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**CERTIFICATION REPORT  
FOR AREA 1, PHASE III PART TWO**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT  
FERNALD, OHIO**



**INFORMATION  
ONLY**

**NOVEMBER 2000**

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

**20720-RP-0006  
REVISION A  
DRAFT**

**000001**

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## LIST OF ACRONYMS AND ABBREVIATIONS

AIPI	Area 1, Phase I
A1P3PT2	Area 1, Phase III
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
CLP	Contract Laboratory Program
COC	constituent of concern
CRDL	contract required detection limit
CU	certification unit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FRL	final remediation level
FTF	Fire Training Facility
GC/MS	gas chromatography/mass spectroscopy
HAMDC	highest allowable minimum detectable concentration
HPGe	high-purity germanium (detector)
HPLC	high performance liquid chromatography
ICP-AES	inductively coupled plasma atomic emission spectroscopy
LCS	laboratory control sample
MDC	minimum detectable concentration
mg/kg	milligrams per kilogram
OEPA	Ohio Environmental Protection Agency
OSDF	On-Site Disposal Facility
OU	Operable Unit
PAHs	polyaromatic hydrocarbons
PCB	polychlorinated biphenyl
pCi/g	picoCuries per gram
PSP	Project Specific Plan
PWID	Project Waste Identification and Disposition
QA/QC	Quality Assurance/Quality Control
RAWP	Remedial Action Work Plan
ROD	Record of Decision
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SDFP	Soil and Disposal Facility Project
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
TPU	total propagated uncertainty
V&V	verification and validation
V/FCN	Variance/Field Change Notice
WAC	waste acceptance criteria

## EXECUTIVE SUMMARY

1  
2  
3 This certification report presents the information and data used by the U.S. Department of Energy (DOE)  
4 to determine that existing and/or residual soil contamination does not exceed final remediation levels  
5 (FRLs) in Area 1, Phase III (A1PIII) Part Two at the Fernald Environmental Management Project  
6 (FEMP). On the basis of this reported information and supporting project files, DOE has determined that  
7 no further remedial action is required in A1PIII Part Two; therefore, this area can be considered  
8 "certified."

9  
10 Delineation and design of the three certification units (CUs) was initially presented in the Certification  
11 Design Letter (CDL) for A1PIII Part Two (DOE 2000a). An additional CU was created when results  
12 showed a failure for benzo(a)pyrene in CU A1P2P3-C-01 and the affected portion of the CU was  
13 excavated. Certification sampling was conducted in all CUs to verify that the certification criteria  
14 established in the Sitewide Excavation Plan (SEP, DOE 1998) were achieved. These criteria state that:  
15 1) the mean concentrations or activities of the primary area-specific constituents of concern within a CU  
16 are less than the FRLs at the 95 percent upper confidence level, and 2) no certification result can exceed  
17 two times the FRL (i.e., the hot spot criterion). If either of these criteria is not met, further investigation  
18 and possible excavation would be required. If both of these criteria are met for a CU, it can be released  
19 for final land use development.

20  
21 The A1PIII Part Two samples were analyzed at the FEMP on-site laboratories and at a FEMP-approved  
22 off-site laboratory, following guidelines outlined in the Sitewide Comprehensive Environmental  
23 Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan  
24 (SCQ, Procedure FD-1000) and the SEP. All these samples were analyzed and reported at the required  
25 analytical support level. Analytical data packages included sample results with associated quality  
26 assurance/quality control data and all applicable raw data. The data were also subjected to the required  
27 validation and verification process, which did not identify any significant quality concerns.

28  
29 Two of the three initial A1PIII Part Two CUs achieved the certification criteria. CU A1P3P2-C-01 failed  
30 for benzo(a)pyrene. The affected area, approximately 15,000 square feet to the east of the former Fire  
31 Training Facility, was excavated and the excavation footprint became a separate CU. Additional  
32 certification samples (A1P3P2-C-04) were collected and analyzed for polyaromatic hydrocarbon (PAH)

1 parameters only. The results showed that the contamination was effectively removed and all PAH  
2 concentrations were below the associated FRL. The determination of passing or failing certification was  
3 based on a review of certification sample analytical results from each CU against the certification  
4 criteria. After the 15,000 square feet remediation, all four CUs passed final certification relative to the  
5 average constituent of concern concentration and the "hot spot" criteria.

6  
7 DOE has restricted access to certified areas (and those currently being certified) in order to maintain  
8 their integrity prior to development of the final land use. Upon approval from the regulatory agencies,  
9 this area will become available for future land use or restoration projects. Currently, a portion of the  
10 A1PIII Part Two footprint is being used as the clean On-Site Disposal Facility Construction Laydown  
11 Area.

1  
2

## 1.0 INTRODUCTION

3

### 1.1 PURPOSE

4 This certification report presents the information and data used by the U.S. Department of Energy (DOE)  
5 to determine that existing soil contamination does not exceed the final remediation levels (FRLs) within  
6 Area 1, Phase III (A1PIII) Part Two (Figure 1-1). The soil is being certified in order to proceed with  
7 future land use. Based on the data generated and summarized in this report, DOE considers the remedial  
8 goals achieved in A1PIII Part Two.

9

10

### 1.2 BACKGROUND

11 In the Operable Unit (OU) 5 Record of Decision (ROD, DOE 1996a), DOE committed to excavating  
12 contaminated soil that exceeds health-based FRLs. The excavated material may be dispositioned at the  
13 On-Site Disposal Facility (OSDF) or at an off-site disposal facility if the OSDF waste acceptance criteria  
14 (WAC) are not met. The OU5 Remedial Investigation Report (DOE 1995) defined the extent of soil  
15 contamination exceeding the FRLs and, in general, indicated widespread contamination occurring in  
16 approximately 430 acres of the 1,050-acre Fernald Environmental Management Project (FEMP).

17

18 In the OU5 Remedial Action Work Plan (RAWP, DOE 1996b), DOE committed to preparing a Sitewide  
19 Excavation Plan (SEP, DOE 1998) to define the overall approach to cleaning up soil and at- and  
20 below-grade debris in accordance with the OU2, OU3, and OU5 RODs. Per the SEP, the FEMP has been  
21 divided into distinct remedial areas and phases for soil remediation; this report addresses the soils in  
22 A1PIII Part Two.

23

24

### 1.3 AREA DESCRIPTION

25 A1PIII Part Two consists of approximately 6.9 acres bordered by Area 1, Phase I (A1PI) to the north and  
26 east and by the railyard and the former Fire Training Facility (FTF) to the south and west. A1PIII Part  
27 Two consists mostly of a flat section excavated in 1996 to provide borrow material for the construction  
28 of the north railyard. In addition, the area also includes a roadway to the north which goes from the FTF  
29 to the OSDF, a ditch along the roadway on the southern boundary of A1PI and a small, wooded area,  
30 approximately 100 feet by 250 feet, north of the FTF.

31

1 **1.4 SCOPE**

2 This report presents the results from the certification of A1PIII Part Two and the subsequent conclusions.  
3 A1PIII Part Two is divided into four certification units (CUs). The certification design for the CUs  
4 follows the general approach outlined in Section 3.4 of the SEP and is detailed in A1PIII Part Two  
5 Certification Design Letter (CDL, DOE 2000a) and subsequent Variance/Field Change Notices  
6 (V/FCNs) to the A1PIII Part Two Certification Sampling Project Specific Plan (PSP, DOE 2000b).

7  
8 **1.5 OBJECTIVES**

9 The objectives of this Certification Report are:

- 10 • Describe the precertification and remedial activities
- 11 • Describe the analytical methods, data validation processes, data reduction and statistical  
12 processes used to support the certification process
- 13 • Present certification sampling results for the four CUs
- 14 • Present the statistical analysis showing that all four CUs have passed the certification  
15 criteria, including FRL attainment and hot spot criteria
- 16 • Describe access controls implemented to prevent recontamination.

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23 **1.6 REPORT FORMAT**

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

- 26 Section 1.0 Introduction: Purpose, background, area description, scope, and objectives of  
27 the report
- 28 Section 2.0 Certification Approach: The approach for certification sampling and analysis
- 29 Section 3.0 Overview of Field Activities: Area preparation, excavation and changes to work  
30 scope
- 31 Section 4.0 Analytical Methodologies, Data Validation Processes and Data Reduction
- 32 Section 5.0 Certification Evaluation and Conclusions
- 33 Section 6.0 Protection of Certified Areas
- 34 Appendix A Certification Statistics

1           Appendix B    Approval of Variance/Field Change Notices to the Certification Sampling PSP

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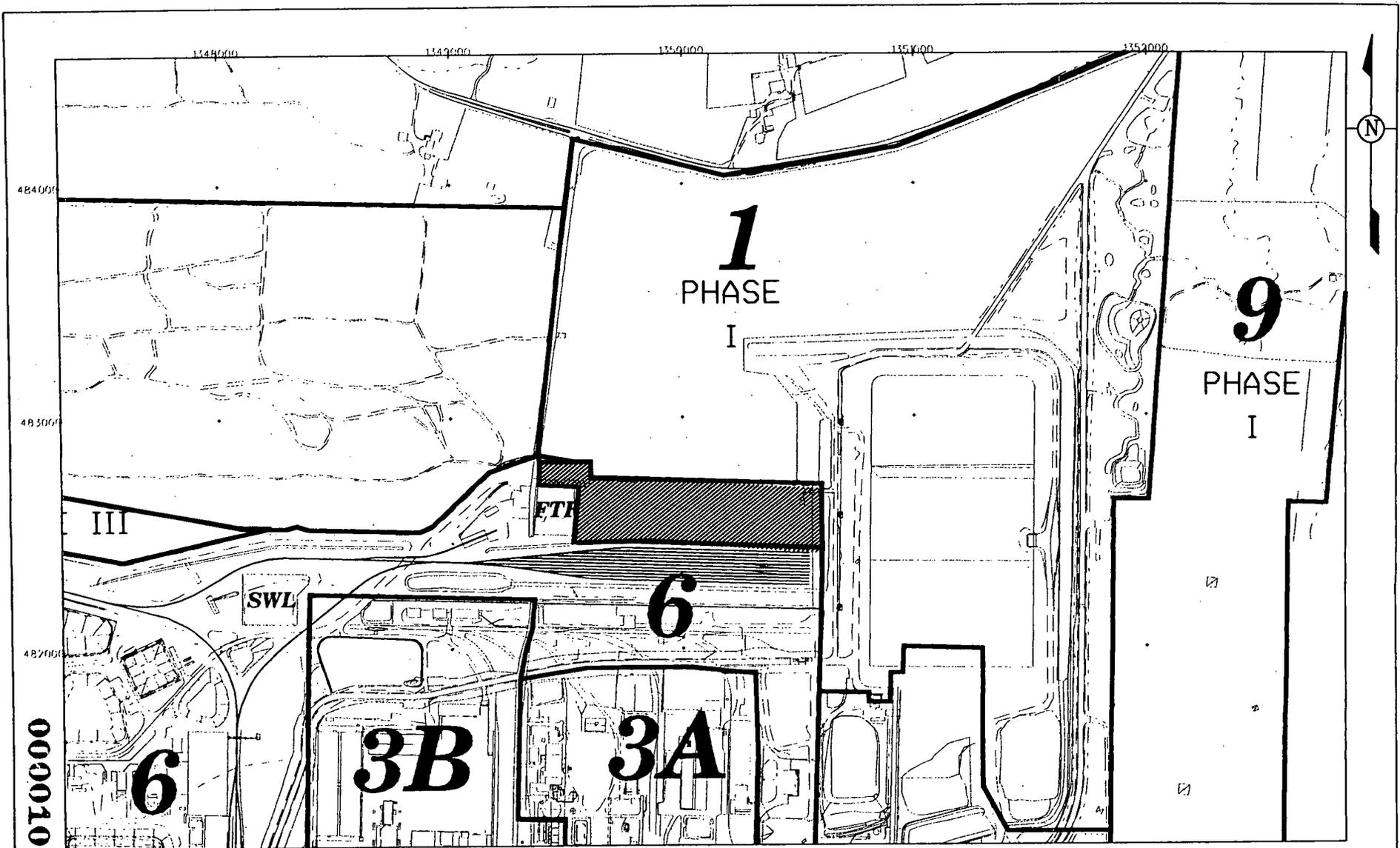
3           Appendix C    Certification Results

4

5    1.7 FEMP CERTIFICATION MASTER MAP

6    In order to track certification and characterization for reuse areas at the FEMP, DOE updates a controlled  
7    map showing the status of the soil remediation areas and phased areas with all Certification Reports.

8    This map has been updated to add certification of A1PIII Part Two (Figure 1-2).

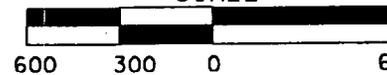


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A1PIII PART 2 AREA

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FIGURE 1-1. A1PIII PART 2 BOUNDARY MAP

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## 2.0 CERTIFICATION APPROACH

### 2.1 CERTIFICATION STRATEGY

This section summarizes the area-specific constituent of concern (ASCOC) selection process and the certification approach, including CU establishment, sampling design, and statistical analysis. The general certification strategy is described in Section 3.4 of the SEP, and the A1PIII Part Two specific strategy is described in the CDL for A1PIII Part Two.

#### 2.1.1 Selection of ASCOCs

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

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

#### 2.1.2 ASCOC Selection Process for A1PIII Part Two

Review of historical data revealed only two surface locations with above-FRL results. Both locations exceeded the FRL for total uranium, and one location exceeded the FRL for radium-226, radium-228, thorium-228, and thorium-232. This contamination was excavated in 1996 during railyard construction activities. The data were evaluated for Area 1 and Area 6 constituents, and no secondary COC results were above FRL.

Since limited data were available for the area to be certified, data were pulled from the Sitewide Environmental Database (SED) for the former FTF and evaluated for Area 1 and Area 6 constituents. Above-FRL results were found for aroclor-1254, aroclor-1260, arsenic, beryllium, and tetrachloroethene. CU A1P3P2-C-01 and -04 are located adjacent to the FTF, and samples collected there were analyzed for

1 each of these constituents except tetrachloroethene. This analyte is not expected to be present due to the  
2 volatility of the compound. The ASCOCs identified for A1PIII Part Two are summarized in Table 2-1.

## 3 4 2.2 CERTIFICATION DESIGN

5 The certification design and sampling strategy follows Section 3.4 of the SEP. The A1PIII Part Two  
6 certification area consists of the following:

- 7  
8 • Three Group 1 CUs: A1P3P2-C-01 comprises the area north and east of the former FTF  
9 and a portion of the roadway between the FTF and the OSDF. A1P3P2-C-02 comprises  
10 the roadway and ditch on the border of A1PI. A1P3P2-C-04 comprises the  
11 15,343 square foot area within CU A1P3P2-C-01 that failed certification for  
12 benzo(a)pyrene and was subsequently excavated.
- 13  
14 • One Group 2 CU: A1P3P2-C-03 comprises mainly of the section previously excavated  
15 to provide borrow material for the north railyard.
- 16

### 17 2.2.1 Sample Selection Process

18 The selection of certification sampling locations was conducted according to Section 3.4.2 of the SEP.  
19 Each CU was first divided into 16 approximately equal sub-CUs. Sample locations were then generated  
20 by randomly selecting easting and northing coordinates within each sub-CU boundary, and testing the  
21 locations against the minimum distance criterion for the CU. The minimum distance criterion is the  
22 smallest distance allowed between two sample locations within a CU, and is a function of CU size.  
23 The formula for calculating the minimum distance is presented in the SEP. If the minimum distance  
24 criterion were violated, an alternative random location was selected for that sub-CU, and all the locations  
25 were re-tested. The initial CU boundaries are shown in Figure 2-1, and the selected A1PIII Part Two  
26 certification sampling locations are shown in Figure 2-2 for CUs A1P3P2-C-01, A1P3P2-C-02, and  
27 A1P3P2-C-03. Figure 2-3 shows the benzo(a)pyrene remediation area comprising CU A1P3P2-C-04.

