Department of Energy

Ohio Field Office
Fernald Closure Project
175 Tri-County Parkway
Springdale, Ohio 45246
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FEB 7 2006

DOE-0068-06

Mr. James A. Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V, SR-6J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF THE DRAFT CERTIFICATION DESIGN LETTER AND CERTIFICATION PROJECT SPECIFIC PLAN FOR SELECTED AREA 6 AND AREA 7 CONCRETE STRUCTURES

Enclosed for your review is the draft Certification Design Letter and Certification Project Specific Plan for Selected Area 6 and Area 7 Concrete Structures. This document describes the methodology and requirements for certification of various concrete slabs and walls, which will allow for potential beneficial reuse of this material.

If you have any questions or require additional information, please contact me at (513) 648-3139.

Sincerely,

Johnny W. Reising
Director

Enclosure

cc w/enclosure:
J. Desormeau, OH/FCP
T. Schneider, OEPA-Dayton (three copies of enclosure)
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M. Shupe, HSI GeoTrans
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cc w/o enclosure:
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F. Johnston, Fluor Fernald, Inc./MS12
C. Murphy, Fluor Fernald, Inc./MS1

Fluor Fernald, Inc.
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FLUOR

February 6, 2006

Fernald Closure Project
Letter No. C:CPD:2006-0027

Mr. Johnny W. Reising, Director
U. S. Department of Energy
Ohio Field Office - Fernald Closure Project
175 Tri-County Parkway
Cincinnati, Ohio 45246

Dear Mr. Reising:

CONTRACT DE-AC24-01OH20115, TRANSMITTAL OF THE DRAFT CERTIFICATION DESIGN LETTER AND CERTIFICATION PROJECT SPECIFIC PLAN FOR SELECTED AREA 6 AND AREA 7 CONCRETE STRUCTURES

Enclosed for your review is the draft Certification Design Letter and Certification Project Specific Plan for Selected Area 6 and Area 7 Concrete Structures. This document describes the methodology and requirements for certification of various concrete slabs and walls, which will allow for potential beneficial reuse of this material.

Upon your concurrence, please forward this document to the U.S. Environmental Protection Agency and Ohio Environmental Protection Agency. If you have any questions or require additional information, please contact Jyh-Dong Chiou at (513) 738-2834 or Mike Frank at (513) 484-2203.

Sincerely,

for: Cornelius M. Murphy
Closure Project Director

CMM:MAF:jkp

Enclosure

c: <u>With Enclosure</u>

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Project Number 20500.2.22 (20500-PSP-0011)

<u>Without Enclosure</u>

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Document 6109

CERTIFICATION DESIGN LETTER AND CERTIFICATION PROJECT SPECIFIC PLAN FOR SELECTED AREA 6 AND AREA 7 CONCRETE STRUCTURES

FERNALD CLOSURE PROJECT
FERNALD, OHIO

JANUARY 2006

U.S. DEPARTMENT OF ENERGY

20500-PSP-0011
REVISON A
DRAFT

CERTIFICATION DESIGN LETTER AND CERTIFICATION PROJECT SPECIFIC PLAN FOR SELECTED AREA 6 AND AREA 7 CONCRETE STRUCTURES

Document Number 20500-PSP-0011
Draft Revision A

January 2006

APPROVAL:

Jyh-Dong Chiou, Project Manager — Date
Environmental Closure Project

Frank Miller, Characterization Manager — Date
Environmental Closure Project

Tom Buhrlage, Sampling Manager — Date
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Safety, Health and Quality

FERNALD CLOSURE PROJECT

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LIST OF ACRONYMS AND ABBREVIATIONS

ASCOC	area-specific constituent of concern
ASL	analytical support level
BTV	benchmark toxicity value
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFD	Cumulative Frequency Distribution
cm^2	square centimeters
COC	constituent of concern
cpm	counts per minute
CU	certification unit
dpm	disintegrations per minute
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FACTS	Fernald Analytical Computerized Tracking System
FAL	Field Activity Log
FCP	Fernald Closure Project
FRL	final remediation level
ft^2	square feet
GC	gas chromatograph
GC/MS	gas chromatography/mass spectroscopy
HWMU	Hazardous Waste Management Unit
ICP/MS	inductively coupled plasma/mass spectroscopy
LSC	liquid scintillation counting
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
µg/L	micrograms per liter
MDL	minimum detectable level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NAD83	North American Datum of 1983
NRC	U.S. Nuclear Regulatory Commission
OEPA	Ohio Environmental Protection Agency
ORISE	Oak Ridge Institute for Science and Education
OU	Operable Unit
PCB	polychlorinated biphenyl
pCi/g	picoCuries per gram
pCi/L	picoCuries per liter
PEDD	preliminary electronic deliverable
PSP	Project Specific Plan
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SARA	Superfund Amendment and Reauthorization Act
SCM	Surface Contamination Monitor
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SPL	Sample Processing Laboratory
TAL	Target Analyte List
TAT	turnaround time
UCL	upper confidence limit

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

UST	underground storage tank
V/FCN	Variance/Field Change Notice
VOC	volatile organic compound
VSL	validation support level
WAC	waste acceptance criteria
WAO	Waste Acceptance Organization

EXECUTIVE SUMMARY

This document combines the Certification Design Letter (CDL) and Certification Sampling Project Specific Plan (PSP) for selected concrete structures in Area 6 and 7 into a single document. Specifically, the concrete structures include the Area 6 Locomotive Maintenance Building floor slab (Area 6) and the Area 7 Test Stand Pad slab, Vitrification Pilot Plant Building floor slab, and the Trailer Parking Area pads used by the Silos Project. This document describes the precertification and certification process for the concrete structures including the methodology for real-time scanning, biased and random sample location selection, selection of analytical constituents of concern, sample collection, laboratory analysis, and validation of the analytical results. This CDL and PSP is unique in two respects: 1) concrete will be certified by adopting the applicable soil final remediation levels (FRLs) and the same statistical data evaluation process applied to soil certification, and 2) the precertification process for selecting biased sample locations (in addition to the 16 random locations in each certification unit) will be based on real-time radiological scanning and visual inspection discussed in this plan. The random and additional biased sampling approach during field certification will ensure that the concrete is below the soil FRLs for each area-specific constituent of concern (ASCOC). Successful certification of this concrete will provide for potential beneficial reuse options of the material on the Fernald site.

The following summarizes the information included in this CDL/PSP:

- The certification unit boundaries and description of the concrete structures of interest to be certified under the guidance of this document;
- Real-time radiological scanning methodology and instrumentation for the concrete surfaces, the quality control process, and background levels for concrete;
- Selection of biased sample locations based on real-time scans and visual observations of concrete surfaces;
- A presentation of the certification unit boundaries and proposed initial random sampling strategy;
- A discussion of the ASCOC selection process and list of certification ASCOCs assigned to the Area 6 and Area 7 concrete;
- Details of certification sampling methods, sample analysis requirements, data validation, and the statistical methodology applied to the certification data; and
- The proposed schedule for the certification activities.

The scope of this effort is limited to the certification of concrete in Area 6 and Area 7 locations currently or formerly occupied by buildings used for remedial actions, as shown in Figure 1-1. Field sampling is scheduled to begin immediately following approval of this document.

The certification design presented in this document follows the general approach outlined in Section 3.4 of the Sitewide Excavation Plan (SEP, DOE 1998a) and SEP Addendum (DOE 2001), which will be adopted for certification of concrete. In addition to the SEP certification standard approach, this plan specifies the use of a conservative biased sampling strategy, based on the real-time scan, and visual inspection results as well as significantly reduced certification unit sizes.

The selection of Area 6 and Area 7 ASCOCs for the concrete was accomplished by reviewing the analytical data set for the source waste processed in the subject buildings (e.g., Silo 1 and 2 waste) and comparing it to the constituent of concern (COC) lists in the Operable Unit 5 Record of Decision (DOE 1996) for which a soil FRL has been established. Additionally, process knowledge and the list of chemicals used and/or spilled in the building during remedial operations were reviewed and evaluated for the purpose of final COC selection.

This CDL/PSP and the execution of the plan's protocols will serve as a test for the concrete certification process to be used later in the Silos 1 and 2 Transfer Tank Building and Remediation Facility, the Radon Control System Building and the Silo 3 Staging Pad. Based on information gathered and improvements identified during implementation of this plan, modifications and refinements will be made to future concrete certification CDL/PSPs.

1.0 INTRODUCTION

This Certification Design Letter (CDL)/Certification Sampling Project Specific Plan (PSP) describes the certification design, precertification method, sampling, analysis, and validation necessary to demonstrate that specific concrete structures in Area 6 and Area 7 meets the soil final remediation levels (FRLs) for all area-specific constituents of concern (ASCOCs). The soil FRLs are applicable to this concrete since there is beneficial reuse of the material planned to remain on or near the soil surface of the Fernald site. The format of this document follows guidelines presented in the Sitewide Excavation Plan (SEP, DOE 1998a). Accordingly, this document consists of nine sections:

1.0 Introduction - Presentation of the purpose, objectives, and scope of this CDL

2.0 Historical Use of Structures and Area-Specific Constituents of Concern - Discussion of selection criteria and ASCOCs for Area 7 Silos Project Area

3.0 Precertification Methodology - Description of the real-time scanning process to be applied to the concrete surfaces

4.0 Certification Approach - Presentation of certification unit (CU) sample design, additional biased sample selection, surveying, sampling method and analytical methodologies

5.0 Schedule

6.0 Quality Assurance/Quality Control Requirements - Presents the field Quality Control (QC), analytical methodologies

7.0 Health and Safety

8.0 Disposition of Waste

9.0 Data Management

References

1.1 OBJECTIVES

The primary objectives of this document are to:

- Define the locations and boundaries of the concrete structures to be certified under the guidance of this CDL/Certification PSP, including the individual CU boundaries and sample locations;

- Describe the real-time radiological scanning methodology and instrumentation for concrete surfaces, the quality control process, and the background levels for concrete;

- Describe the process for selecting biased sample locations based on real-time scans and visual inspections of concrete surfaces;

- Define the ASCOC selection process and list the selected Area 6 and Area 7 ASCOCs for concrete; and

- Summarize the analytical requirements and the statistical methodology that will be employed.

1.2 SCOPE AND AREA DESCRIPTION

The scope of this CDL and Certification PSP includes details of precertification methods, certification sampling, analysis, and validation that will take place in Area 6 and Area 7 for specific areas of concrete as summarized in Table 2-1 and illustrated in Figures 4-1 through 4-4. The specific area descriptions are as follows:

- Area 6 Locomotive Maintenance Building - floor slab is 4,500 square feet (ft^2) with concrete thickness ranging from 8 to 24 inches; contains an inspection pit measuring 55 feet in length and 5 feet deep; above-grade building has been demolished and removed.

- Area 7 Trailer Parking Area - five parallel pads covering 15,500 ft^2 with a thickness of 6 inches.

- Area 7 Vitrification Pilot Plant Building - floor slab is 4,500 ft^2 with thickness ranging from 1 to 2 feet; above-grade building has been demolished and removed.

- Area 7 Test Stand Building - floor slab is 2,450 ft^2 with thickness of 1 foot; above-grade building has been demolished and removed.

1.3 KEY PROJECT PERSONNEL

Key project personnel responsible for performance of the project are listed in Table 1-1.

TABLE 1-1
KEY PROJECT PERSONNEL

Title	Primary	Alternate
DOE Contact	Johnny Reising	TBD
Project Manager	Jyh-Dong Chiou	Rich Abitz
Characterization Manager	Frank Miller	Greg Lupton
Field Sampling Manager	Tom Buhrlage	Jim Hey
Surveying Manager	Jim Schwing	Eric Harman
WAO Contact	Christa Walls	Scott Osborn
Laboratory Contact	Paul McSwigan	Amy Meyer
Data Management Contact	Greg Lupton	Krista Flaugh
Data Validation Contact	James Chambers	Baohe Chen
Field Data Validation Contact	Dee Dee Edwards	James Chambers
FACTS/SED Database Contact	Kym Lockard	Susan Marsh
QA/QC Contact	Reinhard Friske	Dick Scheper
Safety and Health Contact	Gregg Johnson	Jeff Middaugh

DOE - U.S. Department of Energy
FACTS - Fernald Analytical Computerized Tracking System
QA/QC - Quality Assurance/Quality Control
SED - Sitewide Environmental Database
WAO - Waste Acceptance Organization

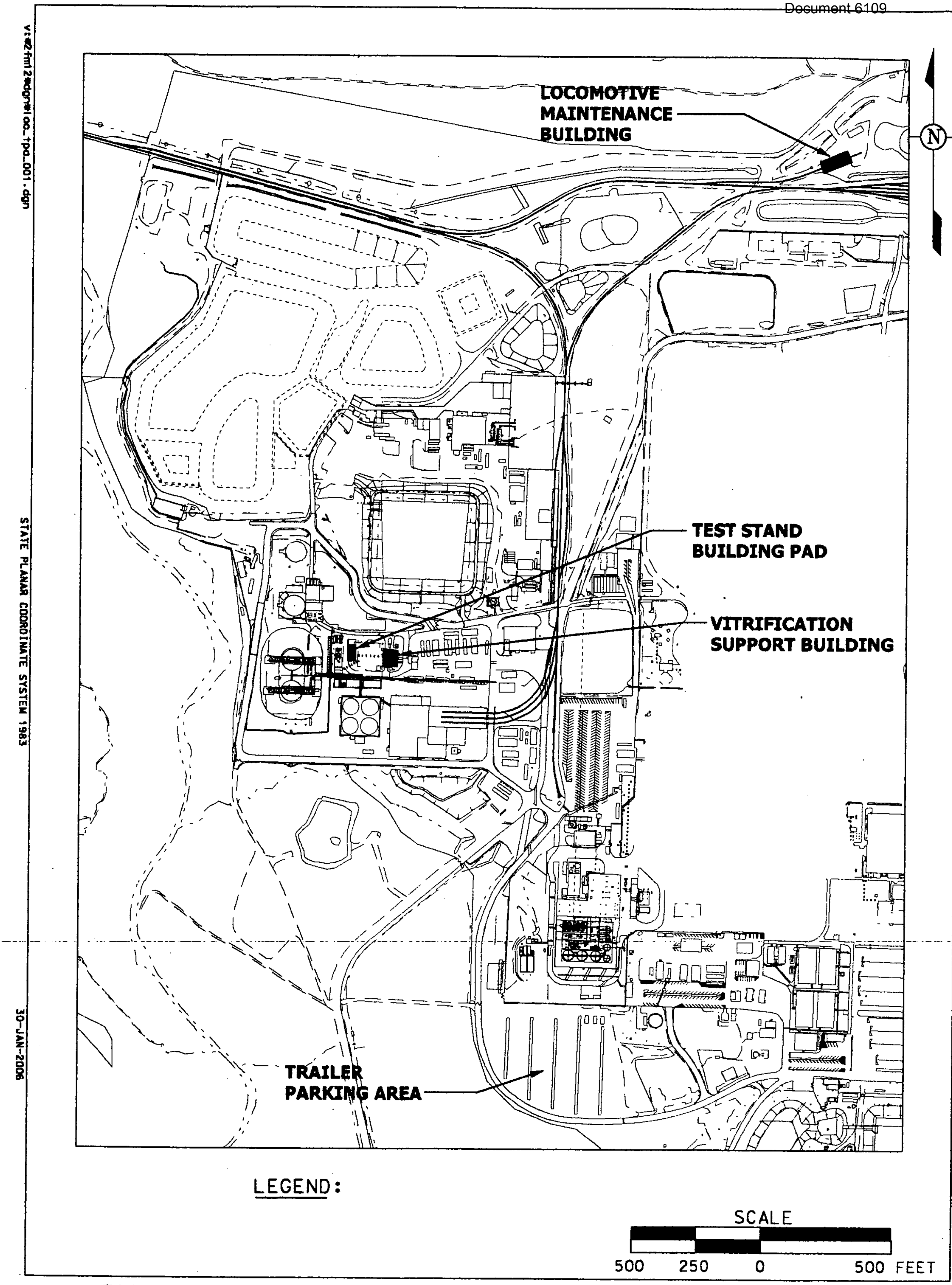

FIGURE 1-1. AREA 6 AND AREA 7 CONCRETE CERTIFICATION AREAS

2.0 HISTORICAL USE OF STRUCTURES AND AREA-SPECIFIC CONSTITUENTS OF CONCERN

2.1 HISTORICAL USE OF STRUCTURES

The concrete floor slabs and pads under this plan are presumed not to be impacted by contaminants associated with remedial action operations. Additionally, any chemicals used in the facilities to support the remedial action are presumed not to have impacted the concrete based on a review of chemical usage and the daily logs used for reporting spills and releases. Although there is an area of visible oil/lubricant stains on the concrete (Locomotive Maintenance floor), any contaminants should be sufficiently removed during the high-pressure water cleaning (or more aggressive methods if necessary) to be performed prior to precertification scanning and sampling. Precertification scanning and certification sampling under this plan will ultimately determine if the concrete will pass certification or will require some degree of removal of localized hot spots before certification is achieved. The surface area of each floor slab or pad is included in Table 2-1.

The Area 6 Locomotive Maintenance Building was constructed in 1997 and utilized from 1999 through 2005 to perform maintenance and inspections on locomotive engines and railcars in support of the Operable Unit (OU) 1 remedial action involving rail transport of wastes off site. A portion of the building, which served as the control point for entry into the railyard and for parking of locomotives, was posted and controlled as a radiological contamination area. The vast majority of chemicals used in the facility were oils and lubricants; small quantities of paint and paint thinner were stored and used in the building on occasion. Known spills of oils or chemicals in the building are limited to visible oil stains in the vicinity of the rail tracks in the center of the building, and less than one gallon of battery acid, which leaked from a locomotive.

The Area 7 Trailer Parking Area was constructed in 2004 and consists of five parallel pads used as a base for the pedestals of loaded and empty trailers containing Silo 1 and 2 waste canisters. This area has historically been maintained as either a radiologically uncontrolled area or, after silo waste treatment was initiated, a Radiological Category II controlled area (radiation only) due to the parked trailers containing Silo 1 and 2 waste. There have been no reported spills or contamination occurrences in this area.

The Area 7 Vitrification Pilot Plant Building was constructed in 1994 and was utilized from 1995 through 1996 to support a vitrification testing (using only radiologically clean surrogate material). Since that time, the facility has been used for various clean functions including a control room for the Silo 1 and 2 Accelerated Waste Retrieval project. The building has always been maintained and posted as either an uncontrolled radiological area or a Radiological Category II controlled area (due to the radiation originating from nearby storage and processing of Silo 1 and 2 wastes). There was no extensive or significant use of hazardous chemicals or spills in the building.

The Area 7 Test Stand Building was constructed in 2003 to test sluice pumps and mixers in a tank of slurry comprised of limestone-based surrogate material. There has been no known use of significant amounts of hazardous chemicals in this building. Additionally, the building has never been controlled as a radiological contamination area since construction.

TABLE 2-1
SUMMARY OF CONCRETE SLABS AND CERTIFICATION UNIT DESIGNS

CU Area	Surface Area (ft^2)	Number of CUs	Number of Samples	ASCOC Groups*
Area 6 Locomotive Building (slab)	4,500	1	16 random samples plus biased locations to high scan results, cracks/joints and sumps	Radium, thorium, uranium isotopes, technetium-99, cesium-137, select metals, polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs)
Area 7 Trailer Parking Area (pads)	15,500	1	16 random samples plus biased locations to high scan results, cracks/joints and sumps	Radium, thorium, uranium isotopes, lead-210; select metals and 1 PCB
Area 7 Vitrification Pilot Plant Building (slab)	4,500	1	16 random samples plus biased locations to high scan results, cracks/joints and sumps	Radium, thorium, uranium isotopes, lead-210; select metals and 1 PCB
Area 7 Test Stand Building (pad)	2,450	1	16 random samples plus biased locations to high scan results, cracks/joints and sumps	Radium, thorium, uranium isotopes, lead-210; select metals and 1 PCB

* Refer to details in Tables 2-2 and 2-5.

2.2 AREA-SPECIFIC CONSTITUENTS OF CONCERN SELECTION CRITERIA

The selection of Area 6 and Area 7 ASCOCs for concrete was accomplished by reviewing the analytical data set for the source waste processed in or transported through the subject areas or buildings (e.g., waste pit contents transported in rail cars were applied to the Locomotive Maintenance Building) and comparing source data to the COCs for which a soil FRL has been established in Table 1-4 of the SEP [which is based on the OU5 Record of Decision (ROD, DOE 1996)]. The OU5 soil FRLs are being applied to the subject concrete to demonstrate that concrete meeting soil FRLs may safely remain at or below soil surface grade in a beneficial reuse application, like the surface soil that will remain for future land use. Additionally, process knowledge and the list of chemicals used in the building during remedial operations were reviewed and evaluated for the purpose of final ASCOC selection.

In the OU5 ROD and the SEP, there are 80 soil constituents of concern (COCs) with established FRLs. All of the constituents in the Silo 1 and 2 data and Waste Pit 4, 5 and 6 data were reviewed to determine the waste constituents that exceed their respective OU5 soil FRL.

In summary, the selection process for retaining ASCOCs (from the waste source data) involved the following criteria for concrete:

- The constituent is listed as a soil COC in the OU5 ROD;

- Analytical results indicate that a contaminant is present in the waste source (e.g., Silo 1 and 2 waste) above its respective soil FRL, and the above-FRL concentrations are not attributable to false positives or elevated detection limits;

- The constituent was used during the remedial action operations in the area of interest based on process knowledge [e.g., Superfund Amendment and Reauthorization Act (SARA) 312 reports] and a known or suspected spill or release of the constituent occurred during operations;

- Physical characteristics of the contaminant, such as degradation rate and volatility, indicate it is likely to persist in the concrete in the case of a spill or release;

- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-228, and thorium-232).

2.2.1 <u>Area 6 ASCOC Selection</u>

The ASCOC list in Table 2-2 was generated from the screening process described above using Table 2-7 of the SEP, process knowledge, review of SARA 312 reports and database logs used to report any spills. For each ASCOC returned from the above-FRL screening process, the justification for retention or elimination from the final list is provided in Table 2-2. The screening of COCs applicable to the waste pit material was previously completed for the Waste Pit 4, 5, and 6 CDL/PSP. Therefore, the same list will be used for this CDL/PSP with modifications based on the recent certification sample results for some of the organic and metal ASCOCs applied to Waste Pits 4, 5 and 6.

Visible staining of the concrete underlying the rails in the center of the building was cause for adding several organic compounds to the list. This data will determine if the concrete in this area of the floor slab exceeds applicable Resource Conservation and Recovery Act (RCRA) limits. Some of these organics had already been selected based on the utilization of the ASCOC list in the Waste Pits 4, 5 and 6 CDL. Table 2-3 includes the final ASCOC list to be applied to the Area 6 Locomotive Maintenance Building Pad.

2.2.2 Area 7 ASCOC Selection

The ASCOC list in Table 2-4 was generated from the screening process described above using Table 2-7 of the SEP and Silo 1 and 2 constituents detected above the established soil FRLs. Additionally, process knowledge of the operations, the SARA 312 inventory reports and database logs used to report any spills were reviewed and considered; no additional ASCOCs were required as a result of this review. For each ASCOC returned from the above-FRL screening process, the justification for retention or elimination from the final list is provided in Table 2-4. Table 2-5 includes the final ASCOC list to be applied to the Area 7 Trailer Parking pads, Vitrification Pilot Plant Building floor slab and the Test Stand Building floor slab.

TABLE 2-2
ASCOC LIST FOR AREA 6 LOCOMOTIVE MAINTENANCE BUILDING FLOOR

ASCOC	Retained as ASCOC?	Justification	CU(s)
Radionuclides			
Total Uranium	Yes	Primary Radionuclide	1
Radium-226	Yes	Primary Radionuclide	1
Radium-228	Yes	Primary Radionuclide	1
Thorium-228	Yes	Primary Radionuclide	1
Thorium-232	Yes	Primary Radionuclide	1
Cesium-137	Yes	Above-FRL concentrations detected within Area 6	1
Technetium-99	Yes	Above-FRL concentrations detected within Area 6	1
Thorium-230	Yes	Above-FRL concentrations detected within Area 6	1
Organic			
1,1-Dichloroethene	Yes	Above-FRL concentrations detected within Waste Pits 5 and 6	1
1,2-Dichloroethene	Yes	Although this is not a COC for Area 6 as defined in the SEP nor was it identified in the characterization of the waste pit material, it was prevalent across the site and has been identified in some of the water monitoring wells in the Waste Pit area.	1
2-Butanone[a]	Yes	Component of material used in maintenance operations	1
4-Methyl-2-pentanone[b]	Yes	Component of material used in maintenance operations	1
Acetone	Yes	Component of material used in maintenance operations	1
Aroclor-1254	Yes	Above-FRL concentrations within Area 6	1
Aroclor-1260	Yes	Above-FRL concentrations within Area 6	1
Benzene	Yes	Component of material used in maintenance operations material	1
Bromodichloromethane	Yes	Above-FRL concentrations detected within Waste Pit 6	1
Dieldrin	Yes	Above-FRL concentrations within Area 6	1
Ethylbenzene	Yes	Component of material used in maintenance operations material	1
Tetrachloroethene	Yes	Above-FRL concentrations detected within Waste Pits 4 and 6	1
Toluene	Yes	Component of material used in maintenance operations material	1
Trichloroethene	Yes	Although this is not a COC for Area 6 as defined in the SEP nor was it identified in the characterization of the waste pit material, it was prevalent across the site and has been identified in some of the water monitoring wells in the Waste Pit area.	1
Total Xylenes	Yes	Component of material used in maintenance operations material	1

TABLE 2-2
ASCOC LIST FOR AREA 6 LOCOMOTIVE MAINTