20600-PSP-0019-3.) See Figure 1. An area of approximately 10'x10' was excavated around each of the 2 location sin CU 12 to remove the known contamination.

CU 12 consists of the southeast corner of Waste Pit 3, which was the ramp coming out of the Waste Pits. These above-FRL locations are in close proximity to the above-FRL sub-CUs A6WP-C19-11 and A6WP-C19-13, which are located on the haul road that runs between Waste Pits 1, 2, and 3, and were excavated and then sampled under V/FCN 20600-PSP-0019-5.

The total uranium results in sub-CUs A6WP-C12-13 and A6WP-C12-18 were 104 mg/kg and 121 mg/kg respectively. These are not considered hot spots but were excavated due to the preliminary statistics indicating failure of the UCL on the mean for CU 12. Therefore, following the excavation in these two sub-CUs, samples will be collected from 2 locations in each sub-CU for TAL K. In each sub-CU, one sample will be collected from the original location after it has been excavated to investigate the presence of residual contamination and one sample will be collected from a random location to ensure that each sub-CU is adequately represented. All four of these locations will be surveyed prior to sampling

The Sampling and Analytical Requirements, TAL K, and the sample identifiers are on Attachment 1.

rveying required: Yes. Surveyors will survey these locations prior to sampling

Justification:
Preliminary statistics indicated that Certification Unit 12 would fail for total uranium with the UCL on the mean being greater than the FRL due to extreme variability of the data even after the total uranium hot spot in sub-CU A6WP-C12-12 was excavated (V/FCN 20600-SPP-0019-3). Therefore, the two areas where the above-FRL samples were collected (A6WP-C12-13 and A6WP-C12-18) were excavated to remove the contamination. Following the excavation, it is necessary to collect samples from the original location and from a random location within each of these sub-CUs verify the removal of contamination and to ensure that each sub-CU is adequately represented.

REQUESTED BY: Krista Flaugh Date: 4/26/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: E. Franke	5-1-06	X	PROJECT MANAGER: J.D. Chiou	4/28/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	4/28/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul McSwigan	4/28/06		RTIMP Manager	
	WAO		X	Sampling Manager: T. Bohrlage for TB	5-17-06

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

DISTRIBUTION

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

ATTACHMENT 1

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Sample Matrix	ASL	TAT	Preservative	Container	Minimum Volume/Mass
K	Gamma Spec.	solid	D	24 hr[a]	None	Glass with Teflon lined lid or plastic push tubes	300 g (900g)[b]

[a] CofA due in 24 hours. ASL D package due in 7 days.

[b] At the direction of theField Sampling Lead, triple the specified volume must be collected for all samples at one location for the contract laboratory to perform the required quality control analysis. The sample shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

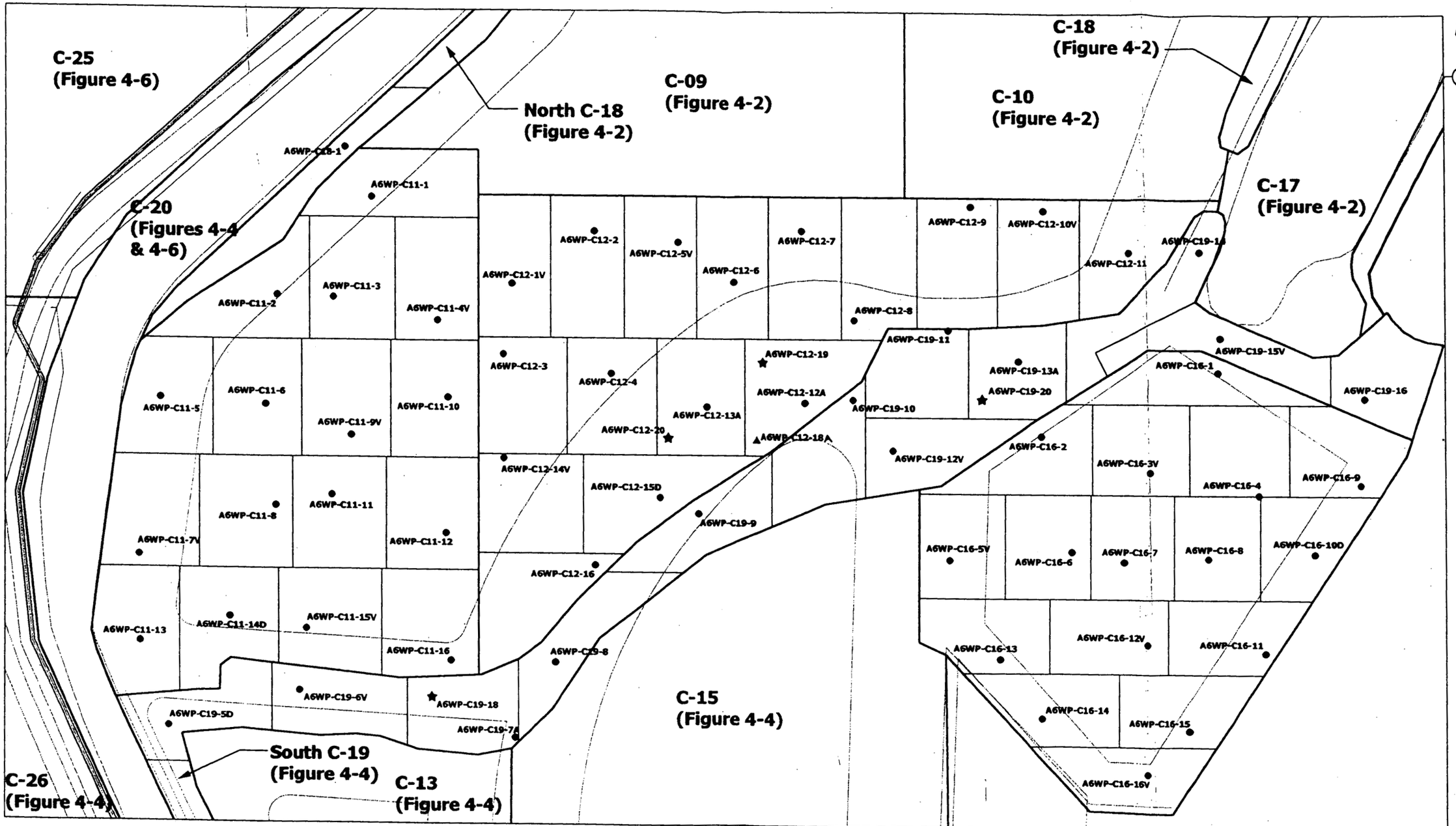
Special Instructions:
No field QC will be collected under this V/FCN.
Analytical Data Validation is required.
Data Package Requirement: ASL D
Historical Data for Shipping is 121 mg/kg total uranium from boring A6WP-C12-18

TAL 20600-PSP-0019-K
(4 soil analysis specified in V/FCN)

Component	FRL	MDL (Soil)
Total Uranium	82 mg/kg	8.2 mg/kg

SAMPLE IDENTIFIERS

CU	Locaiton	Depth (feet)	Sample ID	TAL	Northing	Easting	Description
12	CU12-13A	0-0.5	A6WP-C12-13A^R	K	481580.966	1346791.011	Second Sample (after excavation) at the Original Location (A6WP-C12-13)
12	CU12-20	0-0.5	A6WP-C12-20^R	K	481561.73	1346766.78	New Random Location in sub-CU A6WP-C12-13
12	CU12-18A	0-0.5	A6WP-C12-18A^R	K	481560.6	1346821.243	Second Sample (after excavation) at the Original Location (A6WP-C12-18)
12	CU12-19	0-0.5	A6WP-C12-19^R	K	481608.31	1346825.08	New Random Location in sub-CU A6WP-C12-18



LEGEND:

- ● ORIGINAL SAMPLE LOCATION
- ▲ POST-EXCAVATION SAMPLE LOCATION
- ★ RANDOM SAMPLE LOCATION

SCALE

60 30 0 60 FEET

DRAFT

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FIGURE 1.

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-7
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 1 of 5
PROJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/26/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance documents the collection of samples in CU 13, following the excavation of results greater than 1 x FRL and 2 x FRL for technetium-99 in sub-CUs A6WP-C13-1 and A6WP-C13-13 ~~and A6SP-C19-13~~. See Figure 1. CU 13 consists of the Clearwell. An area of approximately 10'x10' was excavated around each of the 2 locations in CU 13 to remove the known above-WAC contamination.

The technetium-99 result in sub-CU A6WP-C13-1 was 148 pCi/g, which is a hot spot (greater than 2 x FRL), therefore bounding samples will be collected from the excavated area and from one random location in this sub-CU. Five samples (one at the original location, and one at each side of the excavation area to the north, south, east, and west) will be collected from the excavated area for TAL M to investigate the presence of residual contamination. Additionally, one sample will be collected from an additional random location within the sub-CU to ensure that the sub-CU is adequately represented. The original location and the random location will be surveyed prior to sampling and the four "bounding" sample locations will be field located by the Field Sampling Lead and will be surveyed after sampling.

The technetium-99 result in sub-CUs A6WP-C13-13 was 37.5 pCi/g. This result is not considered a hot spot; however, in order to control the potential spread of above-WAC material the soil associated with this above-WAC location must be removed. Therefore, following the excavation in this sub-CU samples will be collected from 2 locations for TAL M. One sample will be collected from the original location after it has been excavated to investigate the presence of residual contamination and one sample will be collected from a random location within the sub-CU to ensure that the sub-C U is adequately represented. Both of these sample locations will be surveyed prior to sampling.

The Sampling and Analytical Requirements and TAL M are on Attachment 1 and the sample identifiers are on Attachment 2.

Surveying required: Yes. Surveyors will survey the original locations, the random locations, and the archive locations prior to sampling and then survey the four field locations after sampling.

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20600-PSP-0019-7
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV A		Page: 2 of 5
PROJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 4/26/06

Justification:

The technetium-99 result in sub-CU A6WP-C13-1 was greater than 2 x FRL. Because the technetium-99 result was greater than 2 x FRL, it was considered a hot spot and was excavated. Following the excavation of this location, it is necessary to collect samples from the original location, from four bounding locations, and from another random location within the same sub-CU to ensure that the hot spot has been removed and to ensure that the sub-CU is adequately represented.

Although the technetium-99 result in sub-CU A6WP-C13-13 was not a hot spot by definition, it was still above the waste acceptance criteria and was excavated. Following the excavation of this location, it is necessary to collect samples from the original location and from one random location within the same sub-CU to ensure that all of the contamination has been removed and to ensure that the sub-CU is adequately represented.

REQUESTED BY: Krista Flaugh Date: 4/26/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Fricke	5-1-06	X	PROJECT MANAGER: J.D. Chico	4/28/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	4/27/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul McSwigan	4/28/06		RTIMP Manager	
	WAO		X	Sampling Manager: T. Bubrigge for TB	5-17-06

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:

ATTACHMENT 1

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Sample Matrix	ASL	TAT	Preservative	Container	Minimum Volume/Mass
M	LSC or GPC	solid	D	48 hr[a]	None	Appropriate glass or plastic	50 g

[a] CofA due in 24 hours. ASL D package due in 7 days.

Special Instructions:
No field QC will be collected under this V/FCN.
Analytical Data Validation is required.
Data Package Requierments: ASL D
Historical Data for Shipping is 243 mg/kg total uranium from boring A6WP-C21-15

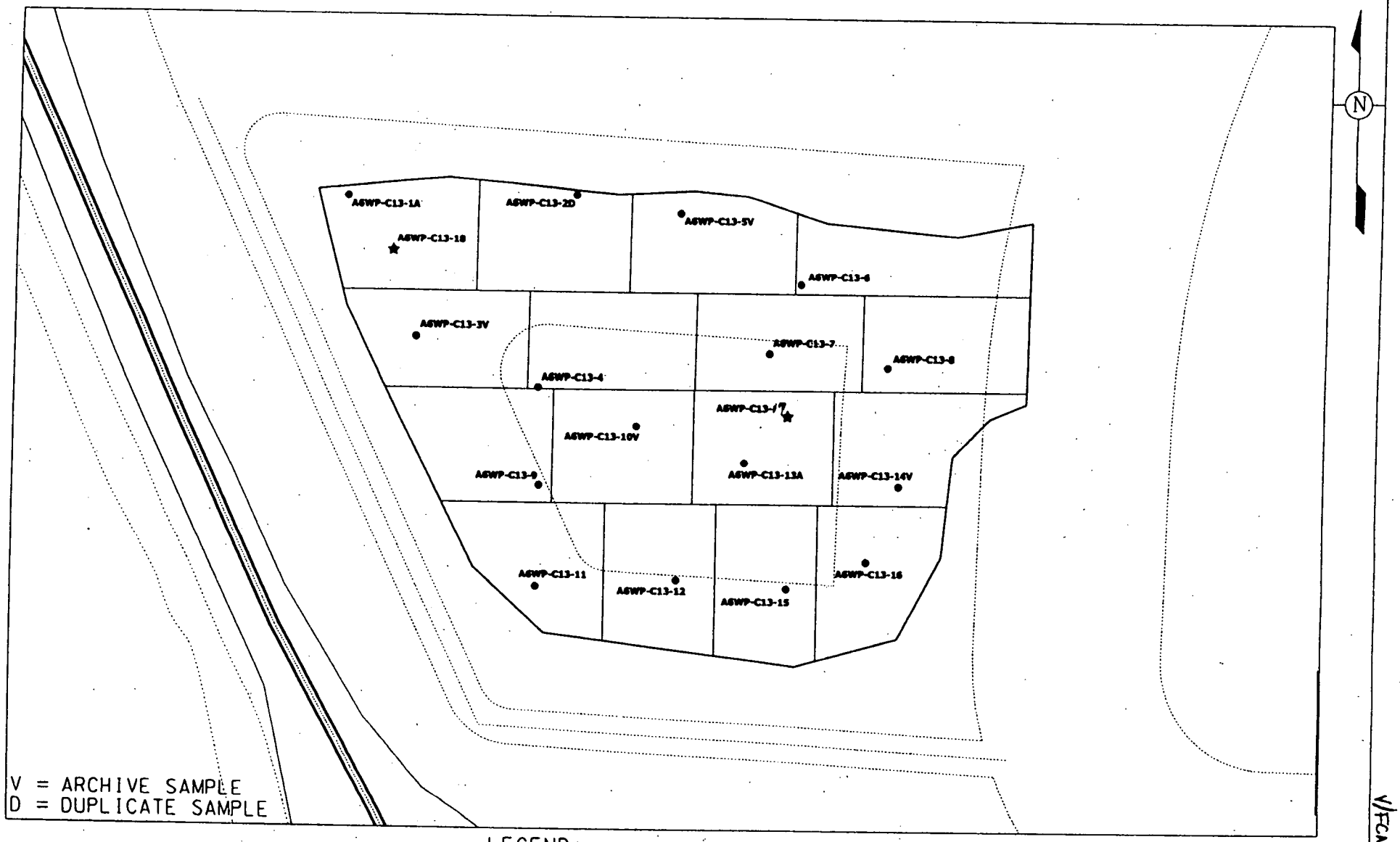
TAL 20600-PSP-0019-M
(8 soil analysis specified in V/FCN)

Component	FRL	MDL (Soil)
Technetium-99	30 pCi/g	2.91 pCi/g

ATTACHMENT 2

SAMPLE IDENTIFIERS

CU	Locaiton	Depth (feet)	Sample ID	TAL	Northing	Easting	Description
13	CU13-1A	0-0.5	A6WP-C13-1A^R	M	481376.57	1346477.32	Second Sample (after excavation) at the Original Location (A6WP-C13-1).
13	CU13-1A-N	0-0.5	A6WP-C13-1A-N^R	M	TBD	TBD	In excavated area north of A6WP-C13-1A
13	CU13-1A-S	0-0.5	A6WP-C13-1A-S^R	M	TBD	TBD	In excavated area south of A6WP-C13-1A
13	CU13-1A-E	0-0.5	A6WP-C13-1A-E^R	M	TBD	TBD	In excavated area east of A6WP-C13-1A
13	CU13-1A-W	0-0.5	A6WP-C13-1A-W^R	M	TBD	TBD	In excavated area west of A6WP-C13-1A
13	CU13-18	0-0.5	A6WP-C13-18^R	M	481361.51	1346490.31	New Random Location in sub-CU A6WP-C13-1
13	CU13-13A	0-0.5	A6WP-C13-13A^R	M	481302.985	1346590.538	Second Sample (after excavation) the Original Location (A6WP-C13-13)
13	CU13-17	0-0.5	A6WP-C13-17^R	M	481316.45	1346602.68	New Random Location in sub-CU A6WP-C13-13



LEGEND:

• ORIGINAL SAMPLE LOCATION

★ RANDOM SAMPLE LOCATION

SCALE

40 20 0 40 FEET

DRAFT

:*2fml2*dgn*wp_123_017.dgn
TATE PLANAR COORDINATE SYSTEM 1983

26-APR-2006

FIGURE 1.

V/FCN 20600-DSP-0019-7
Page 5 of 5

VARIANCE / FIELD CHANGE NOTICE	[redacted]	V/F: 20600-PSP-0019-8
WBS NO.: PROJECT/DOCUMENT/ECDC #20600-PSP-0019 REV 0		Page: 1 of 3
PROJECT TITLE: Project Specific Plan for Area 6 Waste Pits 1, 2, and 3, and the Burn Pit, the Clearwell, and the Areas West and North of the Waste Pits Certification Sampling		Date: 5/23/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance documents the collection of samples in CU 19 following the excavation of soil with results greater than the FRL for total uranium in sub-CU A6WP-C19-13 at location A6WP-C19-20. (Sub-CU A6WP-C19-13 was excavated and then sampled under V/FCN 20600-PSP-0019-5.) See Figure 1. An area of approximately 10'x10' was excavated around A6WP-C19-20 to remove the known contamination.

CU 19 consists of the haul road that was located between Waste Pits 1,2, and 3 and around the Clearwell.

The total uranium result in sub-CU A6WP-C19-13 at location A6WP-C19-20 was 86.5 mg/kg. This is not considered a hot spot but it is the highest total uranium value in this sub-CU and the preliminary statistics for CU 19 indicated a failure of the UCL on the mean for total uranium. Therefore, the area has been excavated. Following the excavation in this sub-CU, samples will be collected from 2 locations within this sub-CU for TAL K. One sample will be collected from the original location after it has been excavated to investigate the presence of residual contamination and one sample will be collected from another random location to ensure that the sub-CU is adequately represented. Both of these locations will be surveyed prior to sampling

The Sampling and Analytical Requirements, TAL K, and the sample identifiers are on Attachment 1.

Surveying required: Yes. Surveyors will survey these locations prior to sampling

Justification:
Following the removal of the total uranium locations in CU 19 that were greater than 1 x FRL and 2 x FRL, additional samples were collected per V/FCN 20600-PSP-0019-5. One total uranium result in sub-CU A6WP-C19-13 at location A6WP-C19-20 was still above the FRL, with a result of 86.5 mg/kg. Although there was only one total uranium results in CU 19 that was above-FRL , the preliminary statistics indicated that CU 19 would still fail for total uranium with the UCL on the mean being greater than the FRL due to extreme variability of the data. Therefore, this above-FRL location (A6WP-C19-20) was excavated to remove the contamination. Following the excavation, it is necessary to collect samples from the original excavated location and from another random location within this sub-CU to verify the removal of contamination and to ensure that the sub-CU is adequately represented.

REQUESTED BY: Krista Flaugh Date: 5/23/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: J. Blake	6-1-06	X	PROJECT MANAGER: J.D. Chase	5/24/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: Frank Miller	23 May 06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McSwigan	5/23/06		RTIMP Manager	
	WAD		X	Sampling Manager: T. Bohlinger	6/1/06

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:

ATTACHMENT 1

SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Sample Matrix	ASL	TAT	Preservative	Container	Minimum Volume/Mass
K	Gamma Spec.	solid	D	24 hr[a]	None	Appropriate glass or plastic	300 g (900g)[b]

[a] CofA due in 24 hours. ASL D package due in 7 days.

[b] At the direction of theField Sampling Lead, triple the specified volume must be collected for all samples at one location for the contract laboratory to perform the required quality control analysis. The sample shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

Special Instructions:
No field QC will be collected under this V/FCN.
Analytical Data Validation is required.
Data Package Requirement: ASL D
Historical Data for Shipping is 86.5 mg/kg total uranium from boring A6WP-C19-20

2 Ref
TAL 20600-PSP-0019-K
(~~W~~soil analysis specified in V/FCN)

Component	FRL	MDL (Soil)
Total Uranium	82 mg/kg	8.2 mg/kg

SAMPLE IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL	Northing	Easting	Description
19	CU19-20A	0-0.5	A6WP-C19-20A^R	K	481586.354	1346959.219	Second Sample (after excavation) at the Original Location (A6WP-C19-20)
19	CU19-21	0-0.5	A6WP-C19-21^R	K	481590.84	1346991.32	New Random Location in sub-CU A6WP-C19-13

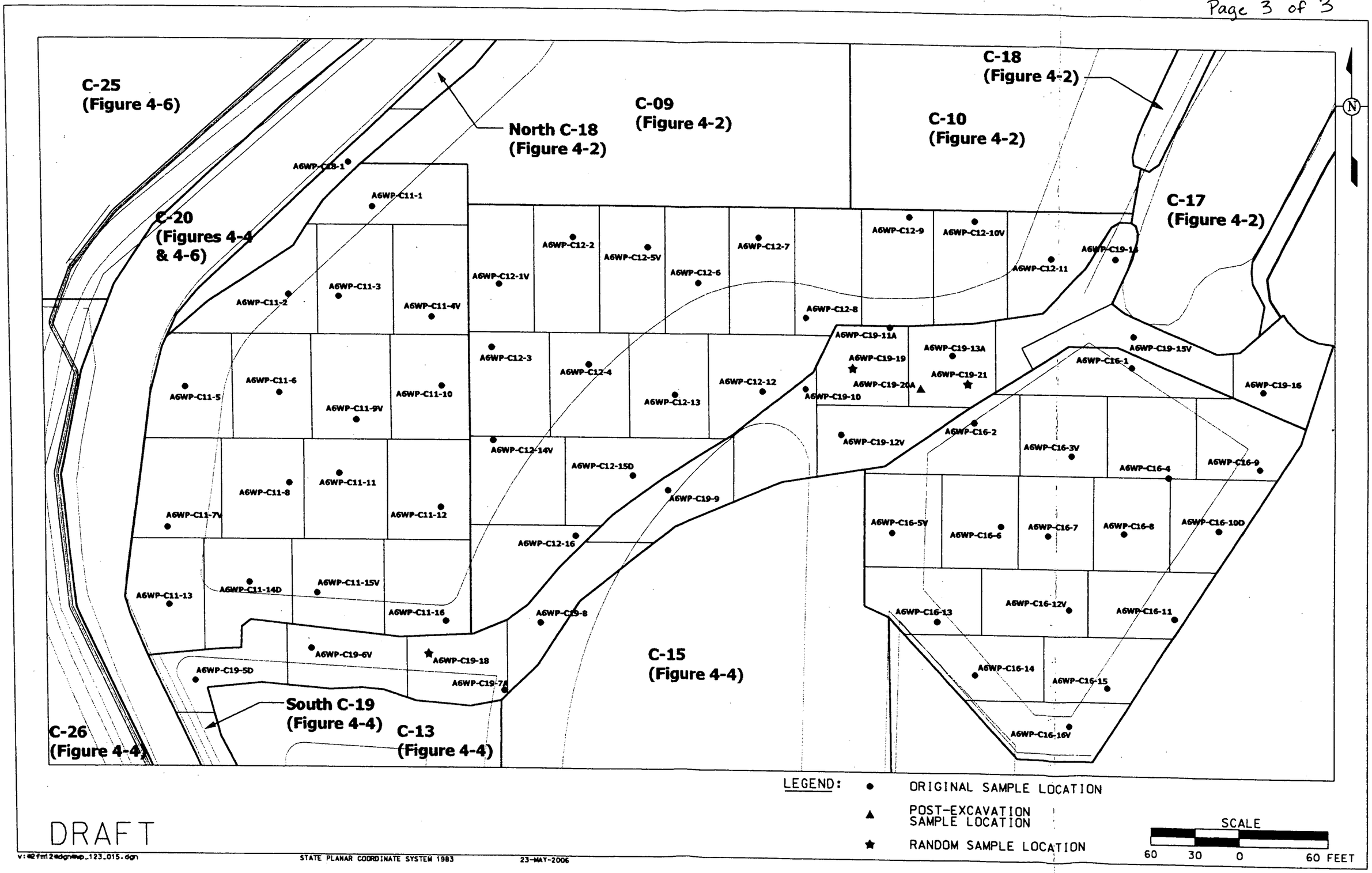

C-25
(Figure 4-6)
C-20
(Figures 4-4
& 4-6)
North C-18
(Figure 4-2)
C-09
(Figure 4-2)
C-10
(Figure 4-2)
C-18
(Figure 4-2)
C-17
(Figure 4-2)
C-15
(Figure 4-4)
South C-19
(Figure 4-4)
C-13
(Figure 4-4)
C-26
(Figure 4-4)
A6WP-C18-1
A6WP-C11-1
A6WP-C11-2
A6WP-C11-3
A6WP-C11-4V
A6WP-C11-5
A6WP-C11-6
A6WP-C11-9V
A6WP-C11-10
A6WP-C11-7V
A6WP-C11-8
A6WP-C11-11
A6WP-C11-12
A6WP-C11-13
A6WP-C11-14D
A6WP-C11-15V
A6WP-C11-16
A6WP-C12-1V
A6WP-C12-2
A6WP-C12-5V
A6WP-C12-6
A6WP-C12-7
A6WP-C12-8
A6WP-C12-9
A6WP-C12-10V
A6WP-C12-11
A6WP-C12-3
A6WP-C12-4
A6WP-C12-13
A6WP-C12-12
A6WP-C12-14V
A6WP-C12-15D
A6WP-C12-16
A6WP-C19-11A
A6WP-C19-19
A6WP-C19-20A
A6WP-C19-10
A6WP-C19-13A
A6WP-C19-21
A6WP-C19-12V
A6WP-C19-9
A6WP-C19-8
A6WP-C19-6V
A6WP-C19-18
A6WP-C19-5D
A6WP-C19-7A
A6WP-C19-15V
A6WP-C16-1
A6WP-C19-16
A6WP-C16-2
A6WP-C16-3V
A6WP-C16-4
A6WP-C16-9
A6WP-C16-5V
A6WP-C16-6
A6WP-C16-7
A6WP-C16-8
A6WP-C16-10D
A6WP-C16-12V
A6WP-C16-13
A6WP-C16-11
A6WP-C16-14
A6WP-C16-15
A6WP-C16-16V
N
LEGEND:
ORIGINAL SAMPLE LOCATION
POST-EXCAVATION SAMPLE LOCATION
RANDOM SAMPLE LOCATION
SCALE
60 30 0 60 FEET
DRAFT
STATE PLANAR COORDINATE SYSTEM 1983
23-MAY-2006

FIGURE 1.

APPENDIX C

RISK ASSESSMENT CALCULATIONS

Appendix C

Risk Assessment Calculations

This appendix provides risk calculations for two receptors exposed to contaminants in the former waste pit area via the pathways of inhalation, dermal contact (soil and surface water), ingestion (soil and surface water) and external radiation. Reasonable maximum exposure receptors evaluated included the undeveloped park user (child, youth, adult, senior adult) and a site worker defined as a groundskeeper/sampler (adult). The exposure parameters for these receptors are discussed in Section 5.2, and they are exposed to contaminants in the soil, surface water and air (particulate and gases). Average soil concentrations were derived from the CUs in the former waste pit area, as defined on Figure 5-1 and discussed in Section 5.2. If a contaminant was not present in the COC list comprising all CUs in the area, it was assigned a value of zero in the risk calculation. The average uranium surface water concentration was calculated from samples obtained from 17 ponds within the former waste pit area. Uranium was the only surface water contaminant available at the time of this report, and other contaminants will be evaluated in the Interim Residual Risk Assessment Report, which is scheduled for release in January 2007. Air concentrations were calculated using soil concentration values and a conversion factor of 6.54E-6 g/m3, a particulate suspension value derived from the ISCLT2 air model used in the CRARE (DOE 1995). Radon-222 is obtained from the RAECOM model used in the CRARE (DOE 1995) and is based on radium-226 soil concentration multiplied by a conversion factor of 9.28 g/m^3. This is a conservative estimate of the radon air concentration, as this is the concentration in equilibrium with radium-226 at the ground surface (i.e., no credit is taken for dispersion). Slope factors and reference doses reflect the November 2006 values found on the EPA and Oak Ridge RAIS web sites, as discussed in Section 5.2.

There are 10 calculation sheets for each receptor: inhalation of chemicals, dermal soil for chemicals, ingest soil for chemicals, dermal surface water for chemicals, ingest surface water for chemicals, inhalation of radionuclides, ingest soil for radionuclides, ingest surface water for radionuclides, external radiation, and a summation page. Data are not available to evaluate the dermal exposure routes for radionuclides. Each page contains the intake equation and defined parameters, exposure parameters, COC concentrations, slope factors, reference doses, HQ and ILCR values, and a summation result for the pathway. The summation page tabulates the total HQ and ILCR for each pathway, the sum across all pathways and the total HQ and ILCR for each COC for all pathways.

APPENDIX C.1

RISK ASSESSMENT CALCULATIONS

GROUNDSKEEPER / SAMPLER

Groundskeeper/Sampler - Inhalation of Gases & Particulates
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	adult
	CDI =	(CS*EF*ED*IR*ET)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	CA =	Concentration of chemical in air	mg/m^3	see COC list below
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Inhalation rate	m^3/hr	2.5
	ET =	Exposure time	hrs/day	7
	BW =	Body weight	kg	71.8
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

COC	conc	RfDi	CSFi	ADULT CDI	HQ	CDI	ILCR
	mg/m^3	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	2.13E-12	NA	5.60E-02	1.42E-13	NA	5.09E-14	2.85E-15
1,1-Dichloroethylene	7.75E-12	5.71E-02	1.75E-01	5.17E-13	9.06E-12	1.85E-13	3.23E-14
1,2-dichloroethane	6.41E-12	NA	9.10E-02	4.28E-13	NA	1.53E-13	1.39E-14
2-Butanone (MEK)	0	1.43E+00	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	NA	NA	0	NA	0	NA
4-Methylphenol	0	NA	NA	0	NA	0	NA
4-Nitroanaline	0	1.14E-03	NA	0	0	0	NA
Acetone	0	NA	NA	0	NA	0	NA
Antimony	9.32E-09	NA	NA	6.23E-10	NA	2.22E-10	NA
Aroclor 1254	1.32E-10	NA	2.00E+00	8.82E-12	NA	3.15E-12	6.30E-12
Aroclor 1260	4.70E-11	NA	2.00E+00	3.14E-12	NA	1.12E-12	2.24E-12
Arsenic	6.73E-08	NA	1.51E+01	4.5E-09	NA	1.61E-09	2.42E-08
Barium	9.30E-07	1.43E-04	NA	6.21E-08	4.34E-04	2.22E-08	NA
Benzene	0	8.57E-03	2.73E-02	0	0.00E+00	0	0
Benzo(a)anthracene	4.36E-11	NA	3.80E-01	2.91E-12	NA	1.04E-12	3.95E-13
Benzo(a)pyrene	3.45E-10	NA	3.08E-01	2.3E-11	NA	8.22E-12	2.53E-12
Benzo(b)fluoranthene	3.22E-10	NA	3.08E+00	2.15E-11	NA	7.67E-12	2.36E-11
Benzo(k)fluoranthene	2.71E-11	NA	3.08E-02	1.81E-12	NA	6.47E-13	1.99E-14
Beryllium	7.03E-09	5.71E-06	8.40E+00	4.7E-10	8.22E-05	1.68E-10	1.41E-09
Bis(2-chloroisopropyl)ether	0	NA	NA	0	NA	0	NA
Bis(2-ethylhexyl)phthalate	0	NA	NA	0	NA	0	NA
Boron	0	5.71E-03	NA	0	0.00E+00	0	NA
Bromodichloromethane	6.41E-12	NA	NA	4.28E-13	NA	1.53E-13	NA
Bromoform	0	NA	3.85E-03	0	NA	0	0.00E+00
Bromomethane	0	0.00143	NA	0	0.00E+00	0	NA
Cadmium	3.20E-09	NA	6.30E+00	2.14E-10	NA	7.63E-11	4.81E-10
Carbazole	0	NA	NA	0	NA	0	NA
Carbon disulfide	0	2.00E-01	NA	0	0.00E+00	0	NA
Carbon tetrachloride	0	NA	5.25E-02	0	NA	0	0
Chlordane	0	2.00E-04	3.50E-01	0	0	0	0
Chlorobenzene	0	1.43E-02	NA	0	0	0	NA
Chloroform	0	NA	8.05E-02	0	NA	0	0
Chromium (VI)	0	2.86E-05	4.20E+01	0	0	0	0
Chrysene	6.56E-11	NA	3.08E-03	4.38E-12	NA	1.56E-12	4.82E-15
Cobalt	0	5.71E-06	9.80E+00	0	0	0	0
Copper	0	NA	NA	0	NA	0	NA
Cyanide	0	NA	NA	0	NA	0	NA
Cyclohexanone	0	NA	NA	0	NA	0	NA
Dibenzo(a,h)anthracene	1.26E-10	NA	3.08E+00	8.4E-12	NA	3E-12	9.24E-12
Dieldrin	1.17E-11	NA	1.61E+01	7.82E-13	NA	2.79E-13	4.50E-12
Di-n-octylphthalate	0	NA	NA	0	NA	0	NA

Groundskeeper/Sampler - Inhalation of Gases & Particulates
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	adult
	CDI =	(CS*EF*ED*IR*ET)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	CA =	Concentration of chemical in air	mg/m^3	see COC list below
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Inhalation rate	m^3/hr	2.5
	ET =	Exposure time	hrs/day	7
	BW =	Body weight	kg	71.8
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

COC	conc	RfDi	CSFi	ADULT CDI	HQ	CDI	ILCR
	mg/m^3	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	0	NA	NA	0	NA	0	NA
Ethylbenzene	0	2.86E-01	3.85E-03	0	0	0	0
Fluoride	4.62E-08	NA	NA	3.09E-09	NA	1.1E-09	NA
Heptachlorodibenzofuran	0	NA	1.16E+03	0	NA	0	0
Heptachlorodibenzo-p-dioxin	1.10E-13	NA	1.16E+03	7.35E-15	NA	2.62E-15	3.04E-12
Hexachlorodibenzofuran	0	NA	1.16E+04	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0	NA	1.16E+04	0	NA	0	0
Indeno(1,2,3-cd)pyrene	2.70E-10	NA	3.08E-01	1.8E-11	NA	6.43E-12	1.98E-12
Lead	0	NA	NA	0	NA	0	NA
Manganese	0	1.43E-05	NA	0	0	0	NA
Mercury	0	NA	NA	0	NA	0	NA
Methanol	0	NA	NA	0	NA	0	NA
Methyl-2-pentanone	0	8.57E-01	NA	0	0	0	NA
Methylene chloride	0	8.57E-01	1.65E-03	0	0	0	0
Molybdenum	2.22E-08	NA	NA	1.48E-09	NA	5.3E-10	NA
Nickel	0	NA	NA	0	NA	0	NA
N-nitrosodiphenylamine	0	NA	NA	0	NA	0	NA
N-nitrosodipropylamine	0	NA	NA	0	NA	0	NA
Octochlorodibenzofuran	0	NA	1.16E+02	0	NA	0	0.00E+00
Octochlorodibenzo-p-dioxin	1.70E-12	NA	1.16E+02	1.13E-13	NA	4.04E-14	4.69E-12
Pentachlorodibenzofuran	0	NA	5.78E+03	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	NA	5.78E+04	0	NA	0	0
Pentachlorophenol	0	NA	NA	0	NA	0	NA
Phenanthrene	4.82E-11	NA	NA	3.22E-12	NA	1.15E-12	NA
Selenium	0	NA	NA	0	NA	0	NA
Silver	3.09E-09	NA	NA	2.06E-10	NA	7.36E-11	NA
Tetrachlorodibenzofuran	0	NA	1.16E+04	0	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	NA	1.16E+05	0	NA	0	0
Tetrachloroethylene	7.24E-12	1.71E-01	2.07E-02	4.83E-13	2.83E-12	1.73E-13	3.57E-15
Thallium	0	NA	NA	0	NA	0	NA
Toluene	0	1.43E+00	NA	0	0	0	NA
Tributyl phosphate	0	NA	NA	0	NA	0	NA
Trichloroethylene	1.20E-11	1.14E-02	4.00E-01	7.98E-13	7.00E-11	2.85E-13	1.14E-13
Trifluorochloromethane	0	2.00E-01	NA	0	0.00E+00	0	NA
Uranium	2.55E-07	NA	NA	1.7E-08	NA	6.07E-09	NA
Vanadium	0	NA	NA	0	NA	0	NA
Vinyl chloride	0	2.86E-02	3.08E-02	0	0	0	0
Xylenes	0	2.86E-02	NA	0	0	0	NA
Zinc	0	NA	NA	0	NA	0	NA
				total =	**5.17E-04**	**total =**	**2.62E-08**

Air concentrations derived from soil values by using a conversion factor of 6.54E-6 g/m3 (based on ISCLT2 air model)

Groundskeeper/Sampler - Dermal Contact with Soil/Sediment
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	adult
	CDI =	(CS*AB*SA*EF*ED*AF*CF)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	CS =	Concentration of chemical in soil	mg/kg	see COC list below
	AB	Absorption factor	–	see COC list below
	SA	Surface area of exposed skin	cm^2/day	4850
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	AF =	Adherence factor	mg/cm^2	0.5
	CF =	Conversion factor	kg/mg	1.00E-06
	BW =	Body weight	kg	71.8
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

					ADULT			
COC	conc	AB	RfDd	CSFd	CDI	HQ	CDI	ILCR
	mg/kg	unitless	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	3.26E-04	1.00E-02	3.24E-03	7.04E-02	3.02E-11	9.31E-09	1.08E-11	7.59E-13
1,1-Dichloroethylene	1.18E-03	1.00E-02	5.00E-02	6.00E-01	1.1E-10	2.19E-09	3.92E-11	2.35E-11
1,2-dichloroethane	9.80E-04	1.00E-02	2.00E-02	9.10E-02	9.07E-11	4.54E-09	3.24E-11	2.95E-12
2-Butanone (MEK)	0	1.00E-02	4.80E-01	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	1.00E-02	NA	9.00E-01	0	NA	0	0
4-Methylphenol	0	1.00E-02	3.25E-03	NA	0	0	0	NA
4-Nitroanaline	0	1.00E-02	2.40E-03	2.63E-02	0	0	0	0
Acetone	0	1.00E-02	7.47E-01	NA	0	0	0	NA
Antimony	1.43E+00	1.00E-03	8.00E-06	NA	1.32E-08	1.65E-03	4.71E-09	NA
Aroclor 1254	2.02E-02	1.40E-01	1.80E-05	2.22E+00	2.62E-08	1.45E-03	9.34E-09	2.07E-08
Aroclor 1260	7.18E-03	1.40E-01	NA	2.22E+00	9.31E-09	NA	3.32E-09	7.38E-09
Arsenic	1.03E+01	3.00E-02	1.23E-04	3.66E+00	2.86E-06	2.32E-02	1.02E-06	3.73E-06
Barium	1.42E+02	1.00E-03	1.40E-02	NA	1.32E-06	9.40E-05	4.7E-07	NA
Benzene	0	1.00E-02	3.88E-03	5.67E-02	0	0	0	0
Benzo(a)anthracene	6.67E-03	1.30E-01	NA	2.35E+00	8.03E-09	NA	2.87E-09	6.74E-09
Benzo(a)pyrene	5.27E-02	1.30E-01	NA	2.35E+01	6.34E-08	NA	2.26E-08	5.32E-07
Benzo(b)fluoranthene	4.92E-02	1.30E-01	NA	2.35E+00	5.92E-08	NA	2.11E-08	4.97E-08
Benzo(k)fluoranthene	4.15E-03	1.30E-01	NA	2.35E-01	4.99E-09	NA	1.78E-09	4.19E-10
Beryllium	1.08E+00	1.00E-03	2.00E-05	4.30E+02	9.95E-09	4.97E-04	3.55E-09	1.53E-06
Bis(2-chloroisopropyl)ether	0	1.00E-02	2.00E-02	NA	0	0	0	NA
Bis(2-ethylhexyl)phthalate	0	1.00E-02	3.80E-03	7.37E-02	0	0	0	0
Boron	0	1.00E-03	1.80E-01	NA	0	0	0	NA
Bromodichloromethane	9.80E-04	1.00E-02	1.96E-02	6.33E-02	9.07E-11	4.63E-09	3.24E-11	2.05E-12
Bromoform	0	1.00E-02	1.20E-02	1.32E-02	0	0	0	0.00E+00
Bromomethane	0	1.00E-02	1.12E-03	NA	0	0	0	NA
Cadmium	4.89E-01	1.00E-03	1.00E-05	NA	4.53E-09	4.53E-04	1.62E-09	NA
Carbazole	0	1.00E-02	NA	2.86E-02	0	NA	0	0
Carbon disulfide	0	2.50E-01	6.30E-02	NA	0	0	0	NA
Carbon tetrachloride	0	1.00E-02	4.55E-04	2.00E-01	0	0	0	0
Chlordane	0	4.00E-02	2.50E-04	7.00E-01	0	0	0	0
Chlorobenzene	0	1.00E-02	6.20E-03	NA	0	0	0	NA
Chloroform	0	1.00E-02	2.00E-03	3.05E-02	0	0	0	0
Chromium (VI)	0	1.00E-03	6.00E-05	NA	0	0	0	NA
Chrysene	1.00E-02	1.30E-01	NA	2.35E-02	1.21E-08	NA	4.31E-09	1.01E-10
Cobalt	0	1.00E-03	1.60E-02	NA	0	0	0	NA
Copper	0	1.00E-03	1.20E-02	NA	0	0	0	NA
Cyanide	0	1.00E-02	3.40E-03	NA	0	0	0	NA
Cyclohexanone	0	1.00E-02	4.00E+00	NA	0	0	0	NA
Dibenzo(a,h)anthracene	1.92E-02	1.30E-01	NA	2.35E+01	2.31E-08	NA	8.26E-09	1.94E-07
Dieldrin	1.79E-03	1.00E-02	2.50E-05	3.20E+01	1.66E-10	6.63E-06	5.92E-11	1.89E-09
Di-n-octylphthalate	0	1.00E-02	3.60E-02	NA	0	0	0	NA

Groundskeeper/Sampler - Dermal Contact with Soil/Sediment
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	adult
	CDI =	(CS*AB*SA*EF*ED*AF*CF)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	CS =	Concentration of chemical in soil	mg/kg	see COC list below
	AB	Absorption factor	–	see COC list below
	SA	Surface area of exposed skin	cm^2/day	4850
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	AF =	Adherence factor	mg/cm^2	0.5
	CF =	Conversion factor	kg/mg	1.00E-06
	BW =	Body weight	kg	71.8
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

COC	conc	AB	RfDd	CSFd	ADULT CDI	ADULT HQ	ADULT CDI	ADULT ILCR
	mg/kg	unitless	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	0	1.00E-02	1.60E-01	NA	0	0	0	NA
Ethylbenzene	0	1.00E-02	9.70E-02	NA	0	0	0	NA
Fluoride	7.07E+00	1.00E-03	5.82E-02	NA	6.54E-08	1.12E-06	2.34E-08	NA
Heptachlorodibenzofuran	0	1.00E-02	NA	3.00E+03	0	NA	0	0
Heptachlorodibenzo-p-dioxin	1.68E-05	3.00E-02	NA	3.00E+03	4.67E-12	NA	1.67E-12	5.00E-09
Hexachlorodibenzofuran	0	1.00E-02	NA	3.00E+04	0	NA	0	0.00E+00
Hexachlorodibenzo-p-dioxin	0	3.00E-02	NA	3.00E+04	0	NA	0	0.00E+00
Indeno(1,2,3-cd)pyrene	4.12E-02	1.30E-01	NA	2.35E+00	4.96E-08	NA	1.77E-08	4.16E-08
Lead	0	1.00E-03	NA	NA	0	NA	0	NA
Manganese	0	1.00E-03	5.60E-03	NA	0	0	0	NA
Mercury	0	1.00E-03	2.10E-05	NA	0	0	0	NA
Methanol	0	1.00E-02	4.00E-01	NA	0	0	0	NA
Methyl-2-pentanone	0	1.00E-02	6.40E-02	NA	0	0	0	NA
Methylene chloride	0	1.00E-02	5.70E-02	7.89E-03	0	0	0	0
Molybdenum	3.40E+00	1.00E-03	1.90E-03	NA	3.15E-08	1.66E-05	1.12E-08	NA
Nickel	0	1.00E-03	5.40E-03	NA	0	0	0	NA
N-nitrosodiphenylamine	0	1.00E-02	5.00E-03	1.96E-02	0	0	0	0
N-nitrosodipropylamine	0	1.00E-02	NA	2.80E+01	0	NA	0	0
Octochlorodibenzofuran	0	1.00E-02	NA	3.00E+02	0	NA	0	0
Octochlorodibenzo-p-dioxin	2.59E-04	3.00E-02	NA	3.00E+02	7.2E-11	NA	2.57E-11	7.71E-09
Pentachlorodibenzofuran	0	1.00E-02	NA	1.50E+04	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	3.00E-02	NA	1.50E+05	0	NA	0	0
Pentachlorophenol	0	2.50E-01	3.00E-02	1.20E-01	0	0	0	0
Phenanthrene	7.37E-03	1.00E-02	NA	NA	6.82E-10	NA	2.44E-10	NA
Selenium	0	1.00E-03	2.20E-03	NA	0	0	0	NA
Silver	4.72E-01	1.00E-03	9.00E-04	NA	4.37E-09	4.85E-06	1.56E-09	NA
Tetrachlorodibenzofuran	0	1.00E-02	NA	3.00E+04	NA	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	3.00E-02	NA	3.00E+05	NA	NA	0	0
Tetrachloroethylene	1.11E-03	1.00E-02	1.00E-02	5.40E-01	1.02E-10	1.02E-08	3.66E-11	1.97E-11
Thallium	0	1.00E-03	1.80E-05	NA	0	0	0	NA
Toluene	0	1.00E-02	6.40E-02	NA	0	0	0	NA
Tributyl phosphate	0	1.00E-02	1.00E-01	1.08E-02	0	0	0	0
Trichloroethylene	1.83E-03	1.00E-02	4.50E-05	2.67E+00	1.69E-10	3.76E-06	6.04E-11	1.61E-10
Trifluorochloromethane	0	1.00E-02	6.90E-02	NA	0	0.00E+00	0	NA
Uranium	3.89E+01	1.00E-03	5.10E-04	NA	3.6E-07	7.07E-04	1.29E-07	NA
Vanadium	0	1.00E-03	7.00E-05	NA	0	0	0	NA
Vinyl chloride	0	1.00E-02	3.00E-03	1.50E+00	0	0	0	0
Xylenes	0	1.00E-02	1.84E-01	NA	0	0	0	NA
Zinc	0	1.00E-03	6.00E-02	NA	0	0	0	NA
					total =	**2.81E-02**	**total =**	**6.13E-06**

Groundskeeper/Sampler - Ingestion of Soil
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	adult
	CDI =	(CS*EF*ED*IR*CF)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated
	CS =	Concentration of chemical in soil	mg/kg	see COC li
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Ingestion rate	mg/day	50
	FI =	Fraction of contaminated soil	unitless	0.75
	CF =	Conversion factor	kg/mg	1.00E-06
	BW =	Body weight	kg	71.8
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

				ADULT			
COC	conc	RfDo	CSFos	CDI	HQ	CDI	ILCR
	mg/kg	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	3.26E-04	4.00E-03	5.70E-02	4.67E-11	1.17E-08	1.67E-11	9.50E-13
1,1-Dichloroethylene	1.18E-03	5.00E-02	6.00E-01	1.70E-10	3.39E-09	6.05E-11	3.63E-11
1,2-dichloroethane	9.80E-04	2.00E-02	9.10E-02	1.40E-10	7.01E-09	5.01E-11	4.56E-12
2-Butanone (MEK)	0	6.00E-01	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	NA	4.50E-01	0	NA	0	0
4-Methylphenol	0	5.00E-03	NA	0	0	0	NA
4-Nitroanaline	0	3.00E-03	2.10E-02	0	0	0	0
Acetone	0	9.00E-01	NA	0	0	0	NA
Antimony	1.43E+00	4.00E-04	NA	2.04E-07	5.10E-04	7.29E-08	NA
Aroclor 1254	2.02E-02	2.00E-05	2.00E+00	2.89E-09	1.44E-04	1.03E-09	2.06E-09
Aroclor 1260	7.18E-03	NA	2.00E+00	1.03E-09	NA	3.67E-10	7.34E-10
Arsenic	1.03E+01	3.00E-04	1.50E+00	1.47E-06	4.91E-03	5.26E-07	7.89E-07
Barium	1.42E+02	2.00E-01	NA	2.04E-05	1.02E-04	7.27E-06	NA
Benzene	0	4.00E-03	5.50E-02	0	0	0	0
Benzo(a)anthracene	6.67E-03	NA	7.30E-01	9.55E-10	NA	3.41E-10	2.49E-10
Benzo(a)pyrene	5.27E-02	NA	7.30E+00	7.54E-09	NA	2.69E-09	1.97E-08
Benzo(b)fluoranthene	4.92E-02	NA	7.30E-01	7.04E-09	NA	2.51E-09	1.84E-09
Benzo(k)fluoranthene	4.15E-03	NA	7.30E-02	5.94E-10	NA	2.12E-10	1.55E-11
Beryllium	1.08E+00	2.00E-03	4.30E+00	1.54E-07	7.69E-05	5.49E-08	2.36E-07
Bis(2-chloroisopropyl)ether	0	4.00E-02	NA	0	0	0	NA
Bis(2-ethylhexyl)phthalate	0	2.00E-02	1.40E-02	0	0	0	0
Boron	0	2.00E-01	NA	0	0	0	NA
Bromodichloromethane	9.80E-04	2.00E-02	6.20E-02	1.40E-10	7.01E-09	5.01E-11	3.11E-12
Bromoform	0	2.00E-02	7.90E-03	0	0	0	0
Bromomethane	0	1.40E-03	NA	0	0	0	NA
Cadmium	4.89E-01	1.00E-03	NA	7.00E-08	7.00E-05	2.50E-08	NA
Carbazole	0	NA	0.002	0	NA	0	0
Carbon disulfide	0	1.00E-01	NA	0	0	0	NA
Carbon tetrachloride	0	7.00E-04	1.30E-01	0	0	0	0
Chlordane	0	5.00E-04	3.50E-01	0	0	0	0
Chlorobenzene	0	2.00E-02	NA	0	0	0	NA
Chloroform	0	1.00E-02	6.10E-03	0	0	0	0
Chromium (VI)	0	3.00E-03	NA	0	0	0	NA
Chrysene	1.00E-02	NA	7.30E-03	1.43E-09	NA	5.12E-10	3.74E-12
Cobalt	0	2.00E-02	NA	0	0	0	NA
Copper	0	4.00E-02	NA	0	0	0	NA
Cyanide	0	2.00E-02	NA	0	0	0	NA
Cyclohexanone	0	5.00E+00	8.40E-01	0	0	0	0
Dibenzo(a,h)anthracene	1.92E-02	NA	7.30E+00	2.75E-09	NA	9.83E-10	7.18E-09
Dieldrin	1.79E-03	5.00E-05	1.60E+01	2.56E-10	5.12E-06	9.15E-11	1.46E-09
Di-n-octylphthalate	0	4.00E-02	NA	0	0	0	NA

Groundskeeper/Sampler - Ingestion of Soil
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	adult
	CDI =	(CS*EF*ED*IR*CF)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated
	CS =	Concentration of chemical in soil	mg/kg	see COC li
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Ingestion rate	mg/day	50
	FI =	Fraction of contaminated soil	unitless	0.75
	CF =	Conversion factor	kg/mg	1.00E-06
	BW =	Body weight	kg	71.8
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

COC	conc	RfDo	CSFos	ADULT CDI	HQ	CDI	ILCR
	mg/kg	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	0	2.00E-01	NA	0	0	0	NA
Ethylbenzene	0	1.00E-01	NA	0	0	0	NA
Fluoride	7.07E+00	6.00E-02	NA	1.01E-06	1.69E-05	3.61E-07	NA
Heptachlorodibenzofuran	0	NA	1.50E+03	0	NA	0	0
Heptachlorodibenzo-p-dioxin	1.68E-05	NA	1.50E+03	2.41E-12	NA	8.60E-13	1.29E-09
Hexachlorodibenzofuran	0	NA	1.50E+03	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0	NA	1.50E+04	0	NA	0	0
Indeno(1,2,3-cd)pyrene	4.12E-02	NA	7.30E-01	5.90E-09	NA	2.11E-09	1.54E-09
Lead	0	NA	NA	0	NA	0	NA
Manganese	0	1.40E-01	NA	0	0	0	NA
Mercury	0	3.00E-04	NA	0	0	0	NA
Methanol	0	5.00E-01	NA	0	0	0	NA
Methyl-2-pentanone	0	8.00E-02	NA	0	0	0	NA
Methylene chloride	0	6.00E-02	7.50E-03	0	0	0	0.00E+00
Molybdenum	3.40E+00	5.00E-03	NA	4.86E-07	9.73E-05	1.74E-07	NA
Nickel	0	2.00E-02	NA	0	0	0	NA
N-nitrosodiphenylamine	0	2.00E-02	4.90E-03	0	0	0	0
N-nitrosodipropylamine	0	NA	7.00E+00	0	NA	0	0
Octochlorodibenzofuran	0	NA	1.50E+02	0	NA	0	0
Octochlorodibenzo-p-dioxin	2.59E-04	NA	1.50E+02	3.71E-11	NA	1.32E-11	1.99E-09
Pentachlorodibenzofuran	0	NA	7.50E+03	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	NA	7.50E+04	0	NA	0	0
Pentachlorophenol	0	3.00E-02	1.20E-01	0	0	0	0
Phenanthrene	7.37E-03	NA	NA	1.06E-09	NA	3.77E-10	NA
Selenium	0	5.00E-03	NA	0	0	0	NA
Silver	4.72E-01	5.00E-03	NA	6.75E-08	1.35E-05	2.41E-08	NA
Tetrachlorodibenzofuran	0	NA	15000	0	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	NA	150000	0	NA	0	0
Tetrachloroethylene	1.11E-03	1.00E-02	5.40E-01	1.58E-10	1.58E-08	5.65E-11	3.05E-11
Thallium	0	9.00E-05	NA	0	0	0	NA
Toluene	0	8.00E-02	NA	0	0	0	NA
Tributyl phosphate	0	2.00E-01	5.40E-03	0	0	0	0
Trichloroethylene	1.83E-03	3.00E-04	4.00E-01	2.62E-10	8.72E-07	9.34E-11	3.74E-11
Trifluorochloromethane	0	3.00E-01	NA	0	0	0	NA
Uranium	3.89E+01	6.00E-04	NA	5.57E-06	9.29E-03	1.99E-06	NA
Vanadium	0	7.00E-03	NA	0	0	0	NA
Vinyl chloride	0	3.00E-03	1.50E+00	0	0	0	0
Xylenes	0	2.00E-01	NA	0	0	0	NA
Zinc	0	3.00E-01	NA	0	0	0	NA
				total =	**1.52E-02**	**total =**	**1.06E-06**

Groundskeeper/Sampler - Dermal Contact with Surface Water
Risk calculation for average U value in waste pits

			UNITS	adult
Intake Equation:	CDI =	(DA*EF*ED*SA)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	DA =	Dermal absorption dose	mg/cm^2day	see COC list below
	EF =	Exposure frequency	days/yr	12
	ED =	Exposure duration	yrs	25
	SA =	Surface area of skin	cm^2	5670
	BW =	Body weight	kg	71.8
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125
where:	DA = C_v*K_p*CF*ET			
	C_v =	concentation of ith contaminant in surface water	mg/L	see COC list below
	K_p =	permeability constant for ith contaminant	cm/hr	see COC list below
	CF =	conversion factor	L/cm^3	0.001
	ET =	exposure time	hr/d	1

COC	C_v	K_p	DA	RfD	CSF	ADULT CDI	ADULT HQ	ADULT CDI	ADULT ILCR
	mg/L	cm/hr	mg/cm^2day	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	0	0.00643	0	3.24E-03	7.04E-02	0	0	0	0
1,1-Dichloroethylene	0	0.0159	0	5.00E-02	6.00E-01	0	0	0	0
1,2-dichloroethane	0	0.00534	0	2.00E-02	9.10E-02	0	0	0	0
2-Butanone (MEK)	0	0.00111	0	4.80E-01	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	0.0169	0	NA	9.00E-01	0	NA	0	0
4-Methylphenol	0	0.00995	0	3.25E-03	NA	0	0	0	NA
4-Nitroanaline	0	0.00266	0	2.40E-03	2.63E-02	0	0	0	0
Acetone	0	0.000569	0	7.47E-01	NA	0	0	0	NA
Antimony	0	0.001	0	8.00E-06	NA	0	0	0	NA
Aroclor 1254	0	1.29	0	1.80E-05	4.44E-01	0	0	0	0
Aroclor 1260	0	5.48	0	NA	4.44E-01	0	NA	0	0
Arsenic	0	0.001	0	1.23E-04	3.66E+00	0	0	0	0
Barium	0	0.001	0	1.40E-02	NA	0	0	0	NA
Benzene	0	0.0207	0	3.88E-03	5.67E-02	0	0	0	0
Benzo(a)anthracene	0	0.948	0	NA	2.35E+00	0	NA	0	0
Benzo(a)pyrene	0	1.24	0	NA	2.35E+01	0	NA	0	0
Benzo(b)fluoranthene	0	0.699	0	NA	2.35E+00	0	NA	0	0
Benzo(k)fluoranthene	0	1.2	0	NA	2.35E-01	0	NA	0	0
Beryllium	0	0.001	0	2.00E-05	4.30E+02	0	0	0	0
Bis(2-chloroisopropyl)ether	0	0.0763	0	2.00E-02	NA	0	0	0	NA
Bis(2-ethylhexyl)phthalate	0	1.97	0	3.80E-03	7.37E-02	0	0	0	0
Boron	0	0.001	0	1.80E-01	NA	0	0	0	NA
Bromodichloromethane	0	0.00502	0	1.96E-02	6.33E-02	0	0	0	0
Bromoform	0	0.00277	0	1.20E-02	1.32E-02	0	0	0	0
Bromomethane	0	3.51E-03	0	1.12E-03	NA	0	0	0	NA
Cadmium	0	0.001	0	5.00E-06	NA	0	0	0	NA
Carbazole	0	0.0797	0	NA	2.86E-02	0	NA	0	0
Carbon disulfide	0	0.0156	0	6.30E-02	NA	0	0	0	NA
Carbon tetrachloride	0	0.0224	0	4.55E-04	2.00E-01	0	0	0	0
Chlordane	0	0.157	0	2.50E-04	7.00E-01	0	0	0	0
Chlorobenzene	0	0.0407	0	6.20E-03	NA	0	0	0	NA
Chloroform	0	0.00892	0	2.00E-03	3.05E-02	0	0	0	0
Chromium (VI)	0	0.002	0	6.00E-05	NA	0	0	0	NA
Chrysene	0	1.03	0	NA	2.35E-02	0	NA	0	0
Cobalt	0	0.0004	0	1.60E-02	NA	0	0	0	NA
Copper	0	0.001	0	1.20E-02	NA	0	0	0	NA
Cyanide	0	0.001	0	3.40E-03	NA	0	0	0	NA
Cyclohexanone	0	0.0018	0	4.00E+00	NA	0	0	0	NA

Groundskeeper/Sampler - Dermal Contact with Surface Water
Risk calculation for average U value in waste pits

			UNITS	adult
Intake Equation:	CDI =	(DA*EF*ED*SA)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	DA =	Dermal absorption dose	mg/cm^2day	see COC list below
	EF =	Exposure frequency	days/yr	12
	ED =	Exposure duration	yrs	25
	SA =	Surface area of skin	cm^2	5670
	BW =	Body weight	kg	71.8
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125
where:	$DA = C_v*K_p*CF*ET$			
	C_v =	concentation of ith contaminant in surface water	mg/L	see COC list below
	K_p =	permeability constant for ith contaminant	cm/hr	see COC list below
	CF =	conversion factor	L/cm^3	0.001
	ET =	exposure time	hr/d	1

COC	C_v	K_p	DA	RfD	CSF	ADULT CDI	ADULT HQ	ADULT CDI	ADULT ILCR
	mg/L	cm/hr	mg/cm^2day	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Dibenzo(a,h)anthracene	0	1.68	0	NA	2.35E+01	0	NA	0	0
Dieldrin	0	0.0445	0	2.50E-05	3.20E+01	0	0	0	0
Di-n-octylphthalate	0	4.45	0	3.60E-02	NA	0	0	0	NA
Ethyl ether	0	0.00288	0	1.60E-01	NA	0	0	0	NA
Ethylbenzene	0	0.0739	0	9.70E-02	NA	0	0	0	NA
Fluoride	0	0.001	0	5.82E-02	NA	0	0	0	NA
Heptachlorodibenzofuran	0	2.55	0	NA	3.00E+03	0	NA	0	0
Heptachlorodibenzo-p-dioxin	0	3.22	0	NA	3.00E+03	0	NA	0	0
Hexachlorodibenzofuran	0	2.38	0	NA	3.00E+04	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0	5.29	0	NA	3.00E+04	0	NA	0	0
Indeno(1,2,3-cd)pyrene	0	2.23	0	NA	2.35E+00	0	NA	0	0
Lead	0	0.0001	0	NA	NA	0	NA	0	NA
Manganese	0	0.001	0	1.84E-03	NA	0	0	0	NA
Mercury	0	0.001	0	2.10E-05	NA	0	0	0	NA
Methanol	0	0.000345	0	4.00E-01	NA	0	0	0	NA
Methyl-2-pentanone	0	0.00397	0	6.40E-02	NA	0	0	0	NA
Methylene chloride	0	0.00446	0	5.70E-02	7.89E-03	0	0	0	0
Molybdenum	0	0.001	0	1.90E-03	NA	0	0	0	NA
Nickel	0	0.0002	0	5.40E-03	NA	0	0	0	NA
N-nitrosodiphenylamine	0	0.0196	0	5.00E-03	1.96E-02	0	0	0	0
N-nitrosodipropylamine	0	2.83E-03	0	NA	2.80E+01	0	NA	0	0
Octochlorodibenzofuran	0	4.78	0	NA	3.00E+02	0	NA	0	0
Octochlorodibenzo-p-dioxin	0	16.5	0	NA	3.00E+02	0	NA	0	0
Pentachlorodibenzofuran	0	1.06	0	NA	1.50E+04	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	0.379	0	NA	1.50E+05	0	NA	0	0
Pentachlorophenol	0	0.195	0	3.00E-02	1.20E-01	0	0	0	0
Phenanthrene	0	0.229	0	NA	NA	0	NA	0	NA
Selenium	0	0.001	0	2.20E-03	NA	0	0	0	NA
Silver	0	0.0006	0	9.00E-04	NA	0	0	0	NA
Tetrachlorodibenzofuran	0	1.12	0	NA	3.00E+05	0	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	1.39	0	NA	3.00E+04	0	NA	0	0
Tetrachloroethylene	0	0.0481	0	1.00E-02	5.40E-01	0	0	0	0
Thallium	0	0.001	0	1.80E-05	NA	0	0	0	NA
Toluene	0	0.0453	0	6.40E-02	NA	0	0	0	NA
Tributyl phosphate	0	0.0313	0	1.00E-01	1.08E-02	0	0	0	0
Trichloroethylene	0	0.0157	0	4.50E-05	2.67E+00	0	0	0	0
Trifluorochloromethane	0	0.0173	0	6.90E-02	NA	0	0	0	NA
Uranium	5.63E-02	0.001	5.63E-08	5.10E-04	NA	1.46E-07	2.87E-04	5.22E-08	NA
Vanadium	0	0.001	0	7.00E-05	NA	0	0	0	NA
Vinyl chloride	0	0.0113	0	3.00E-03	1.50E+00	0	0	0	0
Xylenes	0	0.0704	0	1.84E-01	NA	0	0	0	NA
Zinc	0	0.0006	0	6.00E-02	NA	0	0	0	NA
						total =	2.87E-04	total =	0.00E+00

Groundskeeper/Sampler - Ingestion of Surface Water
Risk calculation for average U value in waste pits

Intake Equation:		UNITS	Assigned Values
	CDI = (CW*EF*ED*IR)/(BW*AT)		
	CDI = Chronic Daily Intake	mg/kgday	adult
	CW = Concentration of chemical in water	mg/L	see COC table below
	EF = Exposure frequency	days/yr	12
	ED = Exposure duration	yrs	25
	IR = Ingestion rate	L/day	0.01
	BW = Body weight	kg	70
	ATc = Average time for carcinogens	days	25550
	ATn = Average time for non-carcinogens	days	9125

				ADULT			
COC	CW mg/L	RfD mg/kgday	CSF kgday/mg	CDI mg/kgday	HQ CDI/RfD	CDI mg/kgday	ILCR CDI*CSF
1,1,2-Trichloroethane	0.00E+00	4.00E-03	5.70E-02	0	0	0	0
1,1-Dichloroethylene	0.00E+00	5.00E-02	6.00E-01	0	0	0	0
1,2-dichloroethane	0.00E+00	2.00E-02	9.10E-02	0	0	0	0
2-Butanone (MEK)	0.00E+00	6.00E-01	NA	0	0	0	NA
3,3-Dichlorobenzidine	0.00E+00	NA	4.50E-01	0	NA	0	0
4-Methylphenol	0.00E+00	5.00E-03	NA	0	0	0	NA
4-Nitroanaline	0.00E+00	3.00E-03	2.10E-02	0	0	0	0
Acetone	0.00E+00	9.00E-01	NA	0	0	0	NA
Antimony	0.00E+00	4.00E-04	NA	0	0	0	NA
Aroclor 1254	0.00E+00	2.00E-05	4.00E-01	0	0	0	0
Aroclor 1260	0.00E+00	NA	4.00E-01	0	NA	0	0
Arsenic	0.00E+00	3.00E-04	1.50E+00	0	0	0	0
Barium	0.00E+00	2.00E-01	NA	0	0	0	NA
Benzene	0.00E+00	4.00E-03	5.50E-02	0	0	0	0
Benzo(a)anthracene	0.00E+00	NA	7.30E-01	0	NA	0	0
Benzo(a)pyrene	0.00E+00	NA	7.30E+00	0	NA	0	0
Benzo(b)fluoranthene	0.00E+00	NA	7.30E-01	0	NA	0	0
Benzo(k)fluoranthene	0.00E+00	NA	7.30E-02	0	NA	0	0
Beryllium	0.00E+00	2.00E-03	4.30E+00	0	0	0	0
Bis(2-chloroisopropyl)ether	0.00E+00	4.00E-02	NA	0	0	0	NA
Bis(2-ethylhexyl)phthalate	0.00E+00	2.00E-02	1.40E-02	0	0	0	0
Boron	0.00E+00	2.00E-01	NA	0	0	0	NA
Bromodichloromethane	0.00E+00	2.00E-02	6.20E-02	0	0	0	0
Bromoform	0.00E+00	2.00E-02	7.90E-03	0	0	0	0
Bromomethane	0.00E+00	1.40E-03	NA	0	0	0	NA
Cadmium	0.00E+00	5.00E-04	NA	0	0	0	NA
Carbazole	0.00E+00	NA	0.002	0	NA	0	0
Carbon disulfide	0.00E+00	1.00E-01	NA	0	0	0	NA
Carbon tetrachloride	0.00E+00	7.00E-04	1.30E-01	0	0	0	0
Chlordane	0.00E+00	5.00E-04	3.50E-01	0	0	0	0
Chlorobenzene	0.00E+00	2.00E-02	NA	0	0	0	NA
Chloroform	0.00E+00	1.00E-02	6.10E-03	0	0	0	0
Chromium (VI)	0.00E+00	3.00E-03	NA	0	0	0	NA
Chrysene	0.00E+00	NA	7.30E-03	0	NA	0	0
Cobalt	0.00E+00	2.00E-02	NA	0	0	0	NA
Copper	0.00E+00	4.00E-02	NA	0	0	0	NA
Cyanide	0.00E+00	2.00E-02	NA	0	0	0	NA
Cyclohexanone	0.00E+00	5.00E+00	8.40E-01	0	0	0	NA

Groundskeeper/Sampler - Ingestion of Surface Water
Risk calculation for average U value in waste pits

Intake Equation:		UNITS	Assigned Values
	CDI = (CW*EF*ED*IR)/(BW*AT)		
	CDI = Chronic Daily Intake	mg/kgday	adult
	CW = Concentration of chemical in water	mg/L	see COC table below
	EF = Exposure frequency	days/yr	12
	ED = Exposure duration	yrs	25
	IR = Ingestion rate	L/day	0.01
	BW = Body weight	kg	70
	ATc = Average time for carcinogens	days	25550
	ATn = Average time for non-carcinogens	days	9125

				ADULT			
COC	**CW** mg/L	**RfD** mg/kgday	**CSF** kgday/mg	**CDI** mg/kgday	**HQ** CDI/RfD	**CDI** mg/kgday	**ILCR** CDI*CSF
Dibenzo(a,h)anthracene	0.00E+00	NA	7.30E+00	0	NA	0	0
Dieldrin	0.00E+00	5.00E-05	1.60E+01	0	0	0	0
Di-n-octylphthalate	0.00E+00	4.00E-02	NA	0	0	0	NA
Ethyl ether	0.00E+00	2.00E-01	NA	0	0	0	NA
Ethylbenzene	0.00E+00	1.00E-01	NA	0	0	0	NA
Fluoride	0.00E+00	6.00E-02	NA	0	0	0	NA
Heptachlorodibenzofuran	0.00E+00	NA	1.50E+03	0	NA	0	0
Heptachlorodibenzo-p-dioxin	0.00E+00	NA	1.50E+03	0	NA	0	0
Hexachlorodibenzofuran	0.00E+00	NA	1.50E+03	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0.00E+00	NA	1.50E+04	0	NA	0	0
Indeno(1,2,3-cd)pyrene	0.00E+00	NA	7.30E-01	0	NA	0	0
Lead	0.00E+00	NA	NA	0	NA	0	NA
Manganese	0.00E+00	4.60E-02	NA	0	0	0	NA
Mercury	0.00E+00	3.00E-04	NA	0	0	0	NA
Methanol	0.00E+00	5.00E-01	NA	0	0	0	NA
Methyl-2-pentanone	0.00E+00	8.00E-02	NA	0	0	0	NA
Methylene chloride	0.00E+00	6.00E-02	7.50E-03	0	0	0	0
Molybdenum	0.00E+00	5.00E-03	NA	0	0	0	NA
Nickel	0.00E+00	2.00E-02	NA	0	0	0	NA
N-nitrosodiphenylamine	0.00E+00	2.00E-02	4.90E-03	0	0	0	0
N-nitrosodipropylamine	0.00E+00	NA	7.00E+00	0	NA	0	0
Octochlorodibenzofuran	0.00E+00	NA	1.50E+02	0	NA	0	0
Octochlorodibenzo-p-dioxin	0.00E+00	NA	1.50E+02	0	NA	0	0
Pentachlorodibenzofuran	0.00E+00	NA	7.50E+03	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0.00E+00	NA	7.50E+04	0	NA	0	0
Pentachlorophenol	0.00E+00	3.00E-02	1.20E-01	0	0	0	0
Phenanthrene	0.00E+00	NA	NA	0	NA	0	NA
Selenium	0.00E+00	5.00E-03	NA	0	0	0	NA
Silver	0.00E+00	5.00E-03	NA	0	0	0	NA
Tetrachlorodibenzofuran	0.00E+00	NA	15000	0	NA	0	0
Tetrachlorodibenzo-p-dioxin	0.00E+00	NA	150000	0	NA	0	0
Tetrachloroethylene	0.00E+00	1.00E-02	5.40E-01	0	0	0	0
Thallium	0.00E+00	9.00E-05	NA	0	0	0	NA
Toluene	0.00E+00	8.00E-02	NA	0	0	0	NA
Tributyl phosphate	0.00E+00	2.00E-01	5.40E-03	0	0	0	0
Trichloroethylene	0.00E+00	3.00E-04	4.00E-01	0	0	0	0
Trifluorochloromethane	0.00E+00	3.00E-01	NA	0	0	0	NA
Uranium	5.63E-02	6.00E-04	NA	3.57E-07	5.96E-04	1.28E-07	NA
Vanadium	0.00E+00	7.00E-03	NA	0	0	0	NA
Vinyl chloride	0.00E+00	3.00E-03	1.50E+00	0	0	0	0
Xylenes	0.00E+00	2.00E-01	NA	0	0	0	NA
Zinc	0.00E+00	3.00E-01	NA	0	0	0	NA
				total = 5.96E-04		**total = 0.00E+00**	

Groundskeeper/Sampler - Inhalation of Gases & Particulates
Risk calculation for average COC values in waste pits

Intake Equation:		UNITS	adult
	CDI = (CA*EF*ED*IR*ET)		
	CDI = Chronic Daily Intake	pCi	calculated below
	CA = Concentration of radionuclide in air	pCi/m^3	see COC list below
	EF = Exposure frequency	days/yr	100
	ED = Exposure duration	yrs	25
	IR = Inhalation rate	m^3/hr	2.5
	ET = Exposure time	hrs/day	7

			ADULT	
COC	**conc** pCi/m^3	**CSFI** 1/pCi	**CDI** pCi	**ILCR** CDI*CSF
Cesium-137 + D	8.97E-07	1.19E-11	3.92E-02	4.67E-13
Lead-210 + D	1.11E-05	1.39E-08	4.84E-01	6.72E-09
Neptunium-237 + D	0	1.77E-08	0	0
Plutonium-238	0	3.36E-08	0	0
Plutonium-239/240	0	3.33E-08	0	0
Radium-226 + D	8.89E-06	1.16E-08	3.89E-01	4.51E-09
Radium-228 + D	7.26E-06	5.23E-09	3.18E-01	1.66E-09
Radon-222+ D	1.26E+01	1.80E-11	5.52E+05	9.93E-06
Strontium-90 + D	0	1.13E-10	0	0
Technetium-99	2.62E-05	1.41E-11	1.15E+00	1.62E-11
Thorium-228 + D	7.28E-06	1.43E-07	3.18E-01	4.55E-08
Thorium-230	6.23E-05	2.85E-08	2.73E+00	7.77E-08
Thorium-232	7.19E-06	4.33E-08	3.15E-01	1.36E-08
Uranium-234	8.69E-05	1.14E-08	3.80E+00	4.34E-08
Uranium-235 + D	3.96E-06	1.01E-08	1.73E-01	1.75E-09
Uranium-238 + D	8.49E-05	9.35E-09	3.71E+00	3.47E-08
			total = 1.02E-05	

air concentrations derived from soil values by using a conversion factor of 6.54E-6 g/m3
(based on ISCLT2 air model)

Exceptions: 'Rn-222 is obtained from RAECOM model and is based on Ra-226 soil concentration multiplied by a conversion factor of 9.28 g/m3 (conservative estimate, as this is the concentration at the ground surface with no dispersion considered)

Groundskeep/Sampler - Ingestion of Soil
Risk calculation for average COC values in waste pits

			UNITS	adult
Intake Equation:	CDI =	(CS*EF*ED*IR*FI)		
	CDI =	Chronic Daily Intake	pCi	calculated below
	CS =	Concentration of radionuclide in soil	pCi/g	see COC list below
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Ingestion rate	g/day	0.05
	FI =	Fraction of contaminated soil	unitless	0.75

			ADULT	
COC	**conc** pCi/g	**CSFos** 1/pCi	**CDI** pCi	**ILCR** CDI*CSF
Cesium-137 + D	1.00E-01	4.33E-11	1.29E+01	5.57E-10
Lead-210 + D	1.57E+00	2.66E-09	1.58E+02	4.21E-07
Neptunium-237 + D	0	1.46E-10	0	0
Plutonium-238	0	2.72E-10	0	0
Plutonium-239/240	0	2.76E-10	0	0
Radium-226 + D	1.36E+00	7.30E-10	1.27E+02	9.30E-08
Radium-228 + D	1.11E+00	2.29E-09	1.04E+02	2.38E-07
Radon-222+ D	NA	NA	NA	NA
Strontium-90 + D	0	1.44E-10	0	0
Technetium-99	2.88E+00	7.66E-12	3.76E+02	2.88E-09
Thorium-228 + D	1.11E+00	8.09E-10	1.04E+02	8.44E-08
Thorium-230	7.62E+00	2.02E-10	8.93E+02	1.80E-07
Thorium-232	1.10E+00	2.31E-10	1.03E+02	2.38E-08
Uranium-234	1.33E+01	1.58E-10	1.25E+03	1.97E-07
Uranium-235 + D	6.06E-01	1.63E-10	5.68E+01	9.26E-09
Uranium-238 + D	1.30E+01	2.10E-10	1.22E+03	2.56E-07
			total = 1.51E-06	

Groundskeeper/Sampler - Ingestion of Surface Water
Risk calculation for average U value in waste pits

Intake Equation:		UNITS	Assigned Values
	CDI = (CW*EF*ED*IR)		
	CDI = Chronic Daily Intake	pCi	adult
	CW = Concentration of radionuclide in water	pCi/L	see COC table below
	EF = Exposure frequency	days/yr	12
	ED = Exposure duration	yrs	25
	IR = Ingestion rate	L/day	0.01

			ADULT	
COC	conc pCi/L	CSF 1/pCi	CDI pCi	ILCR CDI*CSF
Cesium-137 + D	0	3.04E-11	0	0
Lead-210 + D	0	1.27E-09	0	0
Neptunium-237 + D	0	6.74E-11	0	0
Plutonium-238	0	1.31E-10	0	0
Plutonium-239/240	0	1.35E-10	0	0
Radium-226 + D	0	3.86E-10	0	0
Radium-228 + D	0	1.04E-09	0	0
Radon-222+ D	NA	NA	NA	NA
Strontium-90 + D	0	7.40E-11	0	0
Technetium-99	0	2.75E-12	0	0
Thorium-228 + D	0	3.00E-10	0	0
Thorium-230	0	9.10E-11	0	0
Thorium-232	0	1.01E-10	0	0
Uranium-234	1.92E+01	7.07E-11	7.80E+01	5.51E-09
Uranium-235 + D	8.76E-01	7.18E-11	3.55E+00	2.55E-10
Uranium-238 + D	1.88E+01	8.71E-11	7.62E+01	6.63E-09
			total = 1.24E-08	

Construction Worker - External Radiation
Risk calculation for average COC values in waste pits

		UNITS	adult
Intake Equation:	$CDI = (CS*EF*ED*ET_o*(1-SH_o))$		
CDI =	Chronic Daily Intake	yr pCi/g	calculated below
CS =	Concentration of radionuclide in soil	pCi/g	see COC list below
EF =	Fraction of year exposed to radiation	--	0.16
ED =	Exposure duration	yrs	25
ET_o =	Fraction of day spent outdoors	--	0.29
ET_i =	Fraction of day spent indoors	--	0.04
SH_o =	Shield factor outdoors	--	0.25
SH_i =	Shield factor indoors	--	0.5

			ADULT	
COC	**conc** pCi/g	**CSFx** g/pCi yr	**CDI** yr pCi/g	**ILCR** CDI*CSF
Cesium-137 + D	1.00E-01	2.55E-06	1.76E-01	4.49E-07
Lead-210 + D	1.57E+00	4.21E-09	2.17E+00	9.13E-09
Neptunium-237 + D	0	7.97E-07	0	0
Plutonium-238	0	7.22E-11	0	0
Plutonium-239/240	0	2.00E-10	0	0
Radium-226 + D	1.36E+00	8.49E-06	1.74E+00	1.48E-05
Radium-228 + D	1.11E+00	4.53E-06	1.43E+00	6.46E-06
Radon-222+ D	NA	NA	NA	NA
Strontium-90 + D	0	1.96E-08	0	0
Technetium-99	2.88E+00	8.14E-11	5.15E+00	4.19E-10
Thorium-228 + D	1.11E+00	7.76E-06	1.43E+00	1.11E-05
Thorium-230	7.62E+00	8.19E-10	1.22E+01	1.00E-08
Thorium-232	1.10E+00	3.42E-10	1.41E+00	4.83E-10
Uranium-234	1.33E+01	2.52E-10	1.71E+01	4.30E-09
Uranium-235 + D	6.06E-01	5.43E-07	7.77E-01	4.22E-07
Uranium-238 + D	1.30E+01	1.14E-07	1.67E+01	1.90E-06
			total =	**3.51E-05**

Groundskeeper/Sampler - Summation of all Pathways

Average COC concentration in waste pit CUs

	HQ	ILCR	rad only ILCR
Inhale	4.47E-04	1.02E-05	1.02E-05
Dermal Soil	2.42E-02	5.89E-06	NA
Ingest Soil	1.42E-02	2.39E-06	1.51E-06
Dermal Surface Water	3.87E-04	0.00E+00	NA
Ingest Surface Water	5.96E-04	1.24E-08	1.24E-08
Ext Rad	NA	3.51E-05	3.51E-05
SUM	**3.98E-02**	**5.36E-05**	**4.68E-05**

Summation of all paths for individual nuclides

	ILCR
Cesium-137 + D	4.49E-07
Lead-210 + D	4.37E-07
Neptunium-237 + D	0
Plutonium-238	0
Plutonium-239/240	0
Radium-226 + D	1.49E-05
Radium-228 + D	6.70E-06
Radon-222+ D	9.93E-06
Strontium-90 + D	0
Technetium-99	3.32E-09
Thorium-228 + D	1.12E-05
Thorium-230	2.68E-07
Thorium-232	3.79E-08
Uranium-234	2.50E-07
Uranium-235 + D	4.33E-07
Uranium-238 + D	2.20E-06
SUM	**4.68E-05**

Summation of all paths for individual chemicals

	ILCR	HQ
1,1,2-Trichloroethane	2.62E-11	3.22E-07
1,1-Dichloroethylene	1.38E-10	1.29E-08
1,2-dichloroethane	1.73E-11	2.66E-08
2-Butanone (MEK)	No CSFs	0.00E+00
3,3-Dichlorobenzidine	0.00E+00	No RfDs
4-Methylphenol (p-cresol)	No CSFs	0.00E+00
4-Nitroanaline	0.00E+00	0.00E+00
Acetone	No CSFs	0.00E+00
Antimony	No CSFs	1.77E-03
Aroclor 1254	4.37E-08	3.06E-03
Aroclor 1260	1.70E-08	No RfDs
Arsenic	3.62E-06	2.24E-02
Barium	No CSFs	5.56E-04
Benzene	0.00E+00	0.00E+00
Benzo(a)anthracene	8.03E-08	No RfDs
Benzo(a)pyrene	1.06E-06	No RfDs
Benzo(b)fluoranthene	9.88E-08	No RfDs
Benzo(k)fluoranthene	5.00E-09	No RfDs
Beryllium	1.36E-06	5.07E-04
Bis(2-chloroisopropyl)ether	No CSFs	0.00E+00
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00
Boron	No CSFs	0.00E+00
Bromodichloromethane	1.19E-11	2.68E-08
Bromoform	0.00E+00	0.00E+00
Bromomethane	No CSFs	0.00E+00
Cadmium	3.62E-10	3.93E-04
Carbazole	0.00E+00	No RfDs
Carbon disulfide	No CSFs	0.00E+00
Carbon tetrachloride	0.00E+00	0.00E+00
Chlordane	0.00E+00	0.00E+00
Chlorobenzene	No CSFs	0.00E+00
Chloroform	0.00E+00	0.00E+00
Chromium (VI)	0.00E+00	0.00E+00
Chrysene	1.21E-09	No RfDs
Cobalt	0.00E+00	0.00E+00
Copper	No CSFs	0.00E+00
Cyanide	No CSFs	0.00E+00
Cyclohexanone	No CSFs	0.00E+00
Dibenzo(a,h)anthracene	3.86E-07	No RfDs
Dieldrin	7.73E-09	2.70E-05
Di-n-octylphthalate	No CSFs	0.00E+00
Ethyl ether	No CSFs	0.00E+00
Ethylbenzene	0.00E+00	0.00E+00
Fluoride	No CSFs	3.08E-05
Heptachlorodibenzofuran	0.00E+00	No RfDs
Heptachlorodibenzo-p-dioxin	1.45E-08	No RfDs
Hexachlorodibenzofuran	0.00E+00	No RfDs
Hexachlorodibenzo-p-dioxin	0.00E+00	No RfDs
Indeno(1,2,3-cd)pyrene	8.63E-08	No RfDs
Lead	No CSFs	No RfDs
Manganese	No CSFs	0.00E+00
Mercury	No CSFs	0.00E+00
Methanol	No CSFs	0.00E+00
Methyl-2-pentanone	No CSFs	0.00E+00
Methylene chloride	0.00E+00	0.00E+00

Summation of all paths for individual chemicals
(continued)

	ILCR	HQ
Molybdenum	No CSFs	8.21E-05
Nickel	No CSFs	0.00E+00
N-nitrosodiphenylamine	0.00E+00	0.00E+00
N-nitrosodipropylamine	0.00E+00	No RfDs
Octochlorodibenzofuran	0.00E+00	No RfDs
Octochlorodibenzo-p-dioxin	2.23E-08	No RfDs
Pentachlorodibenzofuran	0.00E+00	No RfDs
Pentachlorodibenzo-p-dioxin	0.00E+00	No RfDs
Pentachlorophenol	0.00E+00	0.00E+00
Phenanthrene	No CSFs	No RfDs
Selenium	No CSFs	0.00E+00
Silver	No CSFs	1.21E-05
Tetrachlorodibenzofuran	0.00E+00	No RfDs
Tetrachlorodibenzo-p-dioxin	0.00E+00	No RfDs
Tetrachloroethylene	1.16E-10	6.00E-08
Thallium	No CSFs	0.00E+00
Toluene	No CSFs	0.00E+00
Tributyl phosphate	0.00E+00	0.00E+00
Trichloroethylene	4.57E-10	1.07E-05
Trifluorochloromethane	No CSFs	0.00E+00
Uranium	No CSFs	1.10E-02
Vanadium	No CSFs	0.00E+00
Vinyl chloride	0.00E+00	0.00E+00
Xylenes	No CSFs	0.00E+00
Zinc	No CSFs	0.00E+00
SUM	**6.80E-06**	**3.98E-02**

APPENDIX C.2

RISK ASSESSMENT CALCULATIONS

UNDEVELOPED PARK USER

Undeveloped Park User - Inhalation of Gases & Particulates
Risk calculation for average COC values in waste pits

Intake Equation:

		UNITS	Assigned Values			
			child	youth	adult	senior
CDI =	(CS*EF*ED*IR*ET)/(BW*AT)					
CDI =	Chronic Daily Intake	mg/kgday				
CA =	Concentration of chemical in air	mg/m³	see table of COCs below			
EF =	Exposure frequency	days/yr	20	40	20	40
ED =	Exposure duration	yrs	3	6	14	7
IR =	Inhalation rate	m³/hr	1	1	1	1
ET =	Exposure time	hrs/day	2	2	2	2
BW =	Body weight	kg	15.5	46.9	71.8	71.8
ATc =	Average time for carcinogens	days	25550	25550	25550	25550
ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	RfDI	CSFi	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/m³	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	2.13E-12	NA	5.60E-02	1.51E-14	NA	6.46E-16	3.62E-17	9.97E-15	NA	8.54E-16	4.78E-17	3.26E-15	NA	6.51E-16	3.65E-17	6.51E-15	NA	6.51E-16	3.65E-17	3.48E-14	NA	2.80E-15	1.57E-16
1,1-Dichloroethylene	7.75E-12	5.71E-02	1.75E-01	5.48E-14	9.59E-13	2.35E-15	4.11E-16	3.62E-14	6.34E-13	3.1E-15	5.43E-16	1.18E-14	2.07E-13	2.37E-15	4.14E-16	2.37E-14	4.14E-13	2.37E-15	4.14E-16	1.26E-13	2.21E-12	1.02E-14	1.78E-15
1,2-dichloroethane	8.41E-12	NA	9.10E-02	4.53E-14	NA	1.94E-15	1.77E-16	3E-14	NA	2.57E-15	2.34E-16	9.79E-15	NA	1.96E-15	1.78E-16	1.96E-14	NA	1.96E-15	1.78E-16	1.05E-13	NA	8.43E-15	7.67E-16
2-Butanone (MEK)	0	1.43E+00	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
4-Methylphenol (p-cresol)	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
4-Nitroanaline	0	1.14E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Acetone	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Antimony	9.32E-09	NA	NA	6.59E-11	NA	2.82E-12	NA	4.36E-11	NA	3.73E-12	NA	1.42E-11	NA	2.85E-12	NA	2.85E-11	NA	2.85E-12	NA	1.52E-10	NA	1.23E-11	NA
Aroclor 1254	1.32E-10	NA	2.00E+00	9.34E-13	NA	4E-14	8.00E-14	6.17E-13	NA	5.29E-14	1.06E-13	2.02E-13	NA	4.03E-14	8.06E-14	4.03E-13	NA	4.03E-14	8.06E-14	2.16E-12	NA	1.74E-13	3.47E-13
Aroclor 1260	4.70E-11	NA	2.00E+00	3.32E-13	NA	1.42E-14	2.85E-14	2.2E-13	NA	1.88E-14	3.76E-14	7.17E-14	NA	1.43E-14	2.87E-14	1.43E-13	NA	1.43E-14	2.87E-14	7.67E-13	NA	6.17E-14	1.23E-13
Arsenic	6.73E-08	NA	1.51E+01	4.76E-10	NA	2.04E-11	3.08E-10	3.15E-10	NA	2.7E-11	4.07E-10	1.03E-10	NA	2.05E-11	3.10E-10	2.05E-10	NA	2.05E-11	3.10E-10	1.10E-09	NA	8.85E-11	1.34E-09
Barium	9.30E-07	1.43E-04	NA	6.58E-09	4.60E-05	2.82E-10	NA	4.35E-09	3.04E-05	3.73E-10	NA	1.42E-09	9.93E-06	2.84E-10	NA	2.84E-09	1.99E-05	2.84E-10	NA	1.52E-08	1.06E-04	1.22E-09	NA
Benzene	0	8.57E-03	2.73E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a)anthracene	4.36E-11	NA	3.80E-01	3.08E-13	NA	1.32E-14	5.02E-15	2.04E-13	NA	1.75E-14	6.64E-15	6.66E-14	NA	1.33E-14	5.06E-15	1.33E-13	NA	1.33E-14	5.06E-15	7.12E-13	NA	5.73E-14	2.18E-14
Benzo(a)pyrene	3.45E-10	NA	3.08E-01	2.44E-12	NA	1.04E-13	3.22E-14	1.61E-12	NA	1.38E-13	4.25E-14	5.26E-13	NA	1.05E-13	3.24E-14	1.05E-12	NA	1.05E-13	3.24E-14	5.63E-12	NA	4.53E-13	1.39E-13
Benzo(b)fluoranthene	3.22E-10	NA	3.08E+00	2.28E-12	NA	9.75E-14	3.00E-13	1.5E-12	NA	1.29E-13	3.97E-13	4.91E-13	NA	9.82E-14	3.03E-13	9.82E-13	NA	9.82E-14	3.03E-13	5.25E-12	NA	4.23E-13	1.30E-12
Benzo(k)fluoranthene	2.71E-11	NA	3.08E-02	1.92E-13	NA	8.22E-15	2.53E-16	1.27E-13	NA	1.09E-14	3.35E-16	4.14E-14	NA	8.29E-15	2.55E-16	8.29E-14	NA	8.29E-15	2.55E-16	4.43E-13	NA	3.57E-14	1.10E-15
Beryllium	7.03E-09	5.71E-06	8.40E+00	4.97E-11	8.71E-06	2.13E-12	1.79E-11	3.29E-11	5.76E-06	2.82E-12	2.37E-11	1.07E-11	1.88E-06	2.15E-12	1.80E-11	2.15E-11	3.76E-06	2.15E-12	1.80E-11	1.15E-10	2.01E-05	9.24E-12	7.76E-11
Bis(2-chloroisopropyl)ether	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Bis(2-ethylhexyl)phthalate	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Boron	0	5.71E-03	NA	0	0	0	NA	0	0.00E+00	0	NA	0	0.00E+00	0	NA	0	0	0	NA	0	0	0	NA
Bromodichloromethane	6.41E-12	NA	NA	4.53E-14	NA	1.94E-15	NA	3E-14	NA	2.57E-15	NA	9.79E-15	NA	1.96E-15	NA	1.96E-14	NA	1.96E-15	NA	1.05E-13	NA	8.43E-15	NA
Bromoform	0	NA	3.85E-03	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Bromomethane	0	0.00143	NA	0	0	0	NA	0	0.00E+00	0	NA	0	0.00E+00	0	NA	0	0	0	NA	0	0	0	NA
Cadmium	3.20E-09	NA	6.30E+00	2.26E-11	NA	9.7E-13	6.11E-12	1.5E-11	NA	1.28E-12	8.08E-12	4.89E-12	NA	9.77E-13	6.16E-12	9.77E-12	NA	9.77E-13	6.16E-12	5.22E-11	NA	4.21E-12	2.65E-11
Carbazole	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Carbon disulfide	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Carbon tetrachloride	0	NA	5.25E-02	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Chlordane	0	2.00E-04	3.50E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlorobenzene	0	1.43E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Chloroform	0	NA	8.05E-02	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Chromium (VI)	0	2.86E-05	4.20E+01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysene	6.56E-11	NA	3.08E-03	4.64E-13	NA	1.99E-14	6.12E-17	3.06E-13	NA	2.63E-14	8.09E-17	1E-13	NA	2E-14	6.17E-17	2E-13	NA	2E-14	6.17E-17	1.07E-12	NA	8.62E-14	2.65E-16
Cobalt	0	5.71E-06	9.80E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Cyanide	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Cyclohexanone	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Dibenzo(a,h)anthracene	1.26E-10	NA	3.08E+00	8.89E-13	NA	3.81E-14	1.17E-13	5.88E-13	NA	5.04E-14	1.55E-13	1.92E-13	NA	3.84E-14	1.18E-13	3.84E-13	NA	3.84E-14	1.18E-13	2.05E-12	NA	1.65E-13	5.09E-13
Dieldrin	1.17E-11	NA	1.61E+01	8.28E-14	NA	3.55E-15	5.71E-14	5.47E-14	NA	4.69E-15	7.55E-14	1.79E-14	NA	3.57E-15	5.75E-14	3.57E-14	NA	3.57E-15	5.75E-14	1.91E-13	NA	1.54E-14	2.48E-13
Di-n-octylphthalate	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA

Undeveloped Park User - Inhalation of Gases & Particulates
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CS*EF*ED*IR*ET)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday				
	CA =	Concentration of chemical in air	mg/m³	see table of COCs below			
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Inhalation rate	m³/hr	1	1	1	1
	ET =	Exposure time	hrs/day	2	2	2	2
	BW =	Body weight	kg	15.5	46.9	71.8	71.8
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

				CHILD				YOUTH				ADULT				SENIOR				SUM			
COC	conc	RfDi	CSFi	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
Ethyl ether	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Ethylbenzene	0	2.86E-01	3.85E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fluoride	4.62E-08	NA	NA	3.27E-10	NA	1.4E-11	NA	2.16E-10	NA	1.85E-11	NA	7.06E-11	NA	1.41E-11	NA	1.41E-10	NA	1.41E-11	NA	7.55E-10	NA	6.08E-11	NA
Heptachlorodibenzofuran	0	NA	1.16E+03	0	NA	0	0.00E+00	0	NA	0	0.00E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0
Heptachlorodibenzo-p-dioxin	1.10E-13	NA	1.16E+03	7.78E-16	NA	3.33E-17	3.87E-14	5.14E-16	NA	4.41E-17	5.11E-14	1.68E-16	NA	3.36E-17	3.90E-14	3.36E-16	NA	3.36E-17	3.90E-14	1.80E-15	NA	1.45E-16	1.68E-13
Hexachlorodibenzofuran	0	NA	1.16E+04	0	NA	0	0.00E+00	0	NA	0	0.00E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0	NA	1.16E+04	0	NA	0	0.00E+00	0	NA	0	0.00E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0
Indeno(1,2,3-cd)pyrene	2.70E-10	NA	3.08E-01	1.91E-12	NA	8.17E-14	2.52E-14	1.26E-12	NA	1.08E-13	3.33E-14	4.11E-13	NA	8.23E-14	2.53E-14	8.23E-13	NA	8.23E-14	2.53E-14	4.40E-12	NA	3.54E-13	1.09E-13
Lead	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Manganese	0	1.43E-05	NA	0	0.00E+00	0	NA	0	0.00E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Mercury	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Methanol	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Methyl-2-pentanone	0	8.57E-01	NA	0	0.00E+00	0	NA	0	0.00E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Methylene chloride	0	8.57E-01	1.65E-03	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	0	0	0	0	0	0	0	0	0	0	0
Molybdenum	2.22E-08	NA	NA	1.57E-10	NA	6.74E-12	NA	1.04E-10	NA	8.91E-12	NA	3.39E-11	NA	6.79E-12	NA	6.79E-11	NA	6.79E-12	NA	3.63E-10	NA	2.92E-11	NA
Nickel	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0.00E+00	NA	0.00E+00	NA
N-nitrosodiphenylamine	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0.00E+00	NA	0.00E+00	NA
N-nitrosodipropylamine	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0.00E+00	NA	0.00E+00	NA
Octochlorodibenzofuran	0	NA	1.16E+02	0	NA	0	0.00E+00	0	NA	0	0.00E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0
Octochlorodibenzo-p-dioxin	1.70E-12	NA	1.16E+02	1.2E-14	NA	5.14E-16	5.96E-14	7.92E-15	NA	6.79E-16	7.88E-14	2.59E-15	NA	5.17E-16	6.00E-14	5.17E-15	NA	5.17E-16	6.00E-14	2.77E-14	NA	2.23E-15	2.58E-13
Pentachlorodibenzofuran	0	NA	5.78E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	NA	5.78E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Pentachlorophenol	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Phenanthrene	4.82E-11	NA	NA	3.41E-13	NA	1.46E-14	NA	2.25E-13	NA	1.93E-14	NA	7.36E-14	NA	1.47E-14	NA	1.47E-13	NA	1.47E-14	NA	7.87E-13	NA	6.34E-14	NA
Selenium	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Silver	3.09E-09	NA	NA	2.18E-11	NA	9.35E-13	NA	1.44E-11	NA	1.24E-12	NA	4.71E-12	NA	9.42E-13	NA	9.42E-12	NA	9.42E-13	NA	5.04E-11	NA	4.05E-12	NA
Tetrachlorodibenzofuran	0	NA	1.16E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	NA	1.16E+05	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Tetrachloroethylene	7.24E-12	1.71E-01	2.07E-02	5.12E-14	2.99E-13	2.19E-15	4.54E-17	3.38E-14	1.98E-13	2.9E-15	6.00E-17	1.1E-14	6.46E-14	2.21E-15	4.57E-17	2.21E-14	1.29E-13	2.21E-15	4.57E-17	1.18E-13	6.91E-13	9.51E-15	1.97E-16
Thallium	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Toluene	0	1.43E+00	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Tributyl phosphate	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Trichloroethylene	1.20E-11	1.14E-02	4.00E-01	8.45E-14	7.42E-12	3.62E-15	1.45E-15	5.59E-14	4.90E-12	4.79E-15	1.92E-15	1.82E-14	1.6E-12	3.65E-15	1.46E-15	3.65E-14	3.20E-12	3.65E-15	1.46E-15	1.95E-13	1.71E-11	1.57E-14	6.29E-15
Trifluorochloromethane	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Uranium	2.55E-07	NA	NA	1.8E-09	NA	7.72E-11	NA	1.19E-09	NA	1.02E-10	NA	3.89E-10	NA	7.78E-11	NA	7.78E-10	NA	7.78E-11	NA	4.16E-09	NA	3.35E-10	NA
Vanadium	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Vinyl chloride	0	2.86E-02	3.08E-02	0	0	0	0.00E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xylenes	0	2.86E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Zinc	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
																				total =	1.28E-04	total =	1.44E-09

Air concentrations derived from soil values by using a conversion factor of 6.54E-6 g/m3 (based on ISCLT2 air model)

Undeveloped Park User - Dermal Contact with Soil/Sediment
Risk calculation for average COC values in waste pits

Intake Equation:

			UNITS	Assigned Values			
				child	youth	adult	senior
CDI =	(CS*AB*SA*EF*ED*AF*CF)/(BW*AT)						
CDI =	Chronic Daily Intake		mg/kgday				
CS =	Concentration of chemical in soil		mg/kg	see table of COCs below			
AB	Absorption factor		--	see table of COCs below			
SA	Surface area of exposed skin		cm^2/day	1730	3520	4850	4850
EF =	Exposure frequency		days/yr	20	40	20	40
ED =	Exposure duration		yrs	3	6	14	7
AF =	Adherence factor		mg/cm^2	1.9	1.9	0.06	0.06
CF =	Conversion factor		kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06
BW =	Body weight		kg	15.5	46.9	71.8	71.8
ATc =	Average time for carcinogens		days	25550	25550	25550	25550
ATn =	Average time for non-carcinogens		days	1095	2190	5110	2555

COC	conc	AB	RfDd	CSFd	CHILD				YOUTH				ADULT				SENIOR				SUM			
					CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/kg	unitless	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	3.26E-04	1.00E-02	3.24E-03	7.04E-02	3.8E-11	1.17E-08	1.6E-12	1.14E-13	5.1E-11	1.57E-08	4.4E-12	3.08E-13	7.2E-13	2.24E-10	1.4E-13	1.02E-14	1.4E-12	4.47E-10	1.4E-13	1.02E-14	9.10E-11	2.81E-08	6.28E-12	4.42E-13
1,1-Dichloroethylene	1.18E-03	1.00E-02	5.00E-02	6.00E-01	1.4E-10	2.75E-09	5.9E-12	3.54E-12	1.9E-10	3.70E-09	1.6E-11	9.52E-12	2.6E-12	5.26E-11	5.3E-13	3.18E-13	5.3E-12	1.05E-10	5.3E-13	3.18E-13	3.31E-10	6.61E-09	2.28E-11	1.37E-11
1,2-dichloroethane	9.80E-04	1.00E-02	2.00E-02	9.10E-02	1.1E-10	5.70E-09	4.9E-12	4.44E-13	1.5E-10	7.66E-09	1.3E-11	1.20E-12	2.2E-12	1.09E-10	4.4E-13	3.96E-14	4.4E-12	2.18E-10	4.4E-13	3.96E-14	2.74E-10	1.37E-08	1.89E-11	1.72E-12
2-Butanone (MEK)	0	1.00E-02	4.80E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	1.00E-02	NA	9.00E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
4-Methylphenol (p-cresol)	0	1.00E-02	3.25E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
4-Nitroanaline	0	1.00E-02	2.40E-03	2.63E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetone	0	1.00E-02	7.47E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Antimony	1.43E+00	1.00E-03	8.00E-06	NA	1.7E-08	2.07E-03	7.1E-10	NA	2.2E-08	2.78E-03	1.9E-09	NA	3.2E-10	3.96E-05	6.3E-11	NA	6.3E-10	7.91E-05	6.3E-11	NA	3.98E-08	4.97E-03	2.75E-09	NA
Aroclor 1254	2.02E-02	1.40E-01	1.80E-05	2.22E+00	3.3E-08	1.83E-03	1.4E-09	3.13E-09	4.4E-08	2.45E-03	3.8E-09	8.41E-09	6.3E-10	3.49E-05	1.3E-10	2.79E-10	1.3E-09	6.98E-05	1.3E-10	2.79E-10	7.89E-08	4.38E-03	5.45E-09	1.21E-08
Aroclor 1260	7.18E-03	1.40E-01	NA	2.22E+00	1.2E-08	NA	5E-10	1.11E-09	1.6E-08	NA	1.3E-09	2.99E-09	2.2E-10	NA	4.5E-11	9.92E-11	4.5E-10	NA	4.5E-11	9.92E-11	2.81E-08	NA	1.94E-09	4.30E-09
Arsenic	1.03E+01	3.00E-02	1.23E-04	3.66E+00	3.6E-06	2.92E-02	1.5E-07	5.63E-07	4.8E-06	3.92E-02	4.1E-07	1.51E-06	6.9E-08	5.58E-04	1.4E-08	5.02E-08	1.4E-07	1.12E-03	1.4E-08	5.02E-08	8.62E-06	7.01E-02	5.95E-07	2.18E-06
Barium	1.42E+02	1.00E-03	1.40E-02	NA	1.7E-06	1.18E-04	7.1E-08	NA	2.2E-06	1.59E-04	1.9E-07	NA	3.2E-08	2.26E-06	6.3E-09	NA	6.3E-08	4.51E-06	6.3E-09	NA	3.97E-06	2.84E-04	2.74E-07	NA
Benzene	0	1.00E-02	3.88E-03	5.67E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a)anthracene	6.67E-03	1.30E-01	NA	2.35E+00	1E-08	NA	4.3E-10	1.02E-09	1.4E-08	NA	1.2E-09	2.73E-09	1.9E-10	NA	3.9E-11	9.05E-11	3.9E-10	NA	3.9E-11	9.05E-11	2.42E-08	NA	1.67E-09	3.93E-09
Benzo(a)pyrene	5.27E-02	1.30E-01	NA	2.35E+01	8E-08	NA	3.4E-09	8.02E-08	1.1E-07	NA	9.2E-09	2.16E-07	1.5E-09	NA	3E-10	7.15E-09	3E-09	NA	3E-10	7.15E-09	1.91E-07	NA	1.32E-08	3.10E-07
Benzo(b)fluoranthene	4.92E-02	1.30E-01	NA	2.35E+00	7.4E-08	NA	3.2E-09	7.49E-09	1E-07	NA	8.6E-09	2.01E-08	1.4E-09	NA	2.8E-10	6.68E-10	2.8E-09	NA	2.8E-10	6.68E-10	1.79E-07	NA	1.23E-08	2.90E-08
Benzo(k)fluoranthene	4.15E-03	1.30E-01	NA	2.35E-01	6.3E-09	NA	2.7E-10	6.31E-11	8.4E-09	NA	7.2E-10	1.70E-10	1.2E-10	NA	2.4E-11	5.63E-12	2.4E-10	NA	2.4E-11	5.63E-12	1.51E-08	NA	1.04E-09	2.44E-10
Beryllium	1.08E+00	1.00E-03	2.00E-05	4.30E+02	1.2E-08	6.25E-04	5.4E-10	2.30E-07	1.7E-08	8.40E-04	1.4E-09	6.19E-07	2.4E-10	1.19E-05	4.8E-11	2.05E-08	4.8E-10	2.39E-05	4.8E-11	2.05E-08	3.00E-08	1.50E-03	2.07E-09	8.91E-07
Bis(2-chloroisopropyl)ether	0	1.00E-02	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Bis(2-ethylhexyl)phthalate	0	1.00E-02	3.80E-03	7.37E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Boron	0	1.00E-03	1.80E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Bromodichloromethane	9.80E-04	1.00E-02	1.96E-02	6.33E-02	1.1E-10	5.81E-09	4.9E-12	3.09E-13	1.5E-10	7.82E-09	1.3E-11	8.31E-13	2.2E-12	1.11E-10	4.4E-13	2.76E-14	4.4E-12	2.22E-10	4.4E-13	2.76E-14	2.74E-10	1.40E-08	1.89E-11	1.20E-12
Bromoform	0	1.00E-02	1.20E-02	1.32E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromomethane	0	1.00E-02	1.12E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Cadmium	4.89E-01	1.00E-03	1.00E-05	NA	5.7E-09	5.69E-04	2.4E-10	NA	7.6E-09	7.65E-04	6.6E-10	NA	1.1E-10	1.09E-05	2.2E-11	NA	2.2E-10	2.17E-05	2.2E-11	NA	1.37E-08	1.37E-03	9.43E-10	NA
Carbazole	0	1.00E-02	NA	2.86E-02	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Carbon disulfide	0	2.50E-01	6.30E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Carbon tetrachloride	0	1.00E-02	4.55E-04	2.00E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlordane	0	4.00E-02	2.50E-04	7.00E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlorobenzene	0	1.00E-02	6.20E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Chloroform	0	1.00E-02	2.00E-03	3.05E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium (VI)	0	1.00E-03	6.00E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Chrysene	1.00E-02	1.30E-01	NA	2.35E-02	1.5E-08	NA	6.5E-10	1.53E-11	2E-08	NA	1.7E-09	4.10E-11	2.9E-10	NA	5.8E-11	1.36E-12	5.8E-10	NA	5.8E-11	1.36E-12	3.64E-08	NA	2.51E-09	5.90E-11
Cobalt	0	1.00E-03	1.60E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Copper	0	1.00E-03	1.20E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Cyanide	0	1.00E-02	3.40E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Cyclohexanone	0	1.00E-02	4.00E+00	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Dibenzo(a,h)anthracene	1.92E-02	1.30E-01	NA	2.35E+01	2.9E-08	NA	1.2E-09	2.93E-08	3.9E-08	NA	3.3E-09	7.87E-08	5.6E-10	NA	1.1E-10	2.61E-09	1.1E-09	NA	1.1E-10	2.61E-09	8.98E-08	NA	4.82E-09	1.13E-07
Dieldrin	1.79E-03	1.00E-02	2.50E-05	3.20E+01	2.1E-10	8.32E-06	8.9E-12	2.85E-10	2.8E-10	1.12E-05	2.4E-11	7.67E-10	4E-12	1.59E-07	8E-13	2.54E-11	8E-12	3.18E-07	8E-13	2.54E-11	5.00E-10	2.00E-05	3.45E-11	1.10E-09
Di-n-octylphthalate	0	1.00E-02	3.60E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Ethyl ether	0	1.00E-02	1.60E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA

Undeveloped Park User - Dermal Contact with Soil/Sediment
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CS*AB*SA*EF*ED*AF*CF)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday				
	CS =	Concentration of chemical in soil	mg/kg	see table of COCs below			
	AB	Absorption factor	–	see table of COCs below			
	SA	Surface area of exposed skin	cm^2/day	1730	3520	4850	4850
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	AF =	Adherence factor	mg/cm^2	1.9	1.9	0.06	0.06
	CF =	Conversion factor	kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06
	BW =	Body weight	kg	15.5	46.9	71.8	71.8
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	AB	RfDd	CSFd	CHILD				YOUTH				ADULT				SENIOR				SUM			
					CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/kg	unitless	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethylbenzene	0	1.00E-02	9.70E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Fluoride	7.07E+00	1.00E-03	5.82E-02	NA	8.2E-08	1.41E-06	3.5E-09	NA	1.1E-07	1.90E-06	9.5E-09	NA	1.6E-09	2.70E-08	3.1E-10	NA	3.1E-09	5.40E-08	3.1E-10	NA	1.97E-07	3.39E-06	1.36E-08	NA
Heptachlorodibenzofuran	0	1.00E-02	NA	3.00E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Heptachlorodibenzo-p-dioxin	1.68E-05	3.00E-02	NA	3.00E+03	5.9E-12	NA	2.5E-13	7.54E-10	7.9E-12	NA	6.8E-13	2.03E-09	1.1E-13	NA	2.2E-14	6.72E-11	2.2E-13	NA	2.2E-14	6.72E-11	1.41E-11	NA	9.72E-13	2.92E-09
Hexachlorodibenzofuran	0	1.00E-02	NA	3.00E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0	3.00E-02	NA	3.00E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Indeno(1,2,3-cd)pyrene	4.12E-02	1.30E-01	NA	2.35E+00	6.2E-08	NA	2.7E-09	6.27E-09	8.4E-08	NA	7.2E-09	1.69E-08	1.2E-09	NA	2.4E-10	5.59E-10	2.4E-09	NA	2.4E-10	5.59E-10	1.50E-07	NA	1.03E-08	2.43E-08
Lead	0	1.00E-03	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Manganese	0	1.00E-03	5.60E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Mercury	0	1.00E-03	2.10E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Methanol	0	1.00E-02	4.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Methyl-2-pentanone	0	1.00E-02	6.40E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Methylene chloride	0	1.00E-02	5.70E-02	7.89E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Molybdenum	3.40E+00	1.00E-03	1.90E-03	NA	4E-08	2.08E-05	1.7E-09	NA	5.3E-08	2.80E-05	4.6E-09	NA	7.6E-10	3.97E-07	1.5E-10	NA	1.5E-09	7.95E-07	1.5E-10	NA	9.49E-08	4.99E-05	6.55E-09	NA
Nickel	0	1.00E-03	5.40E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
N-nitrosodiphenylamine	0	1.00E-02	5.00E-03	1.96E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N-nitrosodipropylamine	0	1.00E-02	NA	2.80E+01	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Octochlorodibenzofuran	0	1.00E-02	NA	3.00E+02	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Octochlorodibenzo-p-dioxin	2.59E-04	3.00E-02	NA	3.00E+02	9E-11	NA	3.9E-12	1.16E-09	1.2E-10	NA	1E-11	3.12E-09	1.7E-12	NA	3.5E-13	1.04E-10	3.5E-12	NA	3.5E-13	1.04E-10	2.17E-10	NA	1.50E-11	4.49E-09
Pentachlorodibenzofuran	0	1.00E-02	NA	1.50E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	3.00E-02	NA	1.50E+05	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Pentachlorophenol	0	2.50E-01	3.00E-02	1.20E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phenanthrene	7.37E-03	1.00E-02	NA	NA	8.6E-10	NA	3.7E-11	NA	1.2E-09	NA	9.9E-11	NA	1.6E-11	NA	3.3E-12	NA	3.3E-11	NA	3.3E-12	NA	2.06E-09	NA	1.42E-10	NA
Selenium	0	1.00E-03	2.20E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Silver	4.72E-01	1.00E-03	9.00E-04	NA	5.5E-09	6.09E-06	2.3E-10	NA	7.4E-09	8.19E-06	6.3E-10	NA	1E-10	1.16E-07	2.1E-11	NA	2.1E-10	2.33E-07	2.1E-11	NA	1.32E-08	1.46E-05	9.09E-10	NA
Tetrachlorodibenzofuran	0	3.00E-02	NA	3.00E+05	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	1.00E-02	NA	3.00E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	0	0
Tetrachloroethylene	1.11E-03	1.00E-02	1.00E-02	5.40E-01	1.3E-10	1.29E-08	5.5E-12	2.98E-12	1.7E-10	1.73E-08	1.5E-11	8.00E-12	2.5E-12	2.46E-10	4.9E-13	2.65E-13	4.9E-12	4.91E-10	4.9E-13	2.65E-13	3.09E-10	3.09E-08	2.13E-11	1.15E-11
Thallium	0	1.00E-03	1.80E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Toluene	0	1.00E-02	6.40E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Tributyl phosphate	0	1.00E-02	1.00E-01	1.08E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloroethylene	1.83E-03	1.00E-02	4.50E-05	2.67E+00	2.1E-10	4.72E-06	9.1E-12	2.43E-11	2.9E-10	6.35E-06	2.4E-11	6.54E-11	4.1E-12	9.02E-08	8.1E-13	2.17E-12	8.1E-12	1.80E-07	8.1E-13	2.17E-12	5.10E-10	1.13E-05	3.52E-11	9.40E-11
Trifluorochloromethane	0	1.00E-02	6.90E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Uranium	3.89E+01	1.00E-03	5.10E-04	NA	4.5E-07	8.87E-04	1.9E-08	NA	6.1E-07	1.19E-03	5.2E-08	NA	8.6E-09	1.70E-05	1.7E-09	NA	1.7E-08	3.39E-05	1.7E-09	NA	1.09E-06	2.13E-03	7.50E-08	NA
Vanadium	0	1.00E-03	7.00E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Vinyl chloride	0	1.00E-02	3.00E-03	1.50E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xylenes	0	1.00E-02	1.64E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Zinc	0	1.00E-03	6.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
																					total =	8.48E-02	total =	3.57E-06

Undeveloped Park User - Ingestion of Soil
Risk calculation for average COC values in waste pits

Intake Equation:

		UNITS	Assigned Values			
			child	youth	adult	senior
CDI =	(CS*EF*ED*IR*CF)/(BW*AT)					
CDI =	Chronic Daily Intake	mg/kgday				
CS =	Concentration of chemical in soil	mg/kg	see table of COCs below			
EF =	Exposure frequency	days/yr	20	40	20	40
ED =	Exposure duration	yrs	3	6	14	7
IR =	Ingestion rate	mg/day	100	75	50	50
FI =	Fraction of contaminated soil	unitless	0.75	0.75	0.75	0.75
CF =	Conversion factor	kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06
BW =	Body weight	kg	15.5	46.9	71.8	71.8
ATc =	Average time for carcinogens	days	25550	25550	25550	25550
ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	RfDo	CSFos	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/kg	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	3.26E-04	4.00E-03	5.70E-02	8.65E-11	2.16E-08	3.71E-12	2.11E-13	4.29E-11	1.07E-08	3.67E-12	2.09E-13	9.33E-12	2.33E-09	1.87E-12	1.06E-13	1.87E-11	4.67E-09	1.87E-12	1.06E-13	1.57E-10	3.93E-08	1.11E-11	6.33E-13
1,1-Dichloroethylene	1.16E-03	5.00E-02	6.00E-01	3.14E-10	6.28E-09	1.35E-11	8.08E-12	1.56E-10	3.11E-09	1.33E-11	8.01E-12	3.39E-11	6.78E-10	6.78E-12	4.07E-12	6.78E-11	1.36E-09	6.78E-12	4.07E-12	5.72E-10	1.14E-08	4.04E-11	2.42E-11
1,2-dichloroethane	9.80E-04	2.00E-02	9.10E-02	2.60E-10	1.30E-08	1.11E-11	1.01E-12	1.29E-10	6.44E-09	1.10E-11	1.01E-12	2.81E-11	1.40E-09	5.61E-12	5.11E-13	5.61E-11	2.81E-09	5.61E-12	5.11E-13	4.73E-10	2.36E-08	3.34E-11	3.04E-12
2-Butanone (MEK)	0	6.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	NA	4.50E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
4-Methylphenol (p-cresol)	0	5.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
4-Nitroanaline	0	3.00E-03	2.10E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetone	0	9.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Antimony	1.43E+00	4.00E-04	NA	3.78E-07	9.45E-04	1.62E-08	NA	1.87E-07	4.68E-04	1.61E-08	NA	4.08E-08	1.02E-04	8.16E-09	NA	8.16E-08	2.04E-04	8.16E-09	NA	6.88E-07	1.72E-03	4.86E-08	NA
Aroclor 1254	2.02E-02	2.00E-05	2.00E+00	5.35E-09	2.68E-04	2.29E-10	4.59E-10	2.65E-09	1.33E-04	2.28E-10	4.55E-10	5.78E-10	2.89E-05	1.16E-10	2.31E-10	1.16E-09	5.78E-05	1.16E-10	2.31E-10	9.74E-09	4.87E-04	6.88E-10	1.38E-09
Aroclor 1260	7.18E-03	NA	2.00E+00	1.90E-09	NA	8.16E-11	1.63E-10	9.44E-10	NA	8.09E-11	1.62E-10	2.06E-10	NA	4.11E-11	8.22E-11	4.11E-10	NA	4.11E-11	8.22E-11	3.47E-09	NA	2.45E-10	4.90E-10
Arsenic	1.03E+01	3.00E-04	1.50E+00	2.73E-06	9.10E-03	1.17E-07	1.75E-07	1.35E-06	4.51E-03	1.16E-07	1.74E-07	2.95E-07	9.82E-04	5.89E-08	8.84E-08	5.89E-07	1.96E-03	5.89E-08	8.84E-08	4.97E-06	1.66E-02	3.51E-07	5.26E-07
Barium	1.42E+02	2.00E-01	NA	3.77E-05	1.89E-04	1.62E-06	NA	1.87E-05	9.35E-05	1.60E-06	NA	4.07E-06	2.04E-05	8.14E-07	NA	8.14E-06	4.07E-05	8.14E-07	NA	6.86E-05	3.43E-04	4.85E-06	NA
Benzene	0	4.00E-03	5.50E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a)anthracene	6.67E-03	NA	7.30E-01	1.77E-09	NA	7.58E-11	5.53E-11	8.77E-10	NA	7.52E-11	5.49E-11	1.91E-10	NA	3.82E-11	2.79E-11	3.82E-10	NA	3.82E-11	2.79E-11	3.22E-09	NA	2.27E-10	1.66E-10
Benzo(a)pyrene	5.27E-02	NA	7.30E+00	1.40E-08	NA	5.99E-10	4.37E-09	6.93E-09	NA	5.94E-10	4.33E-09	1.51E-09	NA	3.02E-10	2.20E-09	3.02E-09	NA	3.02E-10	2.20E-09	2.54E-08	NA	1.80E-09	1.31E-08
Benzo(b)fluoranthene	4.92E-02	NA	7.30E-01	1.30E-08	NA	5.59E-10	4.08E-10	6.47E-09	NA	5.54E-10	4.05E-10	1.41E-09	NA	2.82E-10	2.06E-10	2.82E-09	NA	2.82E-10	2.06E-10	2.37E-08	NA	1.68E-09	1.22E-09
Benzo(k)fluoranthene	4.15E-03	NA	7.30E-02	1.10E-09	NA	4.72E-11	3.44E-12	5.45E-10	NA	4.68E-11	3.41E-12	1.19E-10	NA	2.38E-11	1.73E-12	2.38E-10	NA	2.38E-11	1.73E-12	2.00E-09	NA	1.41E-10	1.03E-11
Beryllium	1.08E+00	2.00E-03	4.30E+00	2.85E-07	1.43E-04	1.22E-08	5.25E-08	1.41E-07	7.07E-05	1.21E-08	5.21E-08	3.08E-08	1.54E-05	6.15E-09	2.65E-08	6.15E-08	3.08E-05	6.15E-09	2.65E-08	5.18E-07	2.59E-04	3.66E-08	1.58E-07
Bis(2-chloroisopropyl)ether	0	4.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Bis(2-ethylhexyl)phthalate	0	2.00E-02	1.40E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Boron	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Bromodichloromethane	9.80E-04	2.00E-02	6.20E-02	2.60E-10	1.30E-08	1.11E-11	6.91E-13	1.29E-10	6.44E-09	1.10E-11	6.85E-13	2.81E-11	1.40E-09	5.61E-12	3.48E-13	5.61E-11	2.81E-09	5.61E-12	3.48E-13	4.73E-10	2.36E-08	3.34E-11	2.07E-12
Bromoform	0	2.00E-02	7.90E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromomethane	0	1.40E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Cadmium	4.89E-01	1.00E-03	NA	1.30E-07	1.30E-04	5.56E-09	NA	6.43E-08	6.43E-05	5.51E-09	NA	1.40E-08	1.40E-05	2.80E-09	NA	2.80E-08	2.80E-05	2.80E-09	NA	2.36E-07	2.36E-04	1.67E-08	NA
Carbazole	0	NA	0.002	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Carbon disulfide	0	1.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Carbon tetrachloride	0	7.00E-04	1.30E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlordane	0	5.00E-04	3.50E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlorobenzene	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Chloroform	0	1.00E-02	6.10E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium (VI)	0	3.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Chrysene	1.00E-02	NA	7.30E-03	2.66E-09	NA	1.14E-10	8.32E-13	1.32E-09	NA	1.13E-10	8.25E-13	2.87E-10	NA	5.74E-11	4.19E-13	5.74E-10	NA	5.74E-11	4.19E-13	4.84E-09	NA	3.42E-10	2.49E-12
Cobalt	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Copper	0	4.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Cyanide	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Cyclohexanone	0	5.00E+00	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Dibenzo(a,h)anthracene	1.92E-02	NA	7.30E+00	5.10E-09	NA	2.19E-10	1.60E-09	2.53E-09	NA	2.17E-10	1.58E-09	5.50E-10	NA	1.10E-10	8.04E-10	1.10E-09	NA	1.10E-10	8.04E-10	9.28E-09	NA	6.55E-10	4.79E-09
Dieldrin	1.79E-03	5.00E-05	1.60E+01	4.75E-10	9.49E-06	2.03E-11	3.25E-10	2.35E-10	4.71E-06	2.02E-11	3.23E-10	5.12E-11	1.02E-06	1.02E-11	1.64E-10	1.02E-10	2.05E-06	1.02E-11	1.64E-10	8.64E-10	1.73E-05	6.10E-11	9.76E-10

Undeveloped Park User - Ingestion of Soil
Risk calculation for average COC values in waste pits

Intake Equation:

			UNITS	Assigned Values			
				child	youth	adult	senior
CDI =	(CS*EF*ED*IR*CF)/(BW*AT)						
CDI =	Chronic Daily Intake		mg/kgday				
CS =	Concentration of chemical in soil		mg/kg	see table of COCs below			
EF =	Exposure frequency		days/yr	20	40	20	40
ED =	Exposure duration		yrs	3	6	14	7
IR =	Ingestion rate		mg/day	100	75	50	50
FI =	Fraction of contaminated soil		unitless	0.75	0.75	0.75	0.75
CF =	Conversion factor		kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06
BW =	Body weight		kg	15.5	46.9	71.8	71.8
ATc =	Average time for carcinogens		days	25550	25550	25550	25550
ATn =	Average time for non-carcinogens		days	1095	2190	5110	2555

COC	conc	RfDo	CSFos	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/kg	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Di-n-octylphthalate	0	4.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Ethyl ether	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Ethylbenzene	0	1.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Fluoride	7.07E+00	6.00E-02	NA	1.87E-06	3.12E-05	8.04E-08	NA	9.29E-07	1.55E-05	7.97E-08	NA	2.02E-07	3.37E-06	4.05E-08	NA	4.05E-07	6.75E-06	4.05E-08	NA	3.41E-06	5.69E-05	2.41E-07	NA
Heptachlorodibenzofuran	0	NA	1.50E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Heptachlorodibenzo-p-dioxin	1.68E-05	NA	1.50E+03	4.46E-12	NA	1.91E-13	2.87E-10	2.21E-12	NA	1.90E-13	2.84E-10	4.81E-13	NA	9.63E-14	1.44E-10	9.63E-13	NA	9.63E-14	1.44E-10	8.12E-12	NA	5.73E-13	8.60E-10
Hexachlorodibenzofuran	0	NA	1.50E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0	NA	1.50E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Indeno(1,2,3-cd)pyrene	4.12E-02	NA	7.30E-01	1.09E-08	NA	4.68E-10	3.42E-10	5.42E-09	NA	4.64E-10	3.39E-10	1.18E-09	NA	2.36E-10	1.72E-10	2.36E-09	NA	2.36E-10	1.72E-10	1.99E-08	NA	1.40E-09	1.03E-09
Lead	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Manganese	0	1.40E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Mercury	0	3.00E-04	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Methanol	0	5.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Methyl-2-pentanone	0	8.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Methylene chloride	0	6.00E-02	7.50E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Molybdenum	3.40E+00	5.00E-03	NA	9.01E-07	1.80E-04	3.86E-08	NA	4.47E-07	8.94E-05	3.83E-08	NA	9.73E-08	1.95E-05	1.95E-08	NA	1.95E-07	3.89E-05	1.95E-08	NA	1.64E-06	3.28E-04	1.16E-07	NA
Nickel	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
N-nitrosodiphenylamine	0	2.00E-02	4.90E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N-nitrosodipropylamine	0	NA	7.00E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Octochlorodibenzofuran	0	NA	1.50E+02	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Octochlorodibenzo-p-dioxin	2.59E-04	NA	1.50E+02	6.87E-11	NA	2.95E-12	4.42E-10	3.41E-11	NA	2.92E-12	4.38E-10	7.42E-12	NA	1.48E-12	2.23E-10	1.48E-11	NA	1.48E-12	2.23E-10	1.25E-10	NA	8.63E-12	1.32E-09
Pentachlorodibenzofuran	0	NA	7.50E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	NA	7.50E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Pentachlorophenol	0	3.00E-02	1.20E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phenanthrene	7.37E-03	NA	NA	1.96E-09	NA	8.38E-11	NA	9.69E-10	NA	8.31E-11	NA	2.11E-10	NA	4.22E-11	NA	4.22E-10	NA	4.22E-11	NA	3.56E-09	NA	2.51E-10	NA
Selenium	0	5.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Silver	4.72E-01	5.00E-03	NA	1.25E-07	2.50E-05	5.36E-09	NA	6.2E-08	1.24E-05	5.31E-09	NA	1.35E-08	2.70E-06	2.70E-09	NA	2.70E-08	5.40E-06	2.70E-09	NA	2.28E-07	4.55E-05	1.61E-08	NA
Tetrachlorodibenzofuran	0	NA	1.50E+05	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	NA	1.50E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0
Tetrachloroethylene	1.11E-03	1.00E-02	5.40E-01	2.93E-10	2.93E-08	1.26E-11	6.79E-12	1.45E-10	1.45E-08	1.25E-11	6.73E-12	3.17E-11	3.17E-09	6.33E-12	3.42E-12	6.33E-11	6.33E-09	6.33E-12	3.42E-12	5.34E-10	5.34E-08	3.77E-11	2.04E-11
Thallium	0	9.00E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Toluene	0	8.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Tributyl phosphate	0	2.00E-01	5.40E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloroethylene	1.83E-03	3.00E-04	4.00E-01	4.85E-10	1.62E-06	2.08E-11	8.31E-12	2.4E-10	8.01E-07	2.06E-11	8.24E-12	5.23E-11	1.74E-07	1.05E-11	4.19E-12	1.05E-10	3.49E-07	1.05E-11	4.19E-12	8.82E-10	2.94E-06	6.23E-11	2.49E-11
Trifluorochloromethane	0	3.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Uranium	3.89E+01	6.00E-04	NA	1.03E-05	1.72E-02	4.43E-07	NA	5.12E-06	8.53E-03	4.39E-07	NA	1.11E-06	1.86E-03	2.23E-07	NA	2.23E-06	3.72E-03	2.23E-07	NA	1.88E-05	3.13E-02	1.33E-06	NA
Vanadium	0	7.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Vinyl chloride	0	3.00E-03	1.50E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xylenes	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA
Zinc	0	3.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA

total = 5.14E-02 **total = 7.09E-07**

Undeveloped Park User - Dermal Contact with Surface Water
Risk calculation for average U value in waste pits

			UNITS	Assigned Values child	youth	adult	senior
Intake Equation:	CDI =	(DA*EF*ED*SA)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday	calculated below			
	DA =	Dermal absorption dose	mg/cm²day	see COC list below			
	EF =	Exposure frequency	days/yr	12	12	12	NA
	ED =	Exposure duration	yrs	3	6	14	NA
	SA =	Surface area of skin	cm²	2180	4470	6070	NA
	BW =	Body weight	kg	15.5	46.9	71.8	NA
	ATc =	Average time for carcinogens	days	25550	25550	25550	NA
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	NA
where:	DA = C_v*K_p*CF*ET						
	C_v =	concentation of ith contaminant in surface water	mg/L	see COC list below			
	K_p =	permeability constant for ith contaminant	cm/hr	see COC list below			
	CF =	conversion factor	L/cm³	0.001	0.001	0.001	NA
	ET =	exposure time	hr/d	1	1	1	NA

COC	C_v	K_p	DA	RfD	CSF	CHILD CDI	CHILD HQ	CHILD CDI	CHILD ILCR	YOUTH CDI	YOUTH HQ	YOUTH CDI	YOUTH ILCR	ADULT CDI	ADULT HQ	ADULT CDI	ADULT ILCR	SENIOR CDI	SENIOR HQ	SENIOR CDI	SENIOR ILCR	SUM CDI	SUM HQ	SUM CDI	SUM ILCR
	mg/L	cm/hr	mg/cm²day	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	0	0.00843	0	3.24E-03	7.04E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
1,1-Dichloroethylene	0	0.0159	0	5.00E-02	6.00E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
1,2-dichloroethane	0	0.00534	0	2.00E-02	9.10E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
2-Butanone (MEK)	0	0.00111	0	4.60E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	0.0169	0	NA	9.00E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
4-Methylphenol (p-cresol)	0	0.00995	0	3.25E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
4-Nitroaniline	0	0.00268	0	2.40E-03	2.63E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Acetone	0	0.000569	0	7.47E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Antimony	0	0.001	0	8.00E-06	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Aroclor 1254	0	1.29	0	1.80E-05	4.44E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Aroclor 1260	0	5.48	0	NA	4.44E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Arsenic	0	0.001	0	1.23E-04	3.66E+00	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Barium	0	0.001	0	1.40E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Benzene	0	0.0207	0	3.88E-03	5.67E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Benzo(a)anthracene	0	0.948	0	NA	2.35E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Benzo(a)pyrene	0	1.24	0	NA	2.35E+01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Benzo(b)fluoranthene	0	0.699	0	NA	2.35E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Benzo(k)fluoranthene	0	1.2	0	NA	2.35E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Beryllium	0	0.001	0	2.00E-05	4.30E+02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Bis(2-chloroisopropyl)ether	0	0.0763	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Bis(2-ethylhexyl)phthalate	0	1.97	0	3.80E-03	7.37E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Boron	0	0.001	0	1.80E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Bromodichloromethane	0	0.00602	0	1.96E-02	6.33E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Bromoform	0	0.00277	0	1.20E-02	1.32E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Bromomethane	0	3.51E-03	0	1.12E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Cadmium	0	0.001	0	5.00E-06	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Carbazole	0	0.0797	0	NA	2.68E-02	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Carbon disulfide	0	0.0156	0	6.30E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Carbon tetrachloride	0	0.0224	0	4.55E-04	2.00E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Chlordane	0	0.157	0	2.50E-04	7.00E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Chlorobenzene	0	0.0407	0	6.20E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Chloroform	0	0.00892	0	2.00E-03	3.05E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Chromium (VI)	0	0.002	0	6.00E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Chrysene	0	1.03	0	NA	2.35E-02	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Cobalt	0	0.0004	0	1.60E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Copper	0	0.001	0	1.20E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Cyanide	0	0.001	0	3.40E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Cyclohexanone	0	0.0018	0	4.00E+00	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Dibenzo(a,h)anthracene	0	1.68	0	NA	2.35E+01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Dieldrin	0	0.0445	0	2.50E-05	3.20E+01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Di-n-octylphthalate	0	4.45	0	3.60E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA

Undeveloped Park User - Dermal Contact with Surface Water
Risk calculation for average U value in waste pits

			UNITS	Assigned Values: child	youth	adult	senior
Intake Equation:	CDI =	(DA*EF*ED*SA)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday	calculated below			
	DA =	Dermal absorption dose	mg/cm²day	see COC list below			
	EF =	Exposure frequency	days/yr	12	12	12	NA
	ED =	Exposure duration	yrs	3	6	14	NA
	SA =	Surface area of skin	cm²	2180	4470	6070	NA
	BW =	Body weight	kg	15.5	46.9	71.8	NA
	ATc =	Average time for carcinogens	days	25550	25550	25550	NA
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	NA
where:	DA = C_v*K_p*CF*ET						
	C_v =	concentation of ith contaminant in surface water	mg/L	see COC list below			
	K_p =	permeability constant for ith contaminant	cm/hr	see COC list below			
	CF =	conversion factor	L/cm³	0.001	0.001	0.001	NA
	ET =	exposure time	hr/d	1	1	1	NA

COC	C_v	K_p	DA	RfD	CSF	CHILD CDI	CHILD HQ	CHILD CDI	CHILD ILCR	YOUTH CDI	YOUTH HQ	YOUTH CDI	YOUTH ILCR	ADULT CDI	ADULT HQ	ADULT CDI	ADULT ILCR	SENIOR CDI	SENIOR HQ	SENIOR CDI	SENIOR ILCR	SUM CDI	SUM HQ	SUM CDI	SUM ILCR
	mg/L	cm/hr	mg/cm²day	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	0	0.00288	0	1.60E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Ethylbenzene	0	0.0739	0	9.70E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Fluoride	0	0.001	0	5.82E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Heptachlorodibenzofuran	0	2.55	0	NA	3.00E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Heptachlorodibenzo-p-dioxin	0	3.22	0	NA	3.00E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Hexachlorodibenzofuran	0	2.38	0	NA	3.00E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0	5.29	0	NA	3.00E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Indeno(1,2,3-cd)pyrene	0	2.23	0	NA	2.35E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Lead	0	0.0001	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	NA	NA	NA	NA	0	NA	0	NA
Manganese	0	0.001	0	1.84E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Mercury	0	0.001	0	2.10E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Methanol	0	0.000345	0	4.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Methyl-2-pentanone	0	0.00397	0	6.40E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Methylene chloride	0	0.00446	0	5.70E-02	7.89E-03	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Molybdenum	0	0.001	0	1.90E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Nickel	0	0.0002	0	5.40E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
N-nitrosodiphenylamine	0	0.0196	0	5.00E-03	1.96E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
N-nitrosodipropylamine	0	2.83E-03	0	NA	2.80E+01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Octochlorodibenzofuran	0	4.78	0	NA	3.00E+02	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Octochlorodibenzo-p-dioxin	0	16.5	0	NA	3.00E+02	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Pentachlorodibenzofuran	0	1.08	0	NA	1.50E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	0.379	0	NA	1.50E+05	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Pentachlorophenol	0	0.195	0	3.00E-02	1.20E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Phenanthrene	0	0.229	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	NA	NA	NA	NA	0	NA	0	NA
Selenium	0	0.001	0	2.20E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Silver	0	0.0006	0	9.00E-04	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Tetrachlorodibenzofuran	0	1.12	0	NA	3.00E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	1.39	0	NA	3.00E+05	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Tetrachloroethylene	0	0.0481	0	1.00E-02	5.40E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Thallium	0	0.001	0	1.80E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Toluene	0	0.0453	0	6.40E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Tributyl phosphate	0	0.0313	0	1.00E-01	1.08E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Trichloroethylene	0	0.0157	0	4.50E-05	2.67E+00	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Trifluorochloromethane	0	0.0173	0	6.90E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Uranium	5.63E-02	0.001	5.63E-08	5.10E-04	NA	2.60E-07	5.10E-04	1.12E-08	NA	1.76E-07	3.46E-04	1.51E-08	NA	1.56E-07	3.07E-04	3.13E-08	NA	NA	NA	NA	NA	5.93E-07	1.16E-03	5.76E-08	NA
Vanadium	0	0.001	0	7.00E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Vinyl chloride	0	0.0113	0	3.00E-03	1.50E+00	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Xylenes	0	0.0704	0	1.84E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Zinc	0	0.0006	0	6.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
																						total =	1.16E-03	total =	0.00E+00

Undeveloped Park User - Ingestion of Surface Water
Risk calculation for average U value in waste pits

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CW*EF*ED*IR)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday				
	CW =	Concentration of chemical in water	mg/L	see COC table below			
	EF =	Exposure frequency	days/yr	12	12	12	NA
	ED =	Exposure duration	yrs	3	6	14	NA
	IR =	Ingestion rate	L/day	0.035	0.035	0.015	NA
	BW =	Body weight	kg	15.5	46.9	71.8	NA
	ATc =	Average time for carcinogens	days	25550	25550	25550	NA
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	NA

COC	CW	RfD	CSF	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/L	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	0	4.00E-03	5.70E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
1,1-Dichloroethylene	0	5.00E-02	6.00E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
1,2-dichloroethane	0	2.00E-02	9.10E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
2-Butanone	0	6.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
3,3-Dichlorobenzidine	0	NA	4.50E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
4-Methylphenol	0	5.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
4-Nitroanaline	0	3.00E-03	2.10E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Acetone	0	9.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Antimony	0	4.00E-04	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Aroclor 1254 (exposure to wa	0	2.00E-05	4.00E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Aroclor 1260 (exposure to wa	0	NA	4.00E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Arsenic	0	3.00E-04	1.50E+00	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Barium	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Benzene	0	4.00E-03	5.50E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Benzo(a)anthracene	0	NA	7.30E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Benzo(a)pyrene	0	NA	7.30E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Benzo(b)fluoranthene	0	NA	7.30E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Benzo(k)fluoranthene	0	NA	7.30E-02	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Beryllium	0	2.00E-03	4.30E+00	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Bis(2-chloroisopropyl)ether	0	4.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Bis(2-ethylhexyl)phthalate	0	2.00E-02	1.40E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Boron	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Bromodichloromethane	0	2.00E-02	6.20E-02	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Bromoform	0	2.00E-02	7.90E-03	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Bromomethane	0	1.40E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Cadmium (Water)	0	5.00E-04	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Carbazole	0	NA	0.002	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Carbon disulfide	0	1.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Carbon tetrachloride	0	7.00E-04	1.30E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Chlordane	0	5.00E-04	3.50E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Chlorobenzene	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Chloroform	0	1.00E-02	6.10E-03	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Chromium (VI)	0	3.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Chrysene	0	NA	7.30E-03	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Cobalt	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Copper	0	4.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Cyanide	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Cyclohexanone	0	5.00E+00	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Dibenzo(a,h)anthracene	0	NA	7.30E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Dieldrin	0	5.00E-05	1.60E+01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Di-n-octylphthalate	0	4.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA

Undeveloped Park User - Ingestion of Surface Water
Risk calculation for average U value in waste pits

Intake Equation:

			UNITS	Assigned Values			
				child	youth	adult	senior
CDI =	(CW*EF*ED*IR)/(BW*AT)						
CDI =	Chronic Daily Intake		mg/kgday				
CW =	Concentration of chemical in water		mg/L	see COC table below			
EF =	Exposure frequency		days/yr	12	12	12	NA
ED =	Exposure duration		yrs	3	6	14	NA
IR =	Ingestion rate		L/day	0.035	0.035	0.015	NA
BW =	Body weight		kg	15.5	46.9	71.8	NA
ATc =	Average time for carcinogens		days	25550	25550	25550	NA
ATn =	Average time for non-carcinogens		days	1095	2190	5110	NA

COC	CW	RfD	CSF	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/L	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Ethylbenzene	0	1.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Fluoride	0	6.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Heptachlorodibenzofuran	0	NA	1.50E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Heptachlorodibenzo-p-dioxin	0	NA	1.50E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Hexachlorodibenzofuran	0	NA	1.50E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Hexachlorodibenzo-p-dioxin	0	NA	1.50E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Indeno(1,2,3-cd)pyrene	0	NA	7.30E-01	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Lead	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	NA	NA	NA	NA	0	NA	0	NA
Manganese (Water)	0	4.60E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Mercury	0	3.00E-04	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Methanol	0	5.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
4-Methyl-2-pentanone	0	8.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Methylene chloride	0	6.00E-02	7.50E-03	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Molybdenum	0	5.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Nickel	0	2.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
N-nitrosodiphenylamine	0	2.00E-02	4.90E-03	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
N-nitrosodipropylamine	0	NA	7.00E+00	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Octachlorodibenzofuran	0	NA	1.50E+02	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Octochlorodibenzo-p-dioxin	0	NA	1.50E+02	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Pentachlorodibenzofuran	0	NA	7.50E+03	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Pentachlorodibenzo-p-dioxin	0	NA	7.50E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Pentachlorophenol	0	3.00E-02	1.20E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Phenanthrene	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	NA	NA	NA	NA	0	NA	0	NA
Selenium	0	5.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Silver	0	5.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Tetrachlorodibenzofuran	0	NA	1.50E+04	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Tetrachlorodibenzo-p-dioxin	0	NA	1.50E+05	0	NA	0	0	0	NA	0	0	0	NA	0	0	NA	NA	NA	NA	0	NA	0	0
Tetrachloroethylene	0	1.00E-02	5.40E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Thallium	0	9.00E-05	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Toluene	0	8.00E-02	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Tributyl phosphate	0	2.00E-01	5.40E-03	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Trichloroethylene	0	3.00E-04	4.00E-01	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Trifluorochloromethane	0	3.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Uranium	5.63E-02	6.00E-04	NA	4.18E-06	6.97E-03	1.79E-07	NA	1.38E-06	2.30E-03	1.18E-07	NA	3.87E-07	6.44E-04	7.73E-08	NA	NA	NA	NA	NA	5.95E-06	9.91E-03	3.75E-07	NA
Vanadium	0	7.00E-03	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Vinyl chloride	0	3.00E-03	1.50E+00	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0
Xylenes	0	2.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
Zinc	0	3.00E-01	NA	0	0	0	NA	0	0	0	NA	0	0	0	NA	NA	NA	NA	NA	0	0	0	NA
																				total =	9.91E-03	total =	0.00E+00

Undeveloped Park User - Inhalation of Gases & Particulates
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CA*EF*ED*IR*ET)					
	CDI =	Chronic Daily Intake	pCi				
	CA =	Concentration of radionuclide in air	pCi/m^3	see table of COCs below			
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Inhalation rate	m^3/hr	1.0	1.0	1.0	1.0
	ET =	Exposure time	hrs/day	2	2	2	2

COC	conc	CSFi	CHILD		YOUTH		ADULT		SENIOR		SUM	
			CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR
	pCi/m^3	1/pCi	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF
Cesium-137 + D	6.54E-07	1.19E-11	7.85E-05	9.34E-16	3.14E-04	3.74E-15	3.66E-04	4.36E-15	3.66E-04	4.36E-15	1.13E-03	1.34E-14
Lead-210 + D	1.02E-05	1.39E-08	1.23E-03	1.71E-11	4.91E-03	6.83E-11	5.73E-03	7.97E-11	5.73E-03	7.97E-11	1.76E-02	2.45E-10
Neptunium-237 + D	0	1.77E-08	0	0	0	0	0	0	0	0	0	0
Plutonium-238	0	3.36E-08	0	0	0	0	0	0	0	0	0	0
Plutonium-239/240	0	3.33E-08	0	0	0	0	0	0	0	0	0	0
Radium-226 + D	8.89E-06	1.16E-08	1.07E-03	1.24E-11	4.27E-03	4.95E-11	4.98E-03	5.77E-11	4.98E-03	5.77E-11	1.53E-02	1.77E-10
Radium-228 + D	7.26E-06	5.23E-09	8.72E-04	4.56E-12	3.49E-03	1.82E-11	4.07E-03	2.13E-11	4.07E-03	2.13E-11	1.25E-02	6.53E-11
Radon-222+ D	1.26E+01	1.80E-11	1.51E+03	2.72E-08	6.05E+03	1.09E-07	7.06E+03	1.27E-07	7.06E+03	1.27E-07	2.17E+04	3.90E-07
Strontium-90 + D	0	1.13E-10	0	0	0	0	0	0	0	0	0	0
Technetium-99	1.88E-05	1.41E-11	2.26E-03	3.18E-14	9.03E-03	1.27E-13	1.05E-02	1.49E-13	1.05E-02	1.49E-13	3.24E-02	4.56E-13
Thorium-228 + D	7.28E-06	1.43E-07	8.73E-04	1.25E-10	3.49E-03	4.99E-10	4.08E-03	5.83E-10	4.08E-03	5.83E-10	1.25E-02	1.79E-09
Thorium-230	4.99E-05	2.85E-08	5.98E-03	1.70E-10	2.39E-02	6.82E-10	2.79E-02	7.96E-10	2.79E-02	7.96E-10	8.57E-02	2.44E-09
Thorium-232	7.19E-06	4.33E-08	8.63E-04	3.74E-11	3.45E-03	1.50E-10	4.03E-03	1.74E-10	4.03E-03	1.74E-10	1.24E-02	5.36E-10
Uranium-234	8.69E-05	1.14E-08	1.04E-02	1.19E-10	4.17E-02	4.76E-10	4.87E-02	5.55E-10	4.87E-02	5.55E-10	1.50E-01	1.70E-09
Uranium-235 + D	3.96E-06	1.01E-08	4.75E-04	4.80E-12	1.90E-03	1.92E-11	2.22E-03	2.24E-11	2.22E-03	2.24E-11	6.81E-03	6.88E-11
Uranium-238 + D	8.49E-05	9.35E-09	1.02E-02	9.53E-11	4.08E-02	3.81E-10	4.75E-02	4.45E-10	4.75E-02	4.45E-10	1.46E-01	1.37E-09

total = 3.99E-07

Air concentrations derived from soil values by using a conversion factor of 6.54E-6 g/m3 (based on ISCLT2 air model)

Exceptions: Rn-222 is obtained from RAECOM model and is based on Ra-226 soil concentration multiplied by a conversion factor of 9.28 g/m^3 (conservative estimate, as this is the concentration at the ground surface with no dispersion considered)

Undeveloped Park User - Ingestion of Soil
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	Assigned Values			
	CDI =	(CS*EF*ED*IR*FI)					
	CDI =	Chronic Daily Intake	pCi	child	youth	adult	senior
	CS =	Concentration of radionuclide in soil	pCi/g	see table of COCs below			
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Ingestion rate	g/day	0.1	0.075	0.05	0.05
	FI =	Fraction of contaminated soil	unitless	0.75	0.75	0.75	0.75

			CHILD		YOUTH		ADULT		SENIOR		SUM	
COC	conc	CSFos	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR
	pCi/g	1/pCi	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF
Cesium-137 + D	1.00E-01	4.33E-11	4.50E-01	1.95E-11	1.35E+00	5.85E-11	1.05E+00	4.55E-11	1.05E+00	4.55E-11	3.90E+00	1.69E-10
Lead-210 + D	1.57E+00	2.66E-09	7.05E+00	1.87E-08	2.11E+01	5.62E-08	1.64E+01	4.37E-08	1.64E+01	4.37E-08	6.11E+01	1.62E-07
Neptunium-237 + D	0	1.62E-10	0	0	0	0	0	0	0	0	0	0
Plutonium-238	0	2.72E-10	0	0	0	0	0	0	0	0	0	0
Plutonium-239/240	0	2.77E-10	0	0	0	0	0	0	0	0	0	0
Radium-226 + D	1.36E+00	7.30E-10	6.11E+00	4.46E-09	1.83E+01	1.34E-08	1.43E+01	1.04E-08	1.43E+01	1.04E-08	5.30E+01	3.87E-08
Radium-228 + D	1.11E+00	2.29E-09	5.00E+00	1.14E-08	1.50E+01	3.43E-08	1.17E+01	2.67E-08	1.17E+01	2.67E-08	4.33E+01	9.92E-08
Radon-222+ D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium-90 + D	0	1.44E-10	0	0	0	0	0	0	0	0	0	0
Technetium-99	2.88E+00	7.66E-12	1.29E+01	9.92E-11	3.88E+01	2.98E-10	3.02E+01	2.31E-10	3.02E+01	2.31E-10	1.12E+02	8.60E-10
Thorium-228 + D	1.11E+00	8.09E-10	5.01E+00	4.05E-09	1.50E+01	1.22E-08	1.17E+01	9.45E-09	1.17E+01	9.45E-09	4.34E+01	3.51E-08
Thorium-230	7.62E+00	2.02E-10	3.43E+01	6.93E-09	1.03E+02	2.08E-08	8.00E+01	1.62E-08	8.00E+01	1.62E-08	2.97E+02	6.01E-08
Thorium-232	1.10E+00	2.31E-10	4.95E+00	1.14E-09	1.49E+01	3.43E-09	1.16E+01	2.67E-09	1.16E+01	2.67E-09	4.29E+01	9.91E-09
Uranium-234	1.33E+01	1.58E-10	5.98E+01	9.45E-09	1.79E+02	2.84E-08	1.40E+02	2.21E-08	1.40E+02	2.21E-08	5.18E+02	8.19E-08
Uranium-235 + D	6.06E-01	1.63E-10	2.73E+00	4.44E-10	8.18E+00	1.33E-09	6.36E+00	1.04E-09	6.36E+00	1.04E-09	2.36E+01	3.85E-09
Uranium-238 + D	1.30E+01	2.10E-10	5.84E+01	1.23E-08	1.75E+02	3.68E-08	1.36E+02	2.86E-08	1.36E+02	2.86E-08	5.06E+02	1.06E-07

total = 5.98E-07

Undeveloped Park User - Ingestion of Surface Water
Risk calculation for average U value in waste pits

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CW*EF*ED*IR)					
	CDI =	Chronic Daily Intake	pCi				
	CW =	Concentration of radionuclide in water	pCi/L	see COC table below			
	EF =	Exposure frequency	days/yr	12	12	12	NA
	ED =	Exposure duration	yrs	3	6	14	NA
	IR =	Ingestion rate	L/day	0.035	0.035	0.015	NA

COC	conc	CSF	CHILD		YOUTH		ADULT		SENIOR		SUM	
			CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR
	pCi/L	1/pCi	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF				
Cesium-137 + D	0	3.04E-11	0	0	0	0	0	0	NA	NA	0	0
Lead-210 + D	0	1.27E-09	0	0	0	0	0	0	NA	NA	0	0
Neptunium-237 + D	0	6.74E-11	0	0	0	0	0	0	NA	NA	0	0
Plutonium-238	0	1.31E-10	0	0	0	0	0	0	NA	NA	0	0
Plutonium-239/240	0	1.35E-10	0	0	0	0	0	0	NA	NA	0	0
Radium-226 + D	0	3.86E-10	0	0	0	0	0	0	NA	NA	0	0
Radium-228 + D	0	1.04E-09	0	0	0	0	0	0	NA	NA	0	0
Radon-222+ D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium-90 + D	0	7.40E-11	0	0	0	0	0	0	NA	NA	0	0
Technetium-99	0	2.75E-12	0	0	0	0	0	0	NA	NA	0	0
Thorium-228 + D	0	3.00E-10	0	0	0	0	0	0	NA	NA	0	0
Thorium-230	0	9.10E-11	0	0	0	0	0	0	NA	NA	0	0
Thorium-232	0	1.01E-10	0	0	0	0	0	0	NA	NA	0	0
Uranium-234	1.92E+01	7.07E-11	2.42E+01	1.71E-09	4.85E+01	3.43E-09	4.85E+01	3.43E-09	NA	NA	1.21E+02	8.57E-09
Uranium-235 + D	8.76E-01	7.18E-11	1.10E+00	7.93E-11	2.21E+00	1.59E-10	2.21E+00	1.59E-10	NA	NA	5.52E+00	3.96E-10
Uranium-238 + D	1.88E+01	8.71E-11	2.37E+01	2.06E-09	4.73E+01	4.12E-09	4.73E+01	4.12E-09	NA	NA	1.18E+02	1.03E-08
											total =	**1.93E-08**

Undeveloped Park User - External Radiation
Risk calculation for average COC values in waste pits

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	$(CS*EF*ED*ET_o*(1-SH_o))$					
	CDI =	Chronic Daily Intake	yr pCi/g				
	CS =	Concentration of radionuclide in soil	pCi/g	see table of COCs below			
	EF =	Fraction of year exposed to radiation	--	0.055	0.11	0.055	0.11
	ED =	Exposure duration	yrs	3	6	14	7
	ET_o =	Fraction of day spent outdoors	--	0.083	0.083	0.083	0.083
	SH_o =	Shield factor outdoors	--	0.25	0.25	0.25	0.25

			CHILD		YOUTH		ADULT		SENIOR		SUM	
COC	conc	CSFx	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR
	pCi/g	g/pCi yr	yr pCi/g	CDI*CSF	yr pCi/g	CDI*CSF	yr pCi/g	CDI*CSF	yr pCi/g	CDI*CSF	yr pCi/g	CDI*CSF
Cesium-137 + D	1.00E-01	2.55E-06	1.37E-03	3.49E-09	5.48E-03	1.40E-08	6.39E-03	1.63E-08	6.39E-03	1.63E-08	1.96E-02	5.01E-08
Lead-210 + D	1.57E+00	4.21E-09	2.14E-02	9.03E-11	8.58E-02	3.61E-10	1.00E-01	4.21E-10	1.00E-01	4.21E-10	3.07E-01	1.29E-09
Neptunium-237 + D	0	7.97E-07	0	0	0	0	0	0	0	0	0	0
Plutonium-238	0	7.22E-11	0	0	0	0	0	0	0	0	0	0
Plutonium-239/240	0	2.00E-10	0	0	0	0	0	0	0	0	0	0
Radium-226 + D	1.36E+00	8.49E-06	1.86E-02	1.58E-07	7.45E-02	6.32E-07	8.69E-02	7.37E-07	8.69E-02	7.37E-07	2.67E-01	2.26E-06
Radium-228 + D	1.11E+00	4.53E-06	1.52E-02	6.89E-08	6.09E-02	2.76E-07	7.10E-02	3.22E-07	7.10E-02	3.22E-07	2.18E-01	9.88E-07
Radon-222+ D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium-90 + D	0	1.96E-08	0	0	0	0	0	0	0	0	0	0
Technetium-99	2.88E+00	8.14E-11	3.94E-02	3.21E-12	1.58E-01	1.28E-11	1.84E-01	1.50E-11	1.84E-01	1.50E-11	5.65E-01	4.60E-11
Thorium-228 + D	1.11E+00	7.76E-06	1.52E-02	1.18E-07	6.10E-02	4.73E-07	7.11E-02	5.52E-07	7.11E-02	5.52E-07	2.18E-01	1.70E-06
Thorium-230	7.62E+00	8.19E-10	1.04E-01	8.55E-11	4.18E-01	3.42E-10	4.87E-01	3.99E-10	4.87E-01	3.99E-10	1.50E+00	1.23E-09
Thorium-232	1.10E+00	3.42E-10	1.51E-02	5.15E-12	6.03E-02	2.06E-11	7.03E-02	2.41E-11	7.03E-02	2.41E-11	2.16E-01	7.39E-11
Uranium-234	1.33E+01	2.52E-10	1.82E-01	4.59E-11	7.28E-01	1.84E-10	8.50E-01	2.14E-10	8.50E-01	2.14E-10	2.61E+00	6.58E-10
Uranium-235 + D	6.06E-01	5.43E-07	8.30E-03	4.51E-09	3.32E-02	1.80E-08	3.87E-02	2.10E-08	3.87E-02	2.10E-08	1.19E-01	6.46E-08
Uranium-238 + D	1.30E+01	1.14E-07	1.78E-01	2.03E-08	7.11E-01	8.11E-08	8.30E-01	9.46E-08	8.30E-01	9.46E-08	2.55E+00	2.91E-07

total = 5.36E-06

Undeveloped Park User - Summation of all Pathways
Average COC concentration in waste pit CUs

	HQ	ILCR	rad only ILCR
Inhale	1.26E-04	4.00E-07	3.99E-07
Dermal Soil	8.48E-02	3.57E-06	NA
Ingest Soil	5.14E-02	1.31E-06	5.98E-07
Dermal Surface Water	1.16E-03	0.00E+00	NA
Ingest Surface Water	9.91E-03	1.93E-08	1.93E-08
Ext Rad	NA	5.38E-06	5.36E-06
SUM	**1.47E-01**	**1.07E-05**	**6.37E-06**

Summation of all paths for individual nuclides

	ILCR
Cesium-137 + D	5.03E-08
Lead-210 + D	1.64E-07
Neptunium-237 + D	0.00E+00
Plutonium-238	0.00E+00
Plutonium-239/240	0.00E+00
Radium-226 + D	2.30E-06
Radium-228 + D	1.09E-06
Radon-222+ D	3.90E-07
Strontium-90 + D	0.00E+00
Technetium-99	9.06E-10
Thorium-228 + D	1.73E-06
Thorium-230	6.37E-08
Thorium-232	1.05E-08
Uranium-234	9.28E-08
Uranium-235 + D	6.89E-08
Uranium-238 + D	4.09E-07
	6.37E-06

Summation of all paths for individual chemicals

	ILCR	HQ
1,1,2-Trichloroethane	1.08E-12	6.74E-08
1,1-Dichloroethylene	3.79E-11	1.80E-08
1,2-dichloroethane	4.76E-12	3.73E-08
2-Butanone	no CSFs	0.00E+00
3,3-Dichlorobenzidine	0.00E+00	no RfDs
4-Methylphenol	no CSFs	0.00E+00
4-Nitroanaline	0.00E+00	0.00E+00
Acetone	no CSFs	0.00E+00
Antimony	no CSFs	6.69E-03
Aroclor-1254	1.35E-08	4.87E-03
Aroclor-1260	4.79E-09	no RfDs
Arsenic	2.70E-06	8.66E-02
Barium	no CSFs	7.33E-04
Benzene	0.00E+00	0.00E+00
Benzo(a)anthracene	4.09E-09	no RfDs
Benzo(a)pyrene	3.23E-07	no RfDs
Benzo(b)fluoranthene	3.02E-08	no RfDs
Benzo(k)fluoranthene	2.55E-10	no RfDs
Beryllium	1.05E-06	1.78E-03
Bis(2-chloroisopropyl)ether	no CSFs	0.00E+00
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00
Boron	no CSFs	0.00E+00
Bromodichloromethane	3.27E-12	3.76E-08
Bromoform	0.00E+00	0.00E+00
Bromomethane	no CSFs	0.00E+00
Cadmium	2.65E-11	1.60E-03
Carbazole	0.00E+00	no RfDs
Carbon disulfide	no CSFs	0.00E+00
Carbon tetrachloride	0.00E+00	0.00E+00
Chlordane	0.00E+00	0.00E+00
Chlorobenzene	no CSFs	0.00E+00
Chloroform	0.00E+00	0.00E+00
Chromium (VI)	0.00E+00	0.00E+00
Chrysene	6.15E-11	no RfDs
Cobalt	0.00E+00	0.00E+00
Copper	no CSFs	0.00E+00
Cyanide	no CSFs	0.00E+00
Cyclohexanone	no CSFs	0.00E+00
Dibenzo(a,h)anthracene	1.18E-07	no RfDs
Dieldrin	2.08E-09	3.73E-05
Di-n-octylphthalate	no CSFs	0.00E+00

Summation of all paths for individual chemicals

	ILCR	HQ
Ethyl ether	no CSFs	0.00E+00
Ethylbenzene	0.00E+00	0.00E+00
Fluoride	no CSFs	6.02E-05
Heptachlorodibenzofuran	0.00E+00	no RfDs
Heptachlorodibenzo-p-dioxin	3.78E-09	no RfDs
Hexachlorodibenzofuran	0.00E+00	no RfDs
Hexachlorodibenzo-p-dioxin	0.00E+00	no RfDs
Indeno(1,2,3-cd)pyrene	2.53E-08	no RfDs
Lead	no CSFs	no RfDs
Manganese	no CSFs	0.00E+00
Mercury	no CSFs	0.00E+00
Methanol	no CSFs	0.00E+00
Methyl-2-pentanone	no CSFs	0.00E+00
Methylene chloride	0.00E+00	0.00E+00
Molybdenum	no CSFs	3.78E-04
Nickel	no CSFs	0.00E+00
N-nitrosodiphenylamine	0.00E+00	0.00E+00
N-nitrosodipropylamine	0.00E+00	no RfDs
Octachlorodibenzofuran	0.00E+00	no RfDs
Octochlorodibenzo-p-dioxin	5.82E-09	no RfDs
Pentachlorodibenzofuran	0.00E+00	no RfDs
Pentachlorodibenzo-p-dioxin	0.00E+00	no RfDs
Pentachlorophenol	0.00E+00	0.00E+00
Phenanthrene	no CSFs	no RfDs
Selenium	no CSFs	0.00E+00
Silver	no CSFs	6.01E-05
Tetrachlorodibenzofuran	0.00E+00	no RfDs
Tetrachlorodibenzo-p-dioxin	0.00E+00	no RfDs
Tetrachloroethylene	3.19E-11	8.43E-08
Thallium	no CSFs	0.00E+00
Toluene	no CSFs	0.00E+00
Tributyl phosphate	0.00E+00	0.00E+00
Trichloroethylene	1.19E-10	1.43E-05
Trifluorochloromethane	no CSFs	0.00E+00
Uranium	no CSFs	4.45E-02
Vanadium	no CSFs	0.00E+00
Vinyl chloride	0.00E+00	0.00E+00
Xylenes	no CSFs	0.00E+00
Zinc	no CSFs	0.00E+00
	4.28E-06	**1.47E-01**