### 28 29 2.2.2 Certification Sampling and Analysis

30 Four of the 16 locations (one per each quadrant of the CU) were randomly selected for archiving, and the  
31 other 12 locations were submitted for analysis. Sample points 6, 7, and 8 in CU A1P3P2-C-01 and 3, 4,  
32 5A, 6, 8, 10, 11A, 14 and 15D in CU A1P3P2-C-02 are located within a gravel road footprint. At these  
33 locations, a 4-foot boring was collected. The entire length of the core was surveyed, in 6-inch intervals,  
34 using a beta/gamma (Geiger-Mueller) frisker. No intervals exhibited greater than background  
35 beta/gamma measurements and the certification sample was collected from the top 6-inch interval of the

1 undisturbed, native soil below the gravel/asphalt base as determined in the field by a geologist. The  
2 depth at which the top of the native, undisturbed layer was encountered ranged from 7 to 11 inches. At  
3 all other locations, samples were collected from the 0 to 6-inch (surface) soil interval at the designated  
4 and surveyed location.

5

### 6 2.2.3 Statistical Analysis

7 The statistical analysis of certification samples is discussed in Appendix G of the SEP and Section 4 of  
8 the CDL. The statistical analyses for all CUs are presented in Appendix A of this report. The results for  
9 CU-01 show a failure for benzo(a)pyrene and certification attainment for all other ASCOCs. As a result,  
10 the failed portion of the CU-01 was excavated and the excavation footprint was designated as CU-04. A  
11 statistical table is presented for the entire CU-01 showing the failure for benzo(a)pyrene and certification  
12 attainment for all other analytes. In addition, a statistical table is presented for CU-01, which excludes  
13 the samples in the excavation area (9, 11, and 13). This shows that the non-excavated area within CU-01  
14 passes certification for PAHs. The excavation footprint (CU-04) was sampled for PAHs only and the  
15 statistical table for this CU is also presented in Appendix A.

TABLE 2-1  
 ASCOC LIST FOR ALL CUs

ASCOC	FRL	Reason Retained
Total Uranium	82 mg/kg	Retained as a primary ASCOC sitewide
Radium-226	1.7 pCi/g	Retained as a primary ASCOC sitewide
Radium-228	1.8 pCi/g	Retained as a primary ASCOC sitewide
Thorium-228	1.7 pCi/g	Retained as a primary ASCOC sitewide
Thorium-232	1.5 pCi/g	Retained as a primary ASCOC sitewide
Aroclor-1254	0.13 mg/kg	Retained as a secondary ASCOC for CU A1P3P2-C-01
Aroclor-1260	0.13 mg/kg	Retained as a secondary ASCOC for CU A1P3P2-C-01
Arsenic	12 mg/kg	Retained as a secondary ASCOC for CU A1P3P2-C-01
Beryllium	1.5 mg/kg	Retained as a secondary ASCOC for CU A1P3P2-C-01
Benzo(a)anthracene*	20 mg/kg, 1 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Benzo(a)pyrene*	2 mg/kg, 1 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Benzo(b)fluoranthene*	20 mg/kg, 1 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Benzo(g,h,i)perylene*	1 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
benzo(k)fluoranthene*	200 mg/kg, 1 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Chrysene*	2000 mg/kg, 1 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Dibenzo(a,h)anthracene*	2 mg/kg, 0.088 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Fluoranthene*	10 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Indeno(1,2,3-cd)pyrene*	20 mg/kg, 1 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Phenanthrene*	5 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01
Pyrene*	10 mg/kg**	Retained an ecological COC for CU A1P3P2-C-01

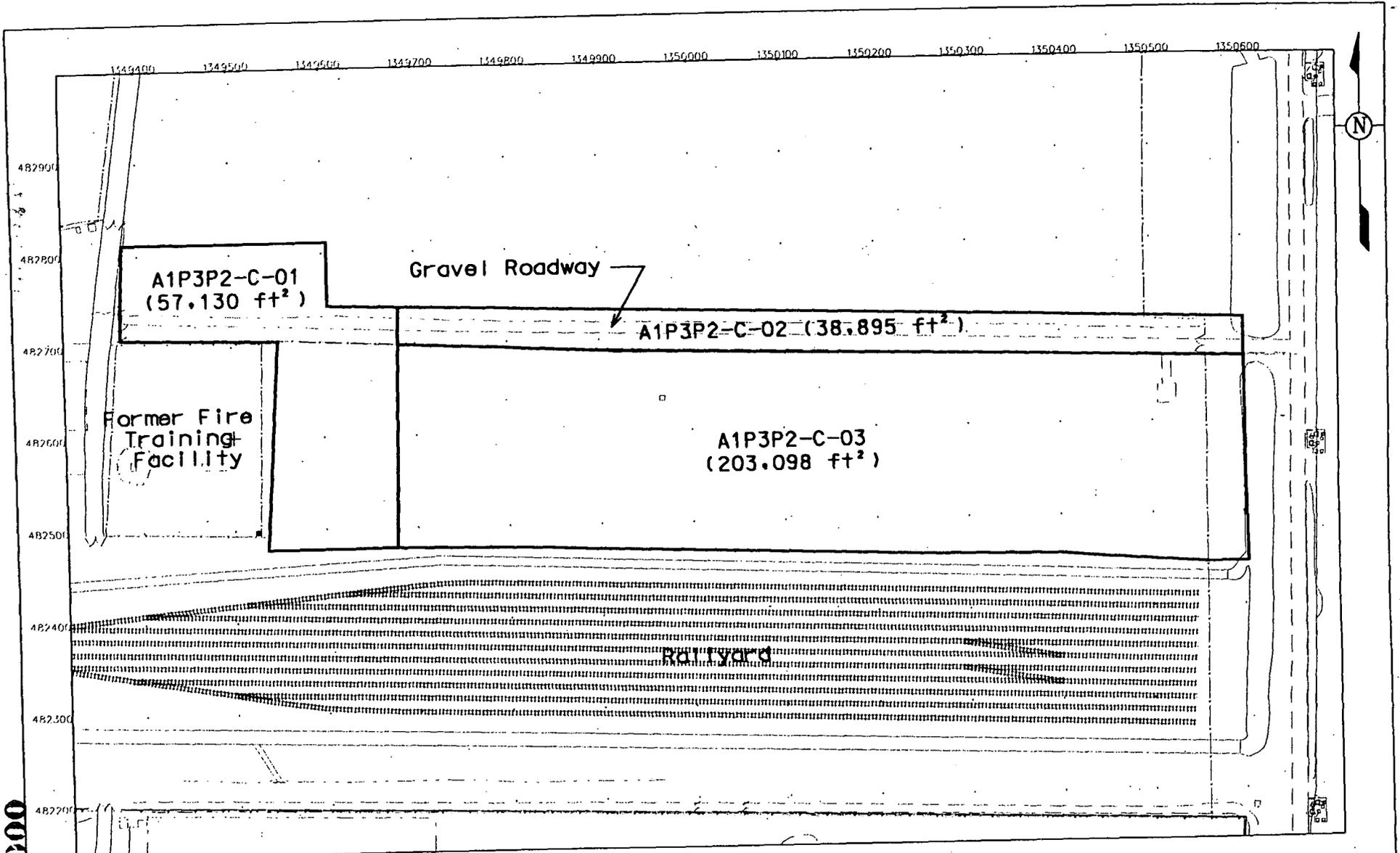
4 mg/kg – milligrams per kilogram

5 pCi/g – picoCuries per gram

6

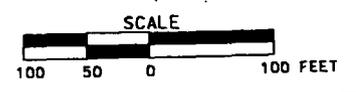
7 \* PAHs include: benzo(a)anthracene, benzo(a) pyrene, benzo(b)fluoranthene, Benzo(g,h,i)perylene,  
 8 benzo(k)fluoranthene, fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, phenanthrene,  
 9 and pyrene

10 \*\* Benchmark toxicity values (BTVs)



**LEGEND:**

— A1PIII PART 2 CU BOUNDARY



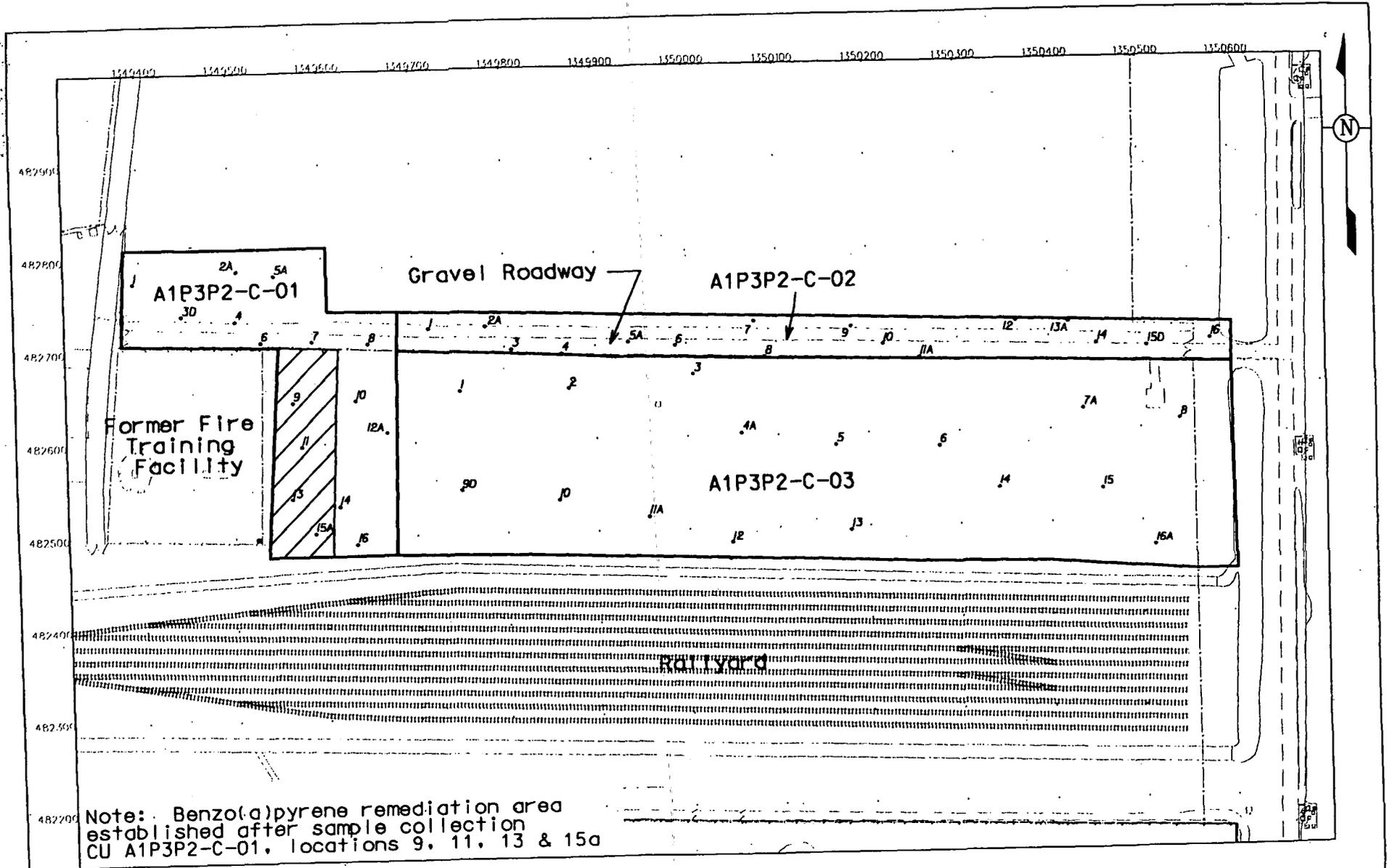
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FIGURE 2-1. A1PIII PART 2 CU BOUNDARIES

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- .5 SAMPLE LOCATION
- A1PIII PART 2 CU AREA BOUNDARY
-  BENZO(a)PYRENE REMEDIATION AREA/CU-04

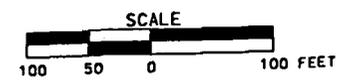


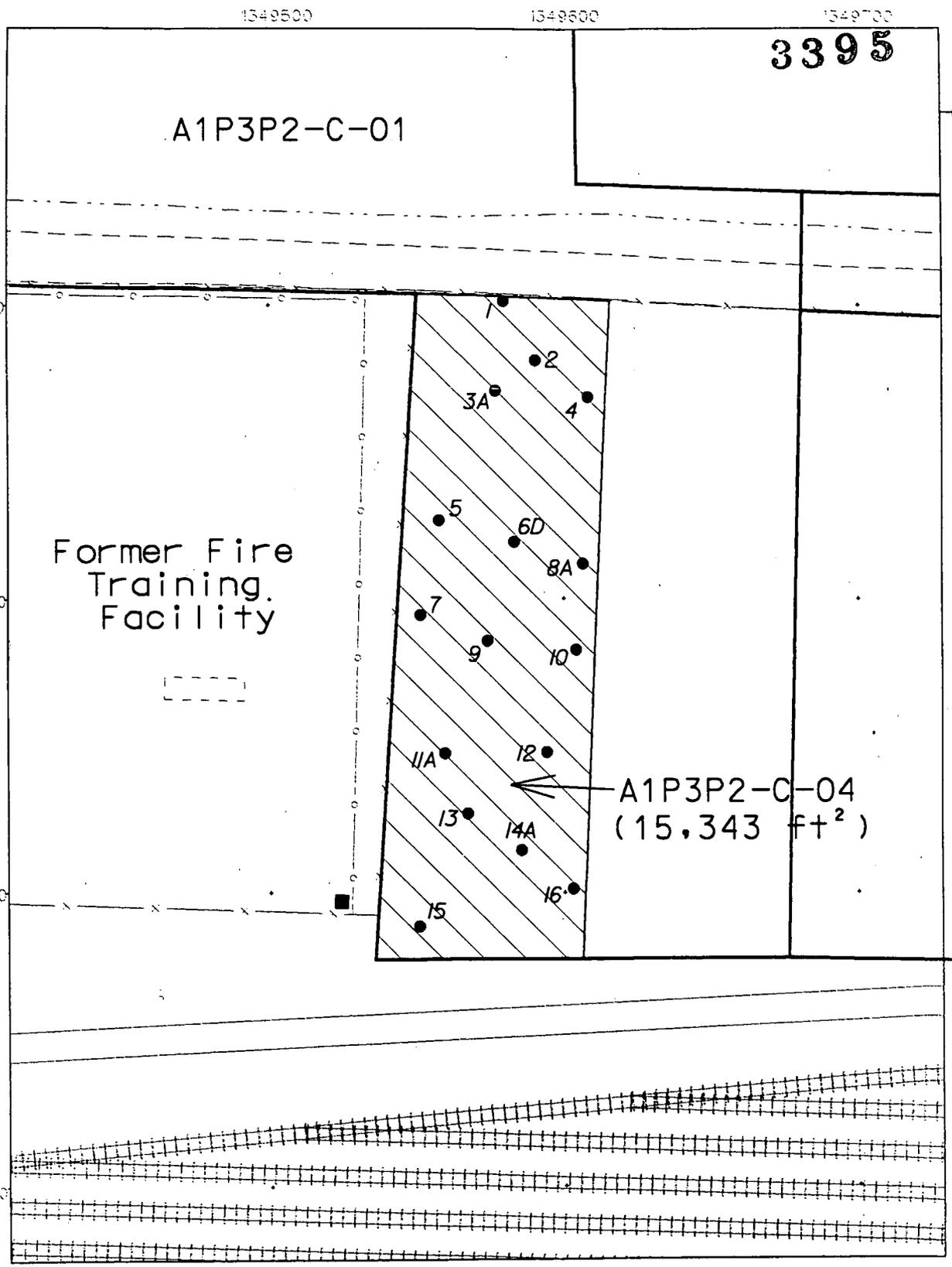
FIGURE 2-2. A1PIII PART 2 CERTIFICATION SAMPLE LOCATIONS

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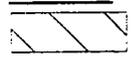
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 CU A1P3PT2-04  
 A1PIII PART 2 BOUNDARY



FIGURE 2-3. CERTIFICATION SAMPLE LOCATIONS IN A1P3P2-C-04

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### 3.0 OVERVIEW OF FIELD ACTIVITIES

#### 3.1 DATA EVALUATION, PRECERTIFICATION AND AREA PREPARATION

Based on historical data and precertification surveys from A1P3PT2, Part Two, no soil remediation activities were required prior to certification sampling. The field activities in A1P3PT2 Part Two began in early Spring 2000 and concluded in Fall 2000. Precertification scanning of A1P3PT2 Part Two was mostly completed in May 2000, with additional high-purity germanium (HPGe) detector shots taken at a sinkhole in the southwestern corner of CU A1P3P2-C-01 in August 2000. As discussed in Section 2.2 of the CDL, several total uranium and radium-226 concentrations were greater than one times the FRL, but no concentrations exceeded the "hot spot" criteria. The area was determined to be ready for certification based on historical and precertification data. Certification sampling was conducted in August 2000 for CUs A1P3P2-C-01, 02 and 03.

Analytical data for the CUs was received in September and CU A1P3P2-C-01 showed a FRL failure for benzo(a)pyrene. The above-FRL results were concentrated along the eastern boundary of the CU along the FTF fence. Subsequently, a remediation strategy was developed and implemented to mitigate the failed benzo(a)pyrene area and certify the remediated footprint. The details of this effort are summarized below in Section 3.2.

#### 3.2 CHANGES TO SCOPE OF WORK

The scope of work for A1P3PT2 Part Two certification sampling was documented in the CDL and A1P3PT2 Part Two CDL and Certification PSP. Documentation of Ohio Environmental Protection Agency (OEPA) approval for significant V/FCNs to the PSP are provided in Appendix B. The following is a summary of the changes to the scope of work.

- The minimum detectable concentrations (MDCs) for PAHs listed in Target Analyte List 20720-PSP-0002 C were set at one-tenth of the BTV; however, the listed detection limit could not be achieved for all analytes using Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ) approved Analytical Support Level (ASL) D methodology. With the exception of dibenzo(a,h)anthracene, detection limits achieved were equal to one-third or less of the BTV. Dibenzo(a,h)anthracene was analyzed twice. The first analysis was SCQ compliant; however, the detection limit exceeded the BTV. The second analysis was performed by high performance liquid chromatography (HPLC) using U.S. Environmental Protection Agency (EPA) approved SW-846 method 8310 and the method detection limit met 1/10 of the BTV.

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- All archive samples from CU A1P3P2-C-03 were collected. In addition, archive samples A1P3P2-C-01-12A and -15A were collected from CU A1P3P2-C-01. Although these samples were collected, they were not submitted for analysis. The archives were collected since they were located within the footprint for the grading and placement of stone for the clean OSDF Construction Laydown Area.
- Samples for PAH and polychlorinated biphenyl (PCB) analyses were inadvertently prepped by the laboratory using SW-846 protocol. Sufficient sample material was available for re-preparation by Contract Laboratory Program (CLP) protocol for all samples with the exception of A1P3P2-C-01-8-PS and A1P3P2-C-01-X (rinsate). The laboratory analyzed all the samples, including the SW-846 extracts, by CLP methodology only.
- Certification samples collected in CU A1P3P2-C-01 showed a failure for benzo(a)pyrene. Additionally, results for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, and chrysene were above the BTV value. All the other COCs were below their associated FRLs. The affected area was limited to an approximately 15,343 square feet area just east of the former FTF. This area was designated for remediation and re-certification.
- Approximately, twelve inches of soil were excavated in this area and the resulting excavation footprint was designated as CU A1P3P2-C-04. Pre- and post-topography of the excavated footprint is shown in Figure 3-1. The estimated 625 cubic yards of impacted material was excavated by Wise Construction under Fluor Fernald direction at the end of September. The impacted material was managed under Project Waste Identification and Disposition (PWID) #579 and hauled to stockpile A3A-008 (former location of Stockpile 4). Miscellaneous fence posts and wooden pallets were hauled to Stockpile 1. Certification sampling of the excavated area (CU A1P3P2-C-04) was conducted at the end of September. Samples were collected and analyzed for PAHs including benzo(a)pyrene by CLP methodology. Samples were not analyzed by SW-846 method 8310 for dibenzo(a,h)anthracene to achieve lower detection limits since the CU A1P3P2-C-01 analyses confirmed that concentrations of the analyte were below FRLs. Additionally, all other COCs were below their associated FRLs, thus sampling and analysis for constituents other than PAHs was not performed for CU A1P3P2-C-04.
- Due to the benzo(a)pyrene certification failure and subsequent remediation, the target submittal date (proposed in the CDL) of the certification report was modified from October 15, 2000.

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STATE PLANNING COORDINATE SYSTEM 1983

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A1P3P2-C-01

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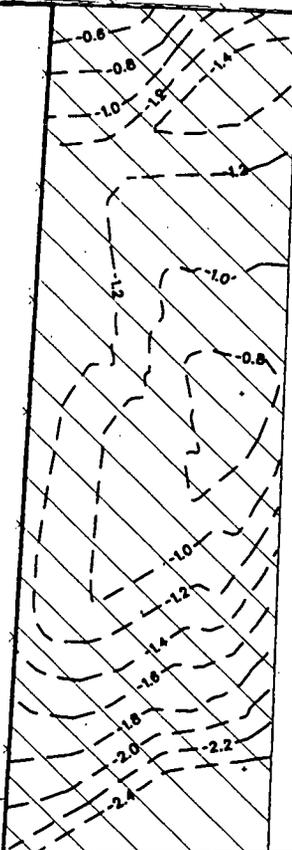
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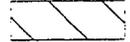
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Former Fire Training Facility



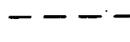
LEGEND:



CU A1P3PT2-04



A1PIII PART 2 BOUNDARY



DIFFERENCE IN ELEVATION (PRE & POST EXCAVATION)

SCALE



50 25 0 50 FEET

FIGURE 3-1. PRE- AND POST- TOPOGRAPHY OF ABOVE-FRL EXCAVATED FOOTPRINT

000021

482400

#### 4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES AND DATA REDUCTION

##### 4.1 ANALYTICAL METHODOLOGIES

The samples for A1P3PT2 Part Two were analyzed at the FEMP on-site laboratory, which meets SCQ requirements. The SCQ is the source for analytical methodologies (Appendix G), data validation and verification, and analytical and field quality assurance/quality control (QA/QC) requirements.

For all the certification data, laboratory analysis met all requirements for ASL D with ASL E exceptions. For soil samples, the project-specified MDC for total uranium, thorium-228 and thorium-232 by gamma spectroscopy is less stringent than the ASL D SCQ highest allowable minimum detectable concentration (HAMDC). Therefore, the total uranium, thorium-228 and thorium-232 gamma spectroscopy data were considered ASL E although the data deliverable is identical in all other specifications for ASL D per Appendix G of the SCQ. Also, the on-site laboratory prepared an ASL D data package, which included sample results with associated QA/QC data and all applicable raw data. Certification analytical results are provided in Appendix C, and a summary of the analytical methods follows.

##### 4.1.1 Radiochemical Methods

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

##### Total Uranium

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

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

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

1 Radium-226

2 Samples were analyzed by gamma spectrometry, and radium-226 was quantified by measuring gamma  
3 rays emitted by members of its decay chain. This method does not require chemical separation, but the  
4 samples must be allowed a 20-day progeny in-growth period before counting. The on-site laboratory  
5 used the same gamma ray emission lines and error weighted average methodology to calculate all  
6 A1PIII Part Two certification results.

7  
8 Radium-228

9 Following gamma spectrometry analysis, radium-228 was also quantified by measuring gamma rays  
10 emitted by members of its decay chain. The on-site laboratory used the same gamma ray emission lines  
11 and error weighted average methodology to calculate all A1PIII Part Two certification results.

12  
13 Isotopic Thorium

14 Isotopic thorium (thorium-228 and thorium-232) was also quantified by measuring gamma rays emitted  
15 by members of its decay chain by gamma spectrometry. The on-site laboratory used the same gamma  
16 ray emission lines and error weighted average methodology to calculate all A1PIII Part Two certification  
17 results.

18  
19 4.1.2 Chemical Methods

20 Metals

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

23  
24 Polychlorinated Biphenyls (PCBs)

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

26  
27 PolyAromatic Hydrocarbons (PAHs)

28 Samples were analyzed for PAHs using gas chromatography/mass spectroscopy (GC/MS). Additionally,  
29 dibenz(a,h)anthracene was also analyzed by SW-846 method 8310 to achieve a detection limit lower than  
30 the associated FRL.

#### 4.2 DATA VERIFICATION AND VALIDATION

This section discusses the data verification and validation (V&V) process used to examine the quality of field and laboratory results. Data were qualified to indicate the level of data usability, or level of confidence in the reported analytical results. The EPA National Functional Guidelines for Data Review (Inorganic Data) (EPA 1994), as adapted and approved by EPA Region V, was used for this process.

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

The V&V process evaluated the following parameters:

- Specific field forms for sample collection and handling
- Chain of Custody forms
- Completeness of laboratory data deliverable.

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

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

Parameters unique to the evaluation of radiochemical analyses include:

- Calibration data for specific energies
- Background checks
- Relative Error ratios
- Detector efficiencies
- Background count correction.

1 For this project, all the radiological data were reviewed and validated for all criteria noted above. Per  
2 project requirements, a minimum of 10 percent of the certification data were validated to validation  
3 Level D. This validation included the same review process as for Level B, but included a systematic  
4 review of the raw data and recalculations. One of the analytical releases was validated to Level D, while  
5 all remaining data were validated to Level B.

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

- 9
- 10 - No qualification; the positive result or detection limit is confident as reported
  - 11
  - 12 J Positive result is estimated or imprecise; data point is usable for decision-making  
13 purposes. Positive results less than the contract required reporting limit are also  
14 qualified in this manner
  - 15
  - 16 R Positive result or detection limit is considered unreliable; data point should not be used  
17 for decision-making purposes
  - 18
  - 19 U Undetected result at the stated limit of detection
  - 20
  - 21 UJ Undetected result; detection limit is considered estimated or imprecise; the data point is  
22 usable for decision-making purposes
  - 23
  - 24 N Positive result is tentatively identified - that is, there is some question regarding the  
25 actual identification and quantification of the result. Compound reported is best  
26 professional judgement of the interpretation of the supporting data, such as mass spectra.  
27 Caution must be exercised with the use of this data
  - 28
  - 29 NV Not Validated. The results for this sample were not validated
  - 30
  - 31 Z This result, or detection limit in this analysis is not the best one to use; another analysis  
32 (e.g., the dilution or re-analysis) contains a more confident and usable result.
  - 33

34 The V&V of this data set did not identify any problems with the data set. All the results were either not  
35 qualified or qualified as estimated (J) and/or nondetects (U). No results were qualified as rejected (R).

#### 36 37 4.3 DATA REDUCTION

38 Each sample used to support the A1PIII Part Two certification decision was entered in the FEMP SED  
39 with the following information:

1 Field Information

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

6 Laboratory Information

7 For each sample result the following information is entered:

- 8
- 9 • Laboratory Result - The reported analytical value from the laboratory
  - 10
  - 11 • Laboratory Qualifier - The qualifier reported from the lab. For radiological parameters
  - 12 non-detect values are assigned a U qualifier
  - 13
  - 14 • Total Propagated Uncertainty (TPU) - This value represents the uncertainty associated
  - 15 with the reported result. TPU includes the counting error, as well as uncertainty from
  - 16 other laboratory measurements and data reduction. (Applicable to radiological
  - 17 parameters only.)
  - 18
  - 19 • Units - The units in which the Laboratory Result is reported.
- 20

21 Validation Information

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

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

35 CU data set.

- 36
- 37 1. All the data for each CU were queried from SED. All the data were used even if the CU
  - 38 had more than the minimum required data points
  - 39
  - 40 2. The data from the validation fields were used for statistical calculations
  - 41
  - 42 3. Data with a qualifier of R or Z was not used in the statistical calculations
- 43

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

1                                   **5.0 CERTIFICATION EVALUATION AND CONCLUSIONS**

2  
3           **5.1 CERTIFICATION RESULTS, EVALUATION, AND CONCLUSION**

4   After remediation of the failed benzo(a)pyrene area, all CUs for A1P3PT2 Part Two passed the certification  
5   criteria. Some of the PAH COCs remain above ecological BTV values; however, the BTV exceedences  
6   do not effect the certification of the area per Section C.1.3.3 of the SEP. Final certification data are  
7   presented in Appendix C. Based on these results, DOE has determined that the remedial objectives in the  
8   OU5 ROD have been achieved in A1P3PT2 Part Two, and no further remedial actions are required. The  
9   subject areas will be released for final land use.

10  
11           **5.2 LESSONS LEARNED**

12   A lessons learned program has been implemented to apply knowledge accumulated during successive  
13   remedial and certification efforts conducted under the SEP. This certification effort was the first  
14   campaign in which an FRL exceedence occurred while sampling and analyzing for ecological COCs.  
15   Field responsiveness to the benzo(a)pyrene certification failure and subsequent remedial action was  
16   extremely efficient due to the concurrent construction work in the area. Evaluation of data, remedial  
17   design, excavation and recertification sampling of the FRL failure were completed within two weeks of  
18   receipt of the initial analytical data. The cooperation and responsiveness of the construction,  
19   engineering, and statistical personnel was extremely efficient and should be recognized as a model for  
20   future scenarios. The FRL exceedence of a non-secondary COC also emphasizes the inherent impact to  
21   the certification process when adding the ecological COC sampling to the certification design.

**6.0 PROTECTION OF CERTIFIED AREAS**

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

The procedure is summarized as follows:

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

**Appendix A: Certification Statistics for A1P3P2-C-01 (includes all locations)**

Sample ID	PRIMARY COCs					SECONDARY COCs	
	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Arsenic	Beryllium
A1P3P2-C-01-01	0.83 -	0.67 -	0.66 -	0.67 -	18.15 -	5.92 -	0.30 -
A1P3P2-C-01-03	1.07 -	0.90 -	0.88 -	0.99 -	4.62 -	5.74 -	0.31 -
A1P3P2-C-01-03-D	1.04 -	0.96 -	0.93 -	0.96 -	4.18 -	5.59 -	0.36 -
A1P3P2-C-01-04	1.00 -	0.89 -	0.88 -	0.89 -	4.97 -	4.19 U	0.33 -
A1P3P2-C-01-06	1.23 -	1.03 -	1.02 -	1.03 -	2.89 J	8.41 -	0.33 -
A1P3P2-C-01-07	1.24 -	1.07 -	1.04 -	1.07 -	2.55 U	6.51 -	0.22 -
A1P3P2-C-01-08	1.19 -	1.14 -	1.13 -	1.14 -	3.91 J	8.24 -	0.19 -
A1P3P2-C-01-09	1.12 -	0.70 -	0.67 -	0.70 -	3.70 J	6.07 -	0.36 -
A1P3P2-C-01-10	0.84 -	0.73 -	0.71 -	0.73 -	2.58 J	3.57 U	0.41 -
A1P3P2-C-01-11	1.09 -	0.99 -	0.97 -	0.99 -	3.51 J	3.79 U	0.40 -
A1P3P2-C-01-13	0.74 -	0.44 -	0.39 -	0.44 -	2.17 J	7.95 -	0.23 -
A1P3P2-C-01-14	0.98 -	0.91 -	0.89 -	0.91 -	2.33 U	6.75 -	0.42 -
A1P3P2-C-01-16	0.95 -	0.77 -	0.75 -	0.77 -	3.48 J	6.97 -	0.31 -
FRL	1.70	1.80	1.70	1.50	82	12.00	1.50
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g	mg/kg	mg/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%
Maximum Result	@ 1.24 -	@ 1.14 -	@ 1.13 -	@ 1.14 -	@ 18.15 -	@ 8.41 -	@ 0.42 -
W-Statistic Probability*	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12
Estimated Mean	--	--	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass
<i>a posteriori</i> Sample	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--

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

**NOTES:**

- (1) @ - Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.
- (2) The maximum value of the two duplicates was used in all statistical equations.
- (3) \* W-Statistic Probability is the highest calculated probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.  
The test is performed on the raw data (untransformed) data (Normal) and the log-transformed data (LogNormal) to test for lognormality.
- (4) \*\* Estimated Mean = Estimated measure of central tendency (Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median).

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3395

Appendix A: Certification Statistics for A1P3P2-C-01 (includes all locations)

Sample ID	SECONDARY COCs								
	Aroclor-1254	Aroclor-1260	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Indeno(1,2,3-cd)-pyrene
A1P3P2-C-01-01	0.037 U	0.037 U	1.900 -	2.500 -	3.200 J	1.300 -	2.200 -	0.380 J	2.700 -
A1P3P2-C-01-03	0.044 U	0.044 U	0.044 J	0.060 J	0.100 J	0.450 U	0.056 J	0.005 J	0.034 J
A1P3P2-C-01-03-D	0.049 U	0.049 U	0.054 J	0.066 J	0.072 J	0.063 J	0.060 J	0.013 J	0.042 J
A1P3P2-C-01-04	0.040 U	0.040 U	0.054 J	0.080 J	0.086 J	0.063 J	0.076 J	0.017 J	0.049 J
A1P3P2-C-01-06	0.039 U	0.039 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.011 UJ	0.400 U
A1P3P2-C-01-07	0.040 U	0.040 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.011 UJ	0.400 U
A1P3P2-C-01-08	0.040 U	0.040 U	0.390 U	0.390 U	0.390 UJ	0.390 U	0.390 U	0.011 U	0.390 U
A1P3P2-C-01-09	0.036 U	0.036 U	4.400 -	4.500 -	6.200 J	4.000 -	4.700 -	1.100 J	4.200 -
A1P3P2-C-01-10	0.036 U	0.036 U	1.100 -	1.200 -	1.000 -	1.000 -	1.200 -	0.270 J	0.770 -
A1P3P2-C-01-11	0.035 U	0.035 U	1.500 -	1.500 -	1.900 J	1.800 -	1.600 -	0.410 -	1.200 -
A1P3P2-C-01-13	0.036 U	0.036 U	4.300 -	4.200 -	5.600 J	3.800 -	4.400 -	1.200 J	4.100 -
A1P3P2-C-01-14	0.034 U	0.034 U	0.390 -	0.410 -	0.390 -	0.480 -	0.420 -	0.110 J	0.230 J
A1P3P2-C-01-16	0.034 U	0.034 U	0.350 -	0.370 -	0.340 -	0.430 -	0.390 -	0.100 J	0.220 J
FRL	0.13	0.13	20.00	2.00	20.00	200.00	2000	2.00	20.00
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Confidence Level	90%	90%	90%	90%	90%	90%	90%	90%	90%
Maximum Result	@ 0.049 U	@ 0.049 U	@ 4.400 -	4.500 -	@ 6.200 J	@ 4.000 -	@ 4.700 -	@ 1.200 J	@ 4.200 -
W-Statistic Probability*	--	--	--	38.3% (LN)	--	--	--	--	--
Test Procedure	--	--	--	Wilcoxon	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Estimated Mean	--	--	--	390	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	0.142	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	FAIL	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	FAIL	Pass	Pass	Pass	Pass	Pass
<i>a posteriori</i> Sample	--	--	--	28	--	--	--	--	--
Size calculation	--	--	--	Fail	--	--	--	--	--

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

NOTES:

- (1) @ - Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.
- (2) The maximum value of the two duplicates was used in all statistical equations.
- (3) \* W-Statistic Probability is the highest calculated probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (Normal) and the log-transformed data (LogNormal) to test for lognormality.
- (4) \*\* Estimated Mean = Estimated measure of central tendency (Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median).

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Appendix A: Certification Statistics for A1P3P2-C-01 (excludes locations 9, 11, 13)

SECONDARY COCs							
Sample ID	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Indeno(1,2,3-cd)-pyrene
A1P3P2-C-01-01	1.900 -	2.500 -	3.200 J	1.300 -	2.200 -	0.380 J	2.700 -
A1P3P2-C-01-03	0.044 J	0.060 J	0.100 J	0.450 U	0.056 J	0.005 J	0.034 J
A1P3P2-C-01-03-D	0.054 J	0.066 J	0.072 J	0.063 J	0.060 J	0.013 J	0.042 J
A1P3P2-C-01-04	0.054 J	0.080 J	0.086 J	0.063 J	0.076 J	0.017 J	0.049 J
A1P3P2-C-01-06	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.011 UJ	0.400 U
A1P3P2-C-01-07	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.011 UJ	0.400 U
A1P3P2-C-01-08	0.390 U	0.390 U	0.390 UJ	0.390 U	0.390 U	0.011 U	0.390 U
A1P3P2-C-01-10	1.100 -	1.200 -	1.000 -	1.000 -	1.200 -	0.270 J	0.770 -
A1P3P2-C-01-14	0.390 -	0.410 -	0.390 -	0.480 -	0.420 -	0.110 J	0.230 J
A1P3P2-C-01-16	0.350 -	0.370 -	0.340 -	0.430 -	0.390 -	0.100 J	0.220 J
FRL	20.00	2.00	20.00	200.00	2000	2.00	20.00
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Confidence Level	90%	90%	90%	90%	90%	90%	90%
Maximum Result	@ 1.900 -	2.500 -	@ 3.200 J	@ 1.300 -	@ 2.200 -	@ 0.380 J	@ 2.700 -
W-Statistic Probability*	--	50.1% (LN)	--	--	--	--	--
Test Procedure	--	Median	--	--	--	--	--
Sample Size	9	9	9	9	9	9	9
Estimated Mean	--	200	--	--	--	--	--
UCL on the Mean**	--	410	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	Pass	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass
<i>a posteriori</i> Sample Size calculation	--	6 Pass	--	--	--	--	--

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

NOTES:

- (1) @ - Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.
- (2) The maximum value of the two duplicates was used in all statistical equations.
- (3) \* W-Statistic Probability is the highest calculated probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (Normal) and the log-transformed data (LogNormal) to test for lognormality.
- (4) \*\* Estimated Mean = Estimated measure of central tendency (Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median).

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Appendix A: Certification Statistics for A1P3P2-C-02

Sample ID	PRIMARY COCs				
	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
A1P3P2-C-02-01	1.18 -	1.02 -	1.02 -	1.02 -	9.37 -
A1P3P2-C-02-03	1.34 -	1.13 -	1.12 -	1.13 -	4.17 J
A1P3P2-C-02-04	1.33 -	1.14 -	1.14 -	1.14 -	3.92 J
A1P3P2-C-02-06	1.42 -	1.20 -	1.17 -	1.20 -	2.97 U
A1P3P2-C-02-07	1.30 -	1.11 -	1.12 -	1.11 -	25.87 -
A1P3P2-C-02-08	1.27 -	1.07 -	1.05 -	1.07 -	14.56 -
A1P3P2-C-02-09	1.29 -	1.04 -	1.04 -	1.04 -	13.90 -
A1P3P2-C-02-10	1.38 -	1.15 -	1.13 -	1.15 -	8.20 -
A1P3P2-C-02-12	1.19 -	1.02 -	1.02 -	1.02 -	23.55 -
A1P3P2-C-02-14	1.35 -	1.08 -	1.06 -	1.08 -	6.13 J
A1P3P2-C-02-15	1.14 -	1.01 -	1.03 -	1.01 -	6.64 J
A1P3P2-C-02-15-D	1.16 -	0.96 -	0.96 -	0.96 -	10.86 J
A1P3P2-C-02-16	1.15 -	0.90 -	0.88 -	0.90 -	2.94 U
FRL	1.70	1.80	1.70	1.50	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g
Confidence Level	95%	95%	95%	95%	95%
Maximum Result	@ 1.42 -	@ 1.20 -	@ 1.17 -	@ 1.20 -	@ 25.87 -
W-Statistic Probability*	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Estimated Mean	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass
<i>a posteriori</i> Sample Size calculation	--	--	--	--	--

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

NOTES:

- (1) @ - Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.
- (2) The maximum value of the two duplicates was used in all statistical equations.
- (3) \* W-Statistic Probability is the highest calculated probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (Normal) and the log-transformed data (LogNormal) to test for lognormality.
- (4) \*\* Estimated Mean = Estimated measure of central tendency (Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median).

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Appendix A: Certification Statistics for A1P3P2-C-03

Sample ID	PRIMARY COCs				
	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
A1P3P2-C-03-01	0.84 -	0.73 -	0.69 -	0.73 -	3.51 -
A1P3P2-C-03-02	0.84 -	0.72 -	0.70 -	0.72 -	2.97 J
A1P3P2-C-03-03	1.12 -	1.07 -	1.02 -	1.07 -	2.67 U
A1P3P2-C-03-05	0.79 -	0.65 -	0.62 -	0.65 -	2.84 J
A1P3P2-C-03-06	0.76 -	0.71 -	0.65 -	0.71 -	2.58 U
A1P3P2-C-03-08	1.11 -	1.10 -	1.08 -	1.10 -	3.31 J
A1P3P2-C-03-09	0.61 J	0.49 -	0.50 -	0.49 -	2.37 U
A1P3P2-C-03-09-D	0.76 J	0.53 -	0.53 -	0.53 -	2.49 U
A1P3P2-C-03-10	0.77 -	0.67 -	0.68 -	0.67 -	2.18 U
A1P3P2-C-03-12	0.66 -	0.59 -	0.58 -	0.59 -	2.98 J
A1P3P2-C-03-13	0.70 -	0.55 -	0.53 -	0.55 -	2.62 U
A1P3P2-C-03-14	0.80 -	0.65 -	0.65 -	0.65 -	2.90 U
A1P3P2-C-03-15	0.72 -	0.59 -	0.56 -	0.59 -	2.49 J
FRL	1.70	1.80	1.70	1.50	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	ug/g
Confidence Level	95%	95%	95%	95%	95%
Maximum Result	@ 1.12 -	@ 1.10 -	@ 1.08 -	@ 1.10 -	@ 3.51 -
W-Statistic Probability*	--	--	--	--	--
Test Procedure	--	--	--	--	--
Sample Size	12	12	12	12	12
Estimated Mean	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass
<i>a posteriori</i> Sample Size calculation	--	--	--	--	--

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

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NOTES:

- (1) @ - Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.
- (2) The maximum value of the two duplicates was used in all statistical equations.
- (3) \* W-Statistic Probability is the highest calculated probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption. The test is performed on the raw data (untransformed) data (Normal) and the log-transformed data (LogNormal) to test for lognormality.
- (4) \*\* Estimated Mean = Estimated measure of central tendency (Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median).

**Appendix A: Certification Statistics for A1P3P2-C-04**

Sample ID	SECONDARY COCs						
	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Indeno(1,2,3-cd)-pyrene
A1P3P2-C-04-01	0.120 J	0.140 J	0.120 J	0.130 J	0.130 J	0.018 J	0.082 J
A1P3P2-C-04-02	0.170 J	0.190 J	0.160 J	0.210 J	0.200 J	0.032 J	0.130 J
A1P3P2-C-04-04	0.380 U	0.380 U	0.380 U	0.380 U	0.380 U	0.380 U	0.380 U
A1P3P2-C-04-05	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
A1P3P2-C-04-06	0.650 -	0.680 J	0.800 J	0.460 -	0.790 J	0.160 J	0.510 -
A1P3P2-C-04-06-D	0.350 J	0.340 J	0.360 J	0.250 J	0.410 J	0.064 J	0.250 J
A1P3P2-C-04-07	0.074 J	0.078 J	0.076 J	0.070 J	0.073 J	0.410 U	0.054 J
A1P3P2-C-04-09	0.390 U	0.390 U	0.390 U	0.390 U	0.390 U	0.390 U	0.390 U
A1P3P2-C-04-10	0.840 -	0.910 -	0.870 -	0.960 -	0.910 -	0.130 J	0.460 -
A1P3P2-C-04-12	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
A1P3P2-C-04-13	0.400 U	0.400 U	0.400 U	0.024 J	0.400 U	0.400 U	0.400 U
A1P3P2-C-04-15	0.100 J	0.100 J	0.100 J	0.099 J	0.110 J	0.021 J	0.076 J
A1P3P2-C-04-16	0.390 U	0.390 U	0.390 U	0.390 U	0.390 U	0.390 U	0.390 U
FRL	20.00	2.00	20.00	200.00	2000	2.00	20.00
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%
Maximum Result	@ 0.840 -	@ 0.910 -	@ 0.870 -	@ 0.960 -	@ 0.910 -	@ 0.410 U	@ 0.510 -
W-Statistic Probability*	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12
Estimated Mean	--	--	--	--	--	--	--
UCL on the Mean**	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--
2x Rule Pass / Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass
<i>a posteriori</i> Sample Size calculation	--	--	--	--	--	--	--

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

**NOTES:**

- (1) @ - Maximum result did not exceed the FRL, therefore no statistics were generated and no other tests performed.
- (2) The maximum value of the two duplicates was used in all statistical equations.
- (3) \* W-Statistic Probability is the highest calculated probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.  
The test is performed on the raw data (untransformed) data (Normal) and the log-transformed data (LogNormal) to test for lognormality.
- (4) \*\* Estimated Mean = Estimated measure of central tendency (Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median).

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**APPENDIX B**

**APPROVAL AND VARIANCE/FIELD CHANGE NOTICES  
TO THE CERTIFICATION SAMPLING PSP**

**VARIANCE/FIELD CHANGE NOTICE LOG FOR THE PROJECT SPECIFIC PLAN  
FOR PREDESIGN SAMPLING OF AREA 1, PHASE III PART TWO**

Variance No.	Variance Date	Variance Description	Significant? (Y or N)	Date Signed	Date Distributed	EPA/OEPA Approval
20720-PSP-0002-01	8/10/00	Modifies the MDC for the PAH analytes and also documents a change in analytical methods for dibenzo(a,h)anthracene.	Y	8/10/00	8/10/00	YES
20720-PSP-0002-02	8/10/00	Documents the collection of all archives from CU A1P3P2-C-03 and archives A1P3P2-C-01-12a and -15a.	N	8/10/00	8/10/00	N/A
20720-PSP-0002-03	9/5/00	Documents the prep of samples A1P3P2-C-01-X and A1P3P2-C-01-8-PS for PAHs and PCBs by SW-846.	Y	9/7/00	09/20/00	09/08/00
20720-PSP-0002-04	9/25/00	Directs sampling and analysis for CU A1P3P2-C-04 which encompasses a portion of CU A1P3P2-C-01 which failed for benzo(a)pyrene. Twelve inches of soil were excavated from the contamination area and the new CU encompasses this excavation footprint.	Y	9/25/00	9/27/00	9/27/00

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State of Ohio Environmental Protection Agency

Southwest District Office

401 East Fifth Street  
Dayton, Ohio 45402-2911  
(513) 285-6357  
FAX (513) 285-6249

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To	J.D. Chiou	From	OEPA
Co.		Co.	
Dept.		Phone #	
Fax #	X5131	Fax #	

3395

MEMO

TO: J.D. Chiou

FROM: Michelle Waller *MW*

DATE: September 27, 2000

SUBJECT: VIFCN 20720-PSP-0002-4 for Project Specific Plan for Certification Sampling of Area1 Phase III, Part Two

This VIFCN directs sampling and analysis for CU A1P3P2-C-04. This area was excavated twelve inches since initially failing certification for benzo(a)pyrene. Ohio EPA approves the sampling and analysis proposed in this VIFCN.

Q:\emplou5\A1P\I\VCN4 wpd



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**VARIANCE / FIELD CHANGE NOTICE**

V/F 20720-PSP-0002-4

PSP NO.: 20720-PSP-0002, Rev. 0

Page 1 of 3

PROJECT TITLE: PROJECT SPECIFIC PLAN FOR CERTIFICATION SAMPLING OF AREA 1, PHASE III, PART TWO

Date: 09/22/00

**VARIANCE / FIELD CHANGE NOTICE (Include justification)**

**Variance:**

**3395**

Certification samples collected in CU A1P3P2-C-01 showed a failure for benzo(a)pyrene. Additionally, results for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, and chrysene were above the BTV value. The affected area is approximately 15378 square feet to the east of the former Fire Training Facility. Twelve inches will be excavated in this area and the resulting excavation footprint will be designated as CU A1P3P2-C-04. Samples will be collected and analyzed for PAHs including benzo(a)pyrene by CLP methodology. Samples will not be analyzed for dibenzo(a,h)anthracene by SW-846 method 8310 to achieve lower detection limits because the initial analysis confirmed that concentrations of this analyte are below BTV. Additionally, all other COCs were below their associated FRLs and resampling and analysis for these constituents will not be performed. This Variance/Field Change Notice (V/FCN) documents the certification design and sampling for CU A1P3P2-C-04.

The attached figure shows the sample locations (Figure 1) and boundary for CU A1P3P2-C-04 (Figure 2). The sample locations were generated per the SEP as discussed in the PSP. Thirteen six-inch samples, collected at twelve locations, will be analyzed for the PAHs. Rinsates, if required, will be collected in accordance with the PSP. The archive sample locations will be marked in the field and collected as needed. Analysis and data validation will be at ASL D as described in Section 4 of the PSP. Sample containers and preservation will comply with Table 3-1 of the PSP. The following are the sample identifications and coordinates for CU A1P3P2-C-04.

Location	Sample ID	Northing	Easting	Analysis
01	A1P3P2-C-04-01-S	482701	1349580	PAHs
02	A1P3P2-C-04-02-S	482681	1349591	PAHs
03	A1P3P2-C-04-03-V	482671	1349577	Archive
04	A1P3P2-C-04-04-S	482668	1349609	PAHs
05	A1P3P2-C-04-05-S	482627	1349558	PAHs
06	A1P3P2-C-04-06-S	482619	1349583	PAHs
06	A1P3P2-C-04-06-S-D	482619	1349583	PAHs
07	A1P3P2-C-04-07-S	482595	1349551	PAHs
08	A1P3P2-C-04-08-V	482612	1349607	Archive
09	A1P3P2-C-04-09-S	482586	1349574	PAHs
10	A1P3P2-C-04-10-S	482583	1349604	PAHs
11	A1P3P2-C-04-11-V	482548	1349559	Archive
12	A1P3P2-C-04-12-S	482548	1349594	PAHs
13	A1P3P2-C-04-13-S	482527	1349567	PAHs
14	A1P3P2-C-04-14-V	482515	1349585	Archive
15	A1P3P2-C-04-15-S	482488	1349551	PAHs
16	A1P3P2-C-04-16-S	482501	1349603	PAHs

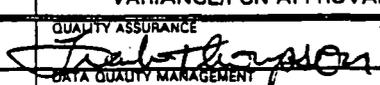
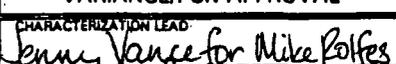
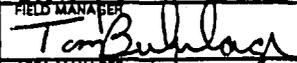
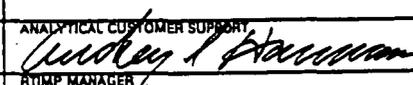
**INFORMATION ONLY**

**Justification:**

Sampling and analysis of the excavated area is necessary to verify removal of the benzo(a)pyrene contamination and to certify the area.

REQUESTED BY: Jenny Vance

Date: September 22, 2000

VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
<small>QUALITY ASSURANCE</small>  <small>DATA QUALITY MANAGEMENT</small>	<u>9/22/00</u>	X	<small>CHARACTERIZATION LEAD</small>  <small>FIELD MANAGER</small>	<u>09/22/00</u>
		X	 <small>AREA MANAGER</small>	<u>9/25/00</u>
<small>ANALYTICAL CUSTOMER SUPPORT</small>  <small>RIMP MANAGER</small>	<u>09/25/00</u>	X	<small>WASTE ACCEPTANCE ORGANIZATION</small> 	<u>9-22-00</u>

VARIANCE/FCN APPROVED  YES  NO REVISION REQUIRED:  YES  NO

**DISTRIBUTION**

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

**000041**

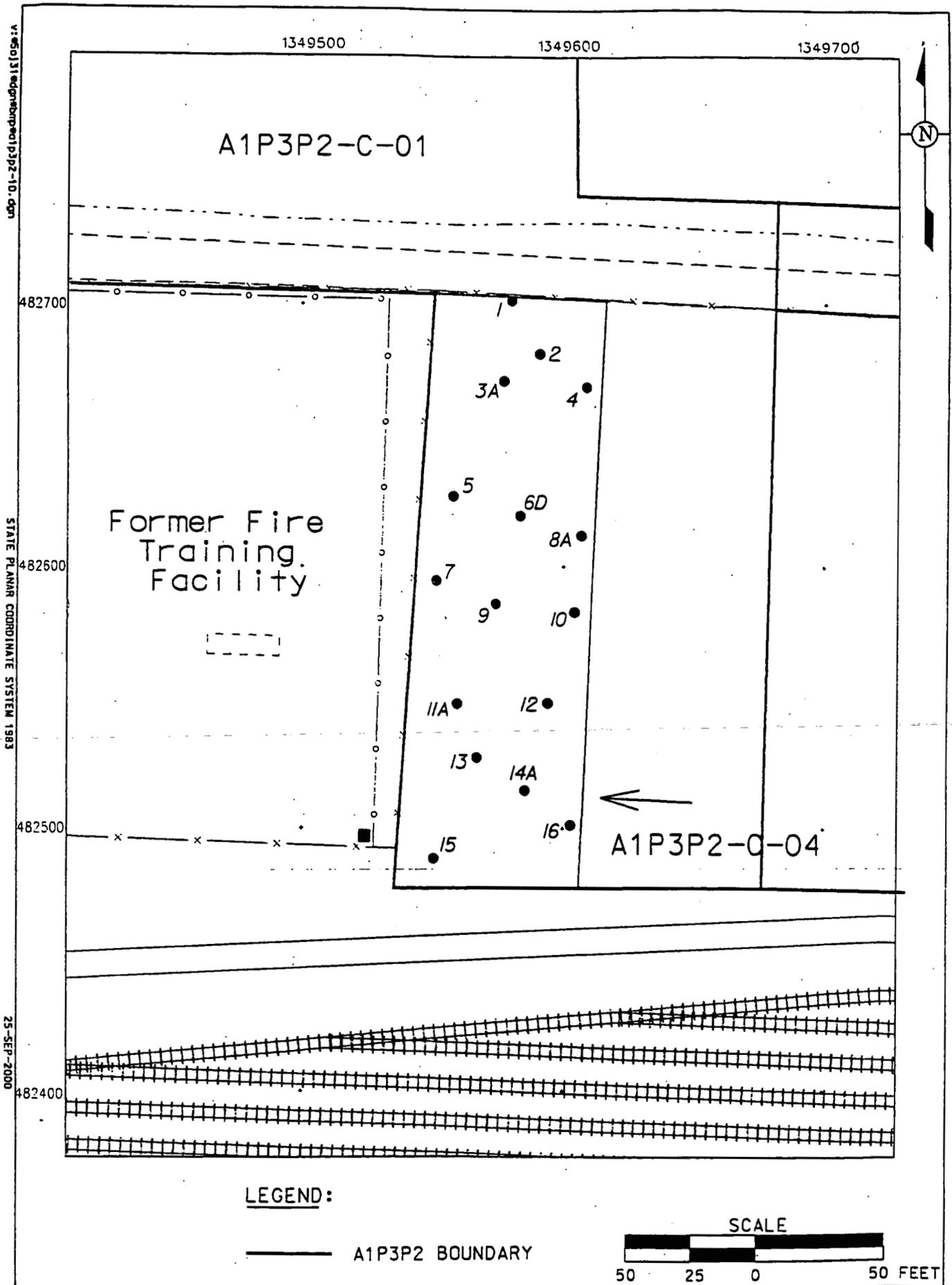
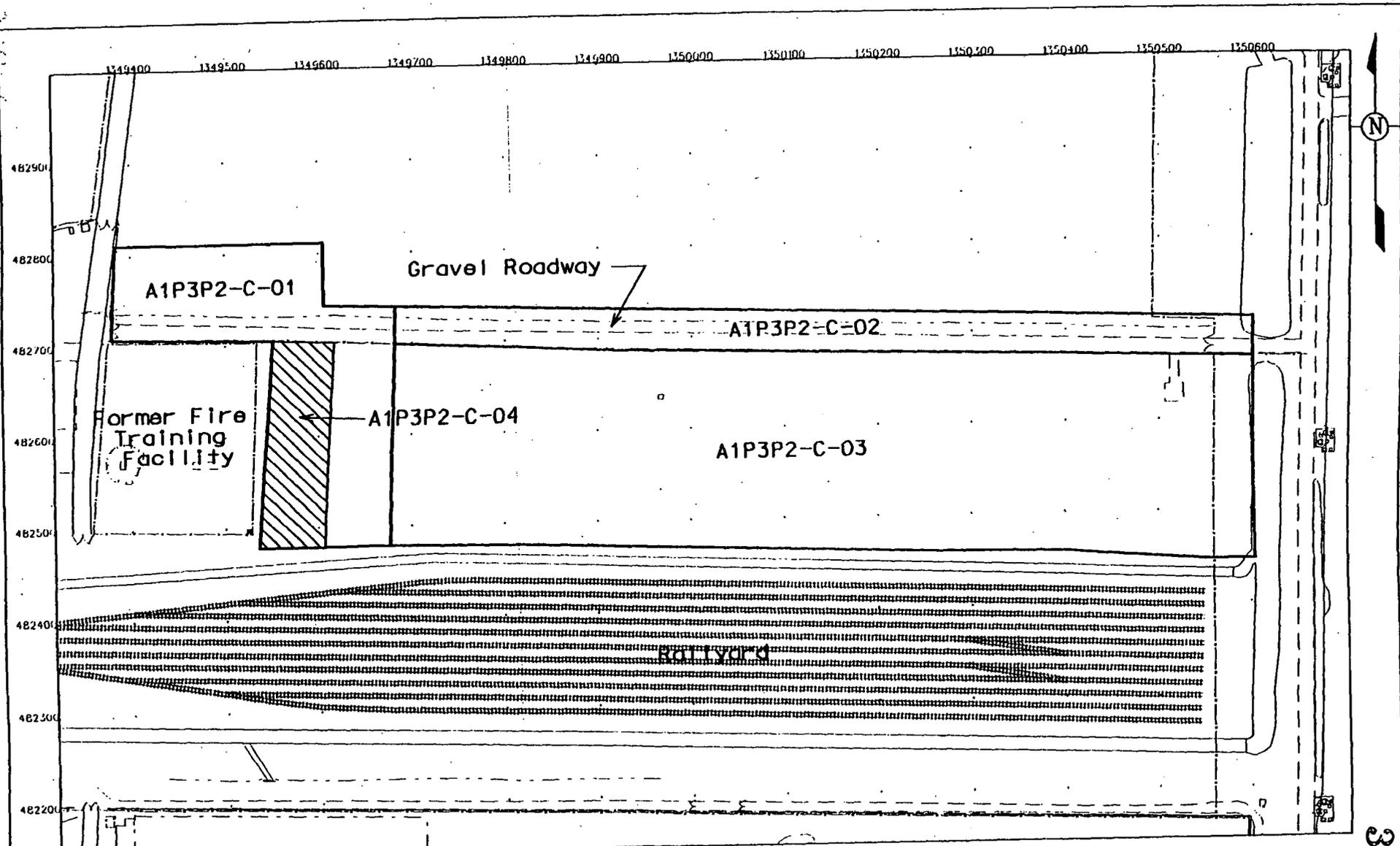


FIGURE 1. SAMPLE LOCATIONS IN A1P3P2-C-04

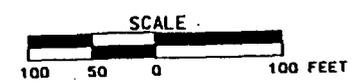
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OK



**LEGEND:**

- A1PIII PART 2 AREA BOUNDARY
- ▨ CU A1P3P2-C-04



**FIGURE 2. LOCATION OF A1P3P2-C-04**

25-SEP-2000

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State of Ohio Environmental Protection Agency

Southwest District Office

401 East Fifth Street  
Dayton, Ohio 45402-2811  
(513) 285-6357  
FAX (513) 285-6249

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To	J.D. Chiou	From
Co.		Co.
Dept.		Phone #
Fax #	25131	Fax #

3395

MEMO

TO: J.D. Chiou

FROM: Donna Boharinnon (DB)

DATE: September 8, 2000

SUBJECT: VIFCN 20720-PSP-0002-3 for Project Specific Plan for Certification Sampling of Area1 Phase III, Part Two

This VIFCN documents the preparation of two samples for PAH and PCB analyses using SW-846 instead of CLP procedures. Ohio EPA approves this VIFCN. However for future sample preparations, DOE is expected to take corrective action so that proper procedures are followed.

**VARIANCE / FIELD CHANGE NOTICE**

V/F 20720-PSP-0002-3

PSP NO.: 20720-PSP-0002, Rev. 0

Page 1 of 1

PROJECT TITLE: PROJECT SPECIFIC PLAN FOR CERTIFICATION SAMPLING OF AREA 1, PHASE III, PART TWO

Date: 09/05/00

VARIANCE / FIELD CHANGE NOTICE (Include justification)

**3395**

**Variance:**

Samples for PAH and PCB analyses were inadvertently prepped by the laboratory using SW-846 protocol. Sufficient sample was available for reprep by CLP protocol for all samples with the exception of A1P3P2-C-01-8-PS and A1P3P2-C-01-X (rinsate). For these samples, the laboratory was requested to analyze the SW-846 extracts by CLP methodology. There are no significant differences in the SW-846 and CLP preps for soil PAHs or water PCBs and the basic differences between the preps for soil PCBs and water PAHs are noted below:

Soil PCBs: CLP requires extraction with a 1:1 methylene chloride/acetone mixture and Gel Permeation Chromatography and Florisil cleanups. SW-846 uses straight methylene chloride and does not require cleanup. Though the cleanups were not performed, a review of the data shows no significant matrix effect for sample A1P3P2-C-01-8-PS.

Water PAHs: CLP requires only an acid extraction, while SW-846 includes an additional base-neutral extraction. The acid and base-neutral extracts are combined prior to volume reduction. Both the CLP and SW-846 extracts are reduced to 1.0 milliliters.

**Justification:**

The differences in the two preps were not significant enough to warrant resampling.

REQUESTED BY: Jenny Vance Date: September 5, 2000

	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X PA	QUALITY ASSURANCE <i>Frank Thompson</i> DATA QUALITY MANAGEMENT	9-7-00	X	CHARACTERIZATION LEAD <i>J. Vance for Mike Rolfes</i> FIELD MANAGER	09/05/00
X	ANALYTICAL CUSTOMER SUPPORT <i>Lindsey [Signature]</i> RTMP MANAGER	09/05/2000	X	AREA MANAGER <i>[Signature]</i> WASTE ACCEPTANCE ORGANIZATION	9/5/2000

VARIANCE/FCN APPROVED  YES  NO REVISION REQUIRED:  YES  NO

**DISTRIBUTION**

PROJECT MANAGER:	DOCUMENT CONTROL:	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER: <b>000045</b>

**VARIANCE / FIELD CHANGE NOTICE**

V/F 20720-PSP-0002-2

PSP NO.: 20720-PSP-0002, Rev. 0

Page 1 of 1

PROJECT TITLE: PROJECT SPECIFIC PLAN FOR CERTIFICATION SAMPLING OF AREA 1, PHASE III, PART TWO

Date: 08/10/00

VARIANCE / FIELD CHANGE NOTICE (Include justification)

3395

8/10/00

TEB

03

This Variance/Field Change Notice documents the collection of all archive samples from CU A1P3P2-C-01. In addition, archive samples A1P3P2-C-01-12a and -15a will be collected from CU A1P3P2-C-01.

01  
TEB  
8/10/00

**ORIGINAL**

Justification:

Per Section 2.2 of the PSP, the request for collection of archives must be documented in a V/FCN.

REQUESTED BY: Mike Rolfes

Date: August 10, 2000

	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE <i>Frank Thompson</i>	8/10/00	X	CHARACTERIZATION LEAD <i>Frank Thompson</i>	8/10/00
	DATA QUALITY MANAGEMENT		X	FIELD MANAGER <i>Tom Bullock</i>	8/10/00
	ANALYTICAL CUSTOMER SUPPORT		X	AREA MANAGER <i>TEB</i>	8-10-00
	RTIMP MANAGER			WASTE ACCEPTANCE ORGANIZATION	

VARIANCE/FCN APPROVED [X] YES [ ] NO

REVISION REQUIRED: [ ] YES [x] NO

**DISTRIBUTION**

PROJECT MANAGER:	DOCUMENT CONTROL:	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER: <b>000046</b>



State of Ohio Environmental Protection Agency

Southwest District Office

401 East Fifth Street  
Dayton, Ohio 45402-2911  
(513) 285-6357  
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To <b>JD Chiou</b>	From <b>DEPA</b>	
Co	Co	
Dept.	Phone #	
Fax # <b>x5/31</b>	Fax # <b>(937) 285-6404</b>	

MEMO

3395

TO: J.D. Chiou

FROM: Michelle Waller *MW*

DATE: August 14, 2000

SUBJECT: V/FCN 20720 PSP-0002-1 for Project Specific Plan for Area 1 Phase III Part Two

This V/FCN modifies the MLC for the PAH analytes and documents a change in analytical methods for dibenzo(a,h)anthracene. Ohio EPA approves these changes.

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**VARIANCE / FIELD CHANGE NOTICE**

V/F 20720-PSP-0002-1

PSP NO.: 20720-PSP-0002, Rev. 0

Page 1 of 1

**PROJECT TITLE: PROJECT SPECIFIC PLAN FOR CERTIFICATION SAMPLING OF AREA 1, PHASE III, PART TWO**

Date: 08/09/00

**VARIANCE / FIELD CHANGE NOTICE (Include justification)**

**Variance:**

**3395**

The purpose of this variance is to document changes to the MDCs listed in TAL 20720-PSP-0002 C. The detection limits are set at one-tenth of the BTV, however, the listed detection limit cannot be achieved for all analytes using SCQ approved ASL D methodology. With the exception of dibenzo(a,h)anthracene, detection limits equal to one-third or less of the BTV will be reported. Dibenzo(a,h)anthracene will be analyzed and reported twice. The first analysis will be SCQ compliant, however, the detection limit will exceed the BTV. The second analysis will be performed by high performance liquid chromatography (HPLC) using EPA approved SW-846 method 8310 and the method detection limit will meet 1/10 of the BTV. The following table lists the revised MDCs for PAHs:

Analyte	BTV Limit	MDC	Analytical Method
Benzo(a)pyrene	1 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Benzo(b)fluoranthene	1 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Benzo(a)anthracene	1 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Benzo(g,h,i)perylene	1 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Benzo(k)fluoranthene	1 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Fluoranthene	10 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Phenanthrene	5 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Dibenzo(a,h)anthracene	0.088 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Indeno(1,2,3-cd)pyrene	1 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Pyrene	10 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Chrysene	1 mg/kg	0.33 mg/kg	CLP SOW OLM03.2 (GC/MS)
Dibenzo(a,h)anthracene	0.088 mg/kg	0.009 mg/kg	SW-846 8310 (HPLC)

**Justification:**

The revised higher MDCs will still allow for determining if soil concentrations of each analyte is below BTV: While SW-846 is not specified in the FEMP SCQ, it is an EPA-approved procedure and will provide results which will allow for determining if the analyte exceeds BTV limits.

REQUESTED BY: Jenny Vance

Date: August 9, 2000

	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE <i>Frank Thompson</i>	5-10-00	X	CHARACTERIZATION LEAD <i>Michael T. Boef</i>	8/9/00
	DATA QUALITY MANAGEMENT		X	FIELD MANAGER	
X	ANALYTICAL CUSTOMER SUPPORT <i>Courtney Hamm</i>	08/09/2000	X	AREA MANAGER <i>[Signature]</i>	8-9-00
	RTIMP MANAGER			WASTE ACCEPTANCE/ORGANIZATION	

VARIANCE/FCN APPROVED  YES  NO REVISION REQUIRED:  YES  NO

**DISTRIBUTION**

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FIELD MANAGER:	OTHER:	OTHER:
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4-3395

**APPENDIX C**

**CERTIFICATION RESULTS**

000049

APPENDIX C  
CERTIFICATION SAMPLE RESULTS

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-01	A1P3P2-C-01-01-PS	Aroclor-1254	0.037	mg/kg	U	No	No
C-01	A1P3P2-C-01-03-PS	Aroclor-1254	0.044	mg/kg	U	No	No
C-01	A1P3P2-C-01-03-PS-D	Aroclor-1254	0.049	mg/kg	U	No	No
C-01	A1P3P2-C-01-04-PS	Aroclor-1254	0.04	mg/kg	U	No	No
C-01	A1P3P2-C-01-06-PS	Aroclor-1254	0.039	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Aroclor-1254	0.04	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Aroclor-1254	0.04	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Aroclor-1254	0.036	mg/kg	U	No	No
C-01	A1P3P2-C-01-10-PS	Aroclor-1254	0.036	mg/kg	U	No	No
C-01	A1P3P2-C-01-11-PS	Aroclor-1254	0.035	mg/kg	U	No	No
C-01	A1P3P2-C-01-13-PS	Aroclor-1254	0.036	mg/kg	U	No	No
C-01	A1P3P2-C-01-14-PS	Aroclor-1254	0.034	mg/kg	U	No	No
C-01	A1P3P2-C-01-16-PS	Aroclor-1254	0.034	mg/kg	U	No	No
C-01	A1P3P2-C-01-01-PS	Aroclor-1260	0.037	mg/kg	U	No	No
C-01	A1P3P2-C-01-03-PS	Aroclor-1260	0.044	mg/kg	U	No	No
C-01	A1P3P2-C-01-03-PS-D	Aroclor-1260	0.049	mg/kg	U	No	No
C-01	A1P3P2-C-01-04-PS	Aroclor-1260	0.04	mg/kg	U	No	No
C-01	A1P3P2-C-01-06-PS	Aroclor-1260	0.039	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Aroclor-1260	0.04	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Aroclor-1260	0.04	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Aroclor-1260	0.036	mg/kg	U	No	No
C-01	A1P3P2-C-01-10-PS	Aroclor-1260	0.036	mg/kg	U	No	No
C-01	A1P3P2-C-01-11-PS	Aroclor-1260	0.035	mg/kg	U	No	No
C-01	A1P3P2-C-01-13-PS	Aroclor-1260	0.036	mg/kg	U	No	No
C-01	A1P3P2-C-01-14-PS	Aroclor-1260	0.034	mg/kg	U	No	No
C-01	A1P3P2-C-01-16-PS	Aroclor-1260	0.034	mg/kg	U	No	No
C-01	A1P3P2-C-01-01-RM	Arsenic	5.92	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-RM	Arsenic	5.74	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-RM-D	Arsenic	5.59	mg/kg	-	No	No
C-01	A1P3P2-C-01-04-RM	Arsenic	4.19	mg/kg	U	No	No
C-01	A1P3P2-C-01-06-RM	Arsenic	8.41	mg/kg	-	No	No
C-01	A1P3P2-C-01-07-RM	Arsenic	6.51	mg/kg	-	No	No
C-01	A1P3P2-C-01-08-RM	Arsenic	8.24	mg/kg	-	No	No
C-01	A1P3P2-C-01-09-RM	Arsenic	6.07	mg/kg	-	No	No
C-01	A1P3P2-C-01-10-RM	Arsenic	3.57	mg/kg	U	No	No
C-01	A1P3P2-C-01-11-RM	Arsenic	3.79	mg/kg	U	No	No
C-01	A1P3P2-C-01-13-RM	Arsenic	7.95	mg/kg	-	No	No
C-01	A1P3P2-C-01-14-RM	Arsenic	6.75	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-RM	Arsenic	6.97	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-PS	Benzo(a)anthracene	1.9	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-03-PS	Benzo(a)anthracene	0.044	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Benzo(a)anthracene	0.054	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Benzo(a)anthracene	0.054	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Benzo(a)anthracene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Benzo(a)anthracene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Benzo(a)anthracene	0.39	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Benzo(a)anthracene	4.4	mg/kg	-	No	Yes

**APPENDIX C  
CERTIFICATION SAMPLE RESULTS**

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-01	A1P3P2-C-01-10-PS	Benzo(a)anthracene	1.1	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-11-PS	Benzo(a)anthracene	1.5	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-13-PS	Benzo(a)anthracene	4.3	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-14-PS	Benzo(a)anthracene	0.39	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-PS	Benzo(a)anthracene	0.35	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-PS	Benzo(a)pyrene	2.5	mg/kg	-	Yes	Yes
C-01	A1P3P2-C-01-03-PS	Benzo(a)pyrene	0.06	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Benzo(a)pyrene	0.066	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Benzo(a)pyrene	0.08	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Benzo(a)pyrene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Benzo(a)pyrene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Benzo(a)pyrene	0.39	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Benzo(a)pyrene	4.5	mg/kg	-	Yes	Yes
C-01	A1P3P2-C-01-10-PS	Benzo(a)pyrene	1.2	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-11-PS	Benzo(a)pyrene	1.5	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-13-PS	Benzo(a)pyrene	4.2	mg/kg	-	Yes	Yes
C-01	A1P3P2-C-01-14-PS	Benzo(a)pyrene	0.41	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-PS	Benzo(a)pyrene	0.37	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-PS	Benzo(b)fluoranthene	3.2	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-03-PS	Benzo(b)fluoranthene	0.1	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Benzo(b)fluoranthene	0.072	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Benzo(b)fluoranthene	0.086	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Benzo(b)fluoranthene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Benzo(b)fluoranthene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Benzo(b)fluoranthene	0.39	mg/kg	UJ	No	No
C-01	A1P3P2-C-01-09-PS	Benzo(b)fluoranthene	6.2	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-10-PS	Benzo(b)fluoranthene	1	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-11-PS	Benzo(b)fluoranthene	1.9	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-13-PS	Benzo(b)fluoranthene	5.6	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-14-PS	Benzo(b)fluoranthene	0.39	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-PS	Benzo(b)fluoranthene	0.34	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-PS	Benzo(g,h,i)perylene	2.7	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-PS	Benzo(g,h,i)perylene	0.043	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Benzo(g,h,i)perylene	0.046	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Benzo(g,h,i)perylene	0.054	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Benzo(g,h,i)perylene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Benzo(g,h,i)perylene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Benzo(g,h,i)perylene	0.39	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Benzo(g,h,i)perylene	4	mg/kg	-	No	No
C-01	A1P3P2-C-01-10-PS	Benzo(g,h,i)perylene	0.83	mg/kg	-	No	No
C-01	A1P3P2-C-01-11-PS	Benzo(g,h,i)perylene	1	mg/kg	-	No	No
C-01	A1P3P2-C-01-13-PS	Benzo(g,h,i)perylene	3.9	mg/kg	-	No	No
C-01	A1P3P2-C-01-14-PS	Benzo(g,h,i)perylene	0.24	mg/kg	J	No	No
C-01	A1P3P2-C-01-16-PS	Benzo(g,h,i)perylene	0.23	mg/kg	J	No	No
C-01	A1P3P2-C-01-01-PS	Benzo(k)fluoranthene	1.3	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-03-PS	Benzo(k)fluoranthene	0.45	mg/kg	U	No	No
C-01	A1P3P2-C-01-03-PS-D	Benzo(k)fluoranthene	0.063	mg/kg	J	No	No

APPENDIX C  
CERTIFICATION SAMPLE RESULTS

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-01	A1P3P2-C-01-04-PS	Benzo(k)fluoranthene	0.063	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Benzo(k)fluoranthene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Benzo(k)fluoranthene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Benzo(k)fluoranthene	0.39	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Benzo(k)fluoranthene	4	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-10-PS	Benzo(k)fluoranthene	1	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-11-PS	Benzo(k)fluoranthene	1.8	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-13-PS	Benzo(k)fluoranthene	3.8	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-14-PS	Benzo(k)fluoranthene	0.48	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-PS	Benzo(k)fluoranthene	0.43	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-RM	Beryllium	0.3	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-RM	Beryllium	0.31	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-RM-D	Beryllium	0.36	mg/kg	-	No	No
C-01	A1P3P2-C-01-04-RM	Beryllium	0.33	mg/kg	-	No	No
C-01	A1P3P2-C-01-06-RM	Beryllium	0.33	mg/kg	-	No	No
C-01	A1P3P2-C-01-07-RM	Beryllium	0.22	mg/kg	-	No	No
C-01	A1P3P2-C-01-08-RM	Beryllium	0.19	mg/kg	-	No	No
C-01	A1P3P2-C-01-09-RM	Beryllium	0.36	mg/kg	-	No	No
C-01	A1P3P2-C-01-10-RM	Beryllium	0.41	mg/kg	-	No	No
C-01	A1P3P2-C-01-11-RM	Beryllium	0.4	mg/kg	-	No	No
C-01	A1P3P2-C-01-13-RM	Beryllium	0.23	mg/kg	-	No	No
C-01	A1P3P2-C-01-14-RM	Beryllium	0.42	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-RM	Beryllium	0.31	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-PS	Chrysene	2.2	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-03-PS	Chrysene	0.056	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Chrysene	0.06	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Chrysene	0.076	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Chrysene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Chrysene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Chrysene	0.39	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Chrysene	4.7	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-10-PS	Chrysene	1.2	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-11-PS	Chrysene	1.6	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-13-PS	Chrysene	4.4	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-14-PS	Chrysene	0.42	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-PS	Chrysene	0.39	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-PS	Dibenzo(a,h)anthracene	0.38	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-03-PS	Dibenzo(a,h)anthracene	0.0046	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Dibenzo(a,h)anthracene	0.0131	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Dibenzo(a,h)anthracene	0.017	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Dibenzo(a,h)anthracene	0.0109	mg/kg	UJ	No	No
C-01	A1P3P2-C-01-07-PS	Dibenzo(a,h)anthracene	0.011	mg/kg	UJ	No	No
C-01	A1P3P2-C-01-08-PS	Dibenzo(a,h)anthracene	0.0108	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Dibenzo(a,h)anthracene	1.1	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-10-PS	Dibenzo(a,h)anthracene	0.364	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-11-PS	Dibenzo(a,h)anthracene	0.41	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-13-PS	Dibenzo(a,h)anthracene	1.2	mg/kg	J	No	Yes

**APPENDIX C  
CERTIFICATION SAMPLE RESULTS**

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-01	A1P3P2-C-01-14-PS	Dibenzo(a,h)anthracene	0.192	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-16-PS	Dibenzo(a,h)anthracene	0.233	mg/kg	J	No	Yes
C-01	A1P3P2-C-01-01-PS	Fluoranthene	2.2	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-PS	Fluoranthene	0.088	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Fluoranthene	0.1	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Fluoranthene	0.1	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Fluoranthene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Fluoranthene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Fluoranthene	0.39	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Fluoranthene	6.9	mg/kg	-	No	No
C-01	A1P3P2-C-01-10-PS	Fluoranthene	2.2	mg/kg	-	No	No
C-01	A1P3P2-C-01-11-PS	Fluoranthene	3	mg/kg	-	No	No
C-01	A1P3P2-C-01-13-PS	Fluoranthene	6.6	mg/kg	-	No	No
C-01	A1P3P2-C-01-14-PS	Fluoranthene	0.74	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-PS	Fluoranthene	0.68	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-PS	Indeno(1,2,3-cd)pyrene	2.7	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-03-PS	Indeno(1,2,3-cd)pyrene	0.034	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Indeno(1,2,3-cd)pyrene	0.042	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Indeno(1,2,3-cd)pyrene	0.049	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Indeno(1,2,3-cd)pyrene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Indeno(1,2,3-cd)pyrene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Indeno(1,2,3-cd)pyrene	0.39	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Indeno(1,2,3-cd)pyrene	4.2	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-10-PS	Indeno(1,2,3-cd)pyrene	0.77	mg/kg	-	No	No
C-01	A1P3P2-C-01-11-PS	Indeno(1,2,3-cd)pyrene	1.2	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-13-PS	Indeno(1,2,3-cd)pyrene	4.1	mg/kg	-	No	Yes
C-01	A1P3P2-C-01-14-PS	Indeno(1,2,3-cd)pyrene	0.23	mg/kg	J	No	No
C-01	A1P3P2-C-01-16-PS	Indeno(1,2,3-cd)pyrene	0.22	mg/kg	J	No	No
C-01	A1P3P2-C-01-01-PS	Phenanthrene	1	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-PS	Phenanthrene	0.028	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Phenanthrene	0.03	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Phenanthrene	0.04	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Phenanthrene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Phenanthrene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-PS	Phenanthrene	0.39	mg/kg	U	No	No
C-01	A1P3P2-C-01-09-PS	Phenanthrene	4.2	mg/kg	-	No	No
C-01	A1P3P2-C-01-10-PS	Phenanthrene	0.88	mg/kg	-	No	No
C-01	A1P3P2-C-01-11-PS	Phenanthrene	1.2	mg/kg	-	No	No
C-01	A1P3P2-C-01-13-PS	Phenanthrene	3.8	mg/kg	-	No	No
C-01	A1P3P2-C-01-14-PS	Phenanthrene	0.29	mg/kg	J	No	No
C-01	A1P3P2-C-01-16-PS	Phenanthrene	0.28	mg/kg	J	No	No
C-01	A1P3P2-C-01-01-PS	Pyrene	3.2	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-PS	Pyrene	0.074	mg/kg	J	No	No
C-01	A1P3P2-C-01-03-PS-D	Pyrene	0.081	mg/kg	J	No	No
C-01	A1P3P2-C-01-04-PS	Pyrene	0.096	mg/kg	J	No	No
C-01	A1P3P2-C-01-06-PS	Pyrene	0.4	mg/kg	U	No	No
C-01	A1P3P2-C-01-07-PS	Pyrene	0.4	mg/kg	U	No	No

APPENDIX C  
CERTIFICATION SAMPLE RESULTS

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-01	A1P3P2-C-01-08-PS	Pyrene	0.025	mg/kg	J	No	No
C-01	A1P3P2-C-01-09-PS	Pyrene	8.6	mg/kg	-	No	No
C-01	A1P3P2-C-01-10-PS	Pyrene	2	mg/kg	-	No	No
C-01	A1P3P2-C-01-11-PS	Pyrene	2.7	mg/kg	-	No	No
C-01	A1P3P2-C-01-13-PS	Pyrene	8.5	mg/kg	-	No	No
C-01	A1P3P2-C-01-14-PS	Pyrene	0.62	mg/kg	-	No	No
C-01	A1P3P2-C-01-16-PS	Pyrene	0.59	mg/kg	-	No	No
C-01	A1P3P2-C-01-01-RM	Radium-226	0.828	pCi/g	-	No	No
C-01	A1P3P2-C-01-03-RM	Radium-226	1.067	pCi/g	-	No	No
C-01	A1P3P2-C-01-03-RM-D	Radium-226	1.037	pCi/g	-	No	No
C-01	A1P3P2-C-01-04-RM	Radium-226	1.003	pCi/g	-	No	No
C-01	A1P3P2-C-01-06-RM	Radium-226	1.226	pCi/g	-	No	No
C-01	A1P3P2-C-01-07-RM	Radium-226	1.241	pCi/g	-	No	No
C-01	A1P3P2-C-01-08-RM	Radium-226	1.194	pCi/g	-	No	No
C-01	A1P3P2-C-01-09-RM	Radium-226	1.116	pCi/g	-	No	No
C-01	A1P3P2-C-01-10-RM	Radium-226	0.843	pCi/g	-	No	No
C-01	A1P3P2-C-01-11-RM	Radium-226	1.092	pCi/g	-	No	No
C-01	A1P3P2-C-01-13-RM	Radium-226	0.743	pCi/g	-	No	No
C-01	A1P3P2-C-01-14-RM	Radium-226	0.976	pCi/g	-	No	No
C-01	A1P3P2-C-01-16-RM	Radium-226	0.948	pCi/g	-	No	No
C-01	A1P3P2-C-01-01-RM	Radium-228	0.671	pCi/g	-	No	No
C-01	A1P3P2-C-01-03-RM	Radium-228	0.895	pCi/g	-	No	No
C-01	A1P3P2-C-01-03-RM-D	Radium-228	0.96	pCi/g	-	No	No
C-01	A1P3P2-C-01-04-RM	Radium-228	0.885	pCi/g	-	No	No
C-01	A1P3P2-C-01-06-RM	Radium-228	1.032	pCi/g	-	No	No
C-01	A1P3P2-C-01-07-RM	Radium-228	1.067	pCi/g	-	No	No
C-01	A1P3P2-C-01-08-RM	Radium-228	1.144	pCi/g	-	No	No
C-01	A1P3P2-C-01-09-RM	Radium-228	0.698	pCi/g	-	No	No
C-01	A1P3P2-C-01-10-RM	Radium-228	0.728	pCi/g	-	No	No
C-01	A1P3P2-C-01-11-RM	Radium-228	0.985	pCi/g	-	No	No
C-01	A1P3P2-C-01-13-RM	Radium-228	0.439	pCi/g	-	No	No
C-01	A1P3P2-C-01-14-RM	Radium-228	0.906	pCi/g	-	No	No
C-01	A1P3P2-C-01-16-RM	Radium-228	0.766	pCi/g	-	No	No
C-01	A1P3P2-C-01-01-RM	Thorium-228	0.661	pCi/g	-	No	No
C-01	A1P3P2-C-01-03-RM	Thorium-228	0.878	pCi/g	-	No	No
C-01	A1P3P2-C-01-03-RM-D	Thorium-228	0.929	pCi/g	-	No	No
C-01	A1P3P2-C-01-04-RM	Thorium-228	0.879	pCi/g	-	No	No
C-01	A1P3P2-C-01-06-RM	Thorium-228	1.024	pCi/g	-	No	No
C-01	A1P3P2-C-01-07-RM	Thorium-228	1.041	pCi/g	-	No	No
C-01	A1P3P2-C-01-08-RM	Thorium-228	1.128	pCi/g	-	No	No
C-01	A1P3P2-C-01-09-RM	Thorium-228	0.666	pCi/g	-	No	No
C-01	A1P3P2-C-01-10-RM	Thorium-228	0.713	pCi/g	-	No	No
C-01	A1P3P2-C-01-11-RM	Thorium-228	0.968	pCi/g	-	No	No
C-01	A1P3P2-C-01-13-RM	Thorium-228	0.389	pCi/g	-	No	No
C-01	A1P3P2-C-01-14-RM	Thorium-228	0.89	pCi/g	-	No	No
C-01	A1P3P2-C-01-16-RM	Thorium-228	0.75	pCi/g	-	No	No
C-01	A1P3P2-C-01-01-RM	Thorium-232	0.671	pCi/g	-	No	No

**APPENDIX C  
CERTIFICATION SAMPLE RESULTS**

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-01	A1P3P2-C-01-03-RM	Thorium-232	0.985	pCi/g	-	No	No
C-01	A1P3P2-C-01-03-RM-D	Thorium-232	0.96	pCi/g	-	No	No
C-01	A1P3P2-C-01-04-RM	Thorium-232	0.885	pCi/g	-	No	No
C-01	A1P3P2-C-01-06-RM	Thorium-232	1.032	pCi/g	-	No	No
C-01	A1P3P2-C-01-07-RM	Thorium-232	1.067	pCi/g	-	No	No
C-01	A1P3P2-C-01-08-RM	Thorium-232	1.144	pCi/g	-	No	No
C-01	A1P3P2-C-01-09-RM	Thorium-232	0.698	pCi/g	-	No	No
C-01	A1P3P2-C-01-10-RM	Thorium-232	0.728	pCi/g	-	No	No
C-01	A1P3P2-C-01-11-RM	Thorium-232	0.985	pCi/g	-	No	No
C-01	A1P3P2-C-01-13-RM	Thorium-232	0.439	pCi/g	-	No	No
C-01	A1P3P2-C-01-14-RM	Thorium-232	0.906	pCi/g	-	No	No
C-01	A1P3P2-C-01-16-RM	Thorium-232	0.766	pCi/g	-	No	No
C-01	A1P3P2-C-01-01-RM	Uranium, Total	18.147	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-RM	Uranium, Total	4.624	mg/kg	-	No	No
C-01	A1P3P2-C-01-03-RM-D	Uranium, Total	4.181	mg/kg	-	No	No
C-01	A1P3P2-C-01-04-RM	Uranium, Total	4.965	mg/kg	-	No	No
C-01	A1P3P2-C-01-06-RM	Uranium, Total	2.888	mg/kg	J	No	No
C-01	A1P3P2-C-01-07-RM	Uranium, Total	2.545	mg/kg	U	No	No
C-01	A1P3P2-C-01-08-RM	Uranium, Total	3.908	mg/kg	J	No	No
C-01	A1P3P2-C-01-09-RM	Uranium, Total	3.695	mg/kg	J	No	No
C-01	A1P3P2-C-01-10-RM	Uranium, Total	2.578	mg/kg	J	No	No
C-01	A1P3P2-C-01-11-RM	Uranium, Total	3.507	mg/kg	J	No	No
C-01	A1P3P2-C-01-13-RM	Uranium, Total	2.173	mg/kg	J	No	No
C-01	A1P3P2-C-01-14-RM	Uranium, Total	0.873	mg/kg	U	No	No
C-01	A1P3P2-C-01-16-RM	Uranium, Total	3.477	mg/kg	J	No	No
C-02	A1P3P2-C-02-01-R	Radium-226	1.175	pCi/g	-	No	No
C-02	A1P3P2-C-02-03-R	Radium-226	1.339	pCi/g	-	No	No
C-02	A1P3P2-C-02-04-R	Radium-226	1.33	pCi/g	-	No	No
C-02	A1P3P2-C-02-06-R	Radium-226	1.424	pCi/g	-	No	No
C-02	A1P3P2-C-02-07-R	Radium-226	1.3	pCi/g	-	No	No
C-02	A1P3P2-C-02-08-R	Radium-226	1.273	pCi/g	-	No	No
C-02	A1P3P2-C-02-09-R	Radium-226	1.294	pCi/g	-	No	No
C-02	A1P3P2-C-02-10-R	Radium-226	1.375	pCi/g	-	No	No
C-02	A1P3P2-C-02-12-R	Radium-226	1.189	pCi/g	-	No	No
C-02	A1P3P2-C-02-14-R	Radium-226	1.353	pCi/g	-	No	No
C-02	A1P3P2-C-02-15-R	Radium-226	1.138	pCi/g	-	No	No
C-02	A1P3P2-C-02-15-R-D	Radium-226	1.158	pCi/g	-	No	No
C-02	A1P3P2-C-02-16-R	Radium-226	1.15	pCi/g	-	No	No
C-02	A1P3P2-C-02-01-R	Radium-228	1.023	pCi/g	-	No	No
C-02	A1P3P2-C-02-03-R	Radium-228	1.126	pCi/g	-	No	No
C-02	A1P3P2-C-02-04-R	Radium-228	1.135	pCi/g	-	No	No
C-02	A1P3P2-C-02-06-R	Radium-228	1.204	pCi/g	-	No	No
C-02	A1P3P2-C-02-07-R	Radium-228	1.11	pCi/g	-	No	No
C-02	A1P3P2-C-02-08-R	Radium-228	1.068	pCi/g	-	No	No
C-02	A1P3P2-C-02-09-R	Radium-228	1.037	pCi/g	-	No	No
C-02	A1P3P2-C-02-10-R	Radium-228	1.152	pCi/g	-	No	No
C-02	A1P3P2-C-02-12-R	Radium-228	1.021	pCi/g	-	No	No

APPENDIX C  
CERTIFICATION SAMPLE RESULTS

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-02	A1P3P2-C-02-14-R	Radium-228	1.079	pCi/g	-	No	No
C-02	A1P3P2-C-02-15-R	Radium-228	1.013	pCi/g	-	No	No
C-02	A1P3P2-C-02-15-R-D	Radium-228	0.964	pCi/g	-	No	No
C-02	A1P3P2-C-02-16-R	Radium-228	0.903	pCi/g	-	No	No
C-02	A1P3P2-C-02-01-R	Thorium-228	1.019	pCi/g	-	No	No
C-02	A1P3P2-C-02-03-R	Thorium-228	1.117	pCi/g	-	No	No
C-02	A1P3P2-C-02-04-R	Thorium-228	1.14	pCi/g	-	No	No
C-02	A1P3P2-C-02-06-R	Thorium-228	1.17	pCi/g	-	No	No
C-02	A1P3P2-C-02-07-R	Thorium-228	1.116	pCi/g	-	No	No
C-02	A1P3P2-C-02-08-R	Thorium-228	1.046	pCi/g	-	No	No
C-02	A1P3P2-C-02-09-R	Thorium-228	1.04	pCi/g	-	No	No
C-02	A1P3P2-C-02-10-R	Thorium-228	1.129	pCi/g	-	No	No
C-02	A1P3P2-C-02-12-R	Thorium-228	1.02	pCi/g	-	No	No
C-02	A1P3P2-C-02-14-R	Thorium-228	1.057	pCi/g	-	No	No
C-02	A1P3P2-C-02-15-R	Thorium-228	1.033	pCi/g	-	No	No
C-02	A1P3P2-C-02-15-R-D	Thorium-228	0.956	pCi/g	-	No	No
C-02	A1P3P2-C-02-16-R	Thorium-228	0.882	pCi/g	-	No	No
C-02	A1P3P2-C-02-01-R	Thorium-232	1.023	pCi/g	-	No	No
C-02	A1P3P2-C-02-03-R	Thorium-232	1.126	pCi/g	-	No	No
C-02	A1P3P2-C-02-04-R	Thorium-232	1.135	pCi/g	-	No	No
C-02	A1P3P2-C-02-06-R	Thorium-232	1.204	pCi/g	-	No	No
C-02	A1P3P2-C-02-07-R	Thorium-232	1.11	pCi/g	-	No	No
C-02	A1P3P2-C-02-08-R	Thorium-232	1.068	pCi/g	-	No	No
C-02	A1P3P2-C-02-09-R	Thorium-232	1.037	pCi/g	-	No	No
C-02	A1P3P2-C-02-10-R	Thorium-232	1.152	pCi/g	-	No	No
C-02	A1P3P2-C-02-12-R	Thorium-232	1.021	pCi/g	-	No	No
C-02	A1P3P2-C-02-14-R	Thorium-232	1.079	pCi/g	-	No	No
C-02	A1P3P2-C-02-15-R	Thorium-232	1.013	pCi/g	-	No	No
C-02	A1P3P2-C-02-15-R-D	Thorium-232	0.964	pCi/g	-	No	No
C-02	A1P3P2-C-02-16-R	Thorium-232	0.903	pCi/g	-	No	No
C-02	A1P3P2-C-02-01-R	Uranium, Total	9.374	mg/kg	-	No	No
C-02	A1P3P2-C-02-03-R	Uranium, Total	4.167	mg/kg	J	No	No
C-02	A1P3P2-C-02-04-R	Uranium, Total	3.916	mg/kg	J	No	No
C-02	A1P3P2-C-02-06-R	Uranium, Total	2.868	mg/kg	U	No	No
C-02	A1P3P2-C-02-07-R	Uranium, Total	25.865	mg/kg	-	No	No
C-02	A1P3P2-C-02-08-R	Uranium, Total	14.563	mg/kg	-	No	No
C-02	A1P3P2-C-02-09-R	Uranium, Total	13.898	mg/kg	-	No	No
C-02	A1P3P2-C-02-10-R	Uranium, Total	8.203	mg/kg	-	No	No
C-02	A1P3P2-C-02-12-R	Uranium, Total	23.548	mg/kg	-	No	No
C-02	A1P3P2-C-02-14-R	Uranium, Total	6.132	mg/kg	J	No	No
C-02	A1P3P2-C-02-15-R	Uranium, Total	6.639	mg/kg	J	No	No
C-02	A1P3P2-C-02-15-R-D	Uranium, Total	10.864	mg/kg	J	No	No
C-02	A1P3P2-C-02-16-R	Uranium, Total	1.404	mg/kg	U	No	No
C-03	A1P3P2-C-03-01-R	Radium-226	0.839	pCi/g	-	No	No
C-03	A1P3P2-C-03-02-R	Radium-226	0.841	pCi/g	-	No	No
C-03	A1P3P2-C-03-03-R	Radium-226	1.116	pCi/g	-	No	No
C-03	A1P3P2-C-03-05-R	Radium-226	0.792	pCi/g	-	No	No

**APPENDIX C  
CERTIFICATION SAMPLE RESULTS**

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-03	A1P3P2-C-03-06-R	Radium-226	0.763	pCi/g	-	No	No
C-03	A1P3P2-C-03-08-R	Radium-226	1.112	pCi/g	-	No	No
C-03	A1P3P2-C-03-09-R	Radium-226	0.611	pCi/g	J	No	No
C-03	A1P3P2-C-03-09-R-D	Radium-226	0.761	pCi/g	J	No	No
C-03	A1P3P2-C-03-10-R	Radium-226	0.772	pCi/g	-	No	No
C-03	A1P3P2-C-03-12-R	Radium-226	0.662	pCi/g	-	No	No
C-03	A1P3P2-C-03-13-R	Radium-226	0.696	pCi/g	-	No	No
C-03	A1P3P2-C-03-14-R	Radium-226	0.801	pCi/g	-	No	No
C-03	A1P3P2-C-03-15-R	Radium-226	0.72	pCi/g	-	No	No
C-03	A1P3P2-C-03-01-R	Radium-228	0.729	pCi/g	-	No	No
C-03	A1P3P2-C-03-02-R	Radium-228	0.723	pCi/g	-	No	No
C-03	A1P3P2-C-03-03-R	Radium-228	1.069	pCi/g	-	No	No
C-03	A1P3P2-C-03-05-R	Radium-228	0.652	pCi/g	-	No	No
C-03	A1P3P2-C-03-06-R	Radium-228	0.713	pCi/g	-	No	No
C-03	A1P3P2-C-03-08-R	Radium-228	1.097	pCi/g	-	No	No
C-03	A1P3P2-C-03-09-R	Radium-228	0.49	pCi/g	-	No	No
C-03	A1P3P2-C-03-09-R-D	Radium-228	0.53	pCi/g	-	No	No
C-03	A1P3P2-C-03-10-R	Radium-228	0.67	pCi/g	-	No	No
C-03	A1P3P2-C-03-12-R	Radium-228	0.592	pCi/g	-	No	No
C-03	A1P3P2-C-03-13-R	Radium-228	0.547	pCi/g	-	No	No
C-03	A1P3P2-C-03-14-R	Radium-228	0.654	pCi/g	-	No	No
C-03	A1P3P2-C-03-15-R	Radium-228	0.585	pCi/g	-	No	No
C-03	A1P3P2-C-03-01-R	Thorium-228	0.686	pCi/g	-	No	No
C-03	A1P3P2-C-03-02-R	Thorium-228	0.701	pCi/g	-	No	No
C-03	A1P3P2-C-03-03-R	Thorium-228	1.017	pCi/g	-	No	No
C-03	A1P3P2-C-03-05-R	Thorium-228	0.623	pCi/g	-	No	No
C-03	A1P3P2-C-03-06-R	Thorium-228	0.654	pCi/g	-	No	No
C-03	A1P3P2-C-03-08-R	Thorium-228	1.075	pCi/g	-	No	No
C-03	A1P3P2-C-03-09-R	Thorium-228	0.495	pCi/g	-	No	No
C-03	A1P3P2-C-03-09-R-D	Thorium-228	0.529	pCi/g	-	No	No
C-03	A1P3P2-C-03-10-R	Thorium-228	0.681	pCi/g	-	No	No
C-03	A1P3P2-C-03-12-R	Thorium-228	0.58	pCi/g	-	No	No
C-03	A1P3P2-C-03-13-R	Thorium-228	0.53	pCi/g	-	No	No
C-03	A1P3P2-C-03-14-R	Thorium-228	0.65	pCi/g	-	No	No
C-03	A1P3P2-C-03-15-R	Thorium-228	0.56	pCi/g	-	No	No
C-03	A1P3P2-C-03-01-R	Thorium-232	0.729	pCi/g	-	No	No
C-03	A1P3P2-C-03-02-R	Thorium-232	0.723	pCi/g	-	No	No
C-03	A1P3P2-C-03-03-R	Thorium-232	1.069	pCi/g	-	No	No
C-03	A1P3P2-C-03-05-R	Thorium-232	0.652	pCi/g	-	No	No
C-03	A1P3P2-C-03-06-R	Thorium-232	0.713	pCi/g	-	No	No
C-03	A1P3P2-C-03-08-R	Thorium-232	1.097	pCi/g	-	No	No
C-03	A1P3P2-C-03-09-R	Thorium-232	0.49	pCi/g	-	No	No
C-03	A1P3P2-C-03-09-R-D	Thorium-232	0.53	pCi/g	-	No	No
C-03	A1P3P2-C-03-10-R	Thorium-232	0.67	pCi/g	-	No	No
C-03	A1P3P2-C-03-12-R	Thorium-232	0.592	pCi/g	-	No	No
C-03	A1P3P2-C-03-13-R	Thorium-232	0.547	pCi/g	-	No	No
C-03	A1P3P2-C-03-14-R	Thorium-232	0.654	pCi/g	-	No	No

APPENDIX C  
CERTIFICATION SAMPLE RESULTS

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-03	A1P3P2-C-03-15-R	Thorium-232	0.585	pCi/g	-	No	No
C-03	A1P3P2-C-03-01-R	Uranium, Total	3.509	mg/kg	-	No	No
C-03	A1P3P2-C-03-02-R	Uranium, Total	2.967	mg/kg	J	No	No
C-03	A1P3P2-C-03-03-R	Uranium, Total	2.587	mg/kg	U	No	No
C-03	A1P3P2-C-03-05-R	Uranium, Total	2.844	mg/kg	J	No	No
C-03	A1P3P2-C-03-06-R	Uranium, Total	1.131	mg/kg	U	No	No
C-03	A1P3P2-C-03-08-R	Uranium, Total	3.312	mg/kg	J	No	No
C-03	A1P3P2-C-03-09-R	Uranium, Total	1.755	mg/kg	U	No	No
C-03	A1P3P2-C-03-09-R-D	Uranium, Total	1.965	mg/kg	U	No	No
C-03	A1P3P2-C-03-10-R	Uranium, Total	1.317	mg/kg	U	No	No
C-03	A1P3P2-C-03-12-R	Uranium, Total	2.981	mg/kg	J	No	No
C-03	A1P3P2-C-03-13-R	Uranium, Total	1.149	mg/kg	U	No	No
C-03	A1P3P2-C-03-14-R	Uranium, Total	1.022	mg/kg	U	No	No
C-03	A1P3P2-C-03-15-R	Uranium, Total	2.492	mg/kg	J	No	No
C-04	A1P3P2-C-04-01-S	Benzo(a)anthracene	0.12	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Benzo(a)anthracene	0.17	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Benzo(a)anthracene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Benzo(a)anthracene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Benzo(a)anthracene	0.65	mg/kg	-	No	No
C-04	A1P3P2-C-04-06-S-D	Benzo(a)anthracene	0.35	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Benzo(a)anthracene	0.074	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Benzo(a)anthracene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Benzo(a)anthracene	0.84	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Benzo(a)anthracene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Benzo(a)anthracene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Benzo(a)anthracene	0.1	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Benzo(a)anthracene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-01-S	Benzo(a)pyrene	0.14	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Benzo(a)pyrene	0.19	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Benzo(a)pyrene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Benzo(a)pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Benzo(a)pyrene	0.68	mg/kg	J	No	No
C-04	A1P3P2-C-04-06-S-D	Benzo(a)pyrene	0.34	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Benzo(a)pyrene	0.078	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Benzo(a)pyrene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Benzo(a)pyrene	0.91	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Benzo(a)pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Benzo(a)pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Benzo(a)pyrene	0.1	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Benzo(a)pyrene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-01-S	Benzo(b)fluoranthene	0.12	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Benzo(b)fluoranthene	0.16	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Benzo(b)fluoranthene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Benzo(b)fluoranthene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Benzo(b)fluoranthene	0.8	mg/kg	J	No	No
C-04	A1P3P2-C-04-06-S-D	Benzo(b)fluoranthene	0.36	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Benzo(b)fluoranthene	0.076	mg/kg	J	No	No

**APPENDIX C  
CERTIFICATION SAMPLE RESULTS**

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-04	A1P3P2-C-04-09-S	Benzo(b)fluoranthene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Benzo(b)fluoranthene	0.87	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Benzo(b)fluoranthene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Benzo(b)fluoranthene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Benzo(b)fluoranthene	0.1	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Benzo(b)fluoranthene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-01-S	Benzo(g,h,i)perylene	0.063	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Benzo(g,h,i)perylene	0.096	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Benzo(g,h,i)perylene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Benzo(g,h,i)perylene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Benzo(g,h,i)perylene	0.46	mg/kg	-	No	No
C-04	A1P3P2-C-04-06-S-D	Benzo(g,h,i)perylene	0.22	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Benzo(g,h,i)perylene	0.039	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Benzo(g,h,i)perylene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Benzo(g,h,i)perylene	0.37	mg/kg	J	No	No
C-04	A1P3P2-C-04-12-S	Benzo(g,h,i)perylene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Benzo(g,h,i)perylene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Benzo(g,h,i)perylene	0.07	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Benzo(g,h,i)perylene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-01-S	Benzo(k)fluoranthene	0.13	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Benzo(k)fluoranthene	0.21	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Benzo(k)fluoranthene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Benzo(k)fluoranthene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Benzo(k)fluoranthene	0.46	mg/kg	-	No	No
C-04	A1P3P2-C-04-06-S-D	Benzo(k)fluoranthene	0.25	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Benzo(k)fluoranthene	0.07	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Benzo(k)fluoranthene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Benzo(k)fluoranthene	0.96	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Benzo(k)fluoranthene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Benzo(k)fluoranthene	0.024	mg/kg	J	No	No
C-04	A1P3P2-C-04-15-S	Benzo(k)fluoranthene	0.099	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Benzo(k)fluoranthene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-01-S	Chrysene	0.13	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Chrysene	0.2	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Chrysene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Chrysene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Chrysene	0.79	mg/kg	J	No	No
C-04	A1P3P2-C-04-06-S-D	Chrysene	0.41	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Chrysene	0.073	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Chrysene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Chrysene	0.91	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Chrysene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Chrysene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Chrysene	0.11	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Chrysene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-01-S	Dibenzo(a,h)anthracene	0.018	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Dibenzo(a,h)anthracene	0.032	mg/kg	J	No	No

APPENDIX C  
CERTIFICATION SAMPLE RESULTS

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-04	A1P3P2-C-04-04-S	Dibenzo(a,h)anthracene	0.38	mg/kg	U	No	Yes
C-04	A1P3P2-C-04-05-S	Dibenzo(a,h)anthracene	0.4	mg/kg	U	No	Yes
C-04	A1P3P2-C-04-06-S	Dibenzo(a,h)anthracene	0.16	mg/kg	J	No	Yes
C-04	A1P3P2-C-04-06-S-D	Dibenzo(a,h)anthracene	0.064	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Dibenzo(a,h)anthracene	0.41	mg/kg	U	No	Yes
C-04	A1P3P2-C-04-09-S	Dibenzo(a,h)anthracene	0.39	mg/kg	U	No	Yes
C-04	A1P3P2-C-04-10-S	Dibenzo(a,h)anthracene	0.13	mg/kg	J	No	Yes
C-04	A1P3P2-C-04-12-S	Dibenzo(a,h)anthracene	0.4	mg/kg	U	No	Yes
C-04	A1P3P2-C-04-13-S	Dibenzo(a,h)anthracene	0.4	mg/kg	U	No	Yes
C-04	A1P3P2-C-04-15-S	Dibenzo(a,h)anthracene	0.021	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Dibenzo(a,h)anthracene	0.39	mg/kg	U	No	Yes
C-04	A1P3P2-C-04-01-S	Fluoranthene	0.2	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Fluoranthene	0.32	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Fluoranthene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Fluoranthene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Fluoranthene	1.3	mg/kg	J	No	No
C-04	A1P3P2-C-04-06-S-D	Fluoranthene	0.75	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Fluoranthene	0.13	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Fluoranthene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Fluoranthene	1.5	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Fluoranthene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Fluoranthene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Fluoranthene	0.18	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Fluoranthene	0.025	mg/kg	J	No	No
C-04	A1P3P2-C-04-01-S	Indeno(1,2,3-cd)pyrene	0.082	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Indeno(1,2,3-cd)pyrene	0.13	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Indeno(1,2,3-cd)pyrene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Indeno(1,2,3-cd)pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Indeno(1,2,3-cd)pyrene	0.51	mg/kg	-	No	No
C-04	A1P3P2-C-04-06-S-D	Indeno(1,2,3-cd)pyrene	0.25	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Indeno(1,2,3-cd)pyrene	0.054	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Indeno(1,2,3-cd)pyrene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Indeno(1,2,3-cd)pyrene	0.46	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Indeno(1,2,3-cd)pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Indeno(1,2,3-cd)pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Indeno(1,2,3-cd)pyrene	0.076	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Indeno(1,2,3-cd)pyrene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-01-S	Phenanthrene	0.082	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Phenanthrene	0.14	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Phenanthrene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Phenanthrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Phenanthrene	0.67	mg/kg	-	No	No
C-04	A1P3P2-C-04-06-S-D	Phenanthrene	0.35	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Phenanthrene	0.053	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Phenanthrene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Phenanthrene	0.86	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Phenanthrene	0.4	mg/kg	U	No	No

**APPENDIX C  
CERTIFICATION SAMPLE RESULTS**

CU	Sample ID	Parameter	Result	Units	Qualifier	Above FRL	Above BTV
C-04	A1P3P2-C-04-13-S	Phenanthrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Phenanthrene	0.11	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Phenanthrene	0.034	mg/kg	J	No	No
C-04	A1P3P2-C-04-01-S	Pyrene	0.2	mg/kg	J	No	No
C-04	A1P3P2-C-04-02-S	Pyrene	0.3	mg/kg	J	No	No
C-04	A1P3P2-C-04-04-S	Pyrene	0.38	mg/kg	U	No	No
C-04	A1P3P2-C-04-05-S	Pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-06-S	Pyrene	1.2	mg/kg	J	No	No
C-04	A1P3P2-C-04-06-S-D	Pyrene	0.6	mg/kg	J	No	No
C-04	A1P3P2-C-04-07-S	Pyrene	0.11	mg/kg	J	No	No
C-04	A1P3P2-C-04-09-S	Pyrene	0.39	mg/kg	U	No	No
C-04	A1P3P2-C-04-10-S	Pyrene	1.8	mg/kg	-	No	No
C-04	A1P3P2-C-04-12-S	Pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-13-S	Pyrene	0.4	mg/kg	U	No	No
C-04	A1P3P2-C-04-15-S	Pyrene	0.17	mg/kg	J	No	No
C-04	A1P3P2-C-04-16-S	Pyrene	0.39	mg/kg	U	No	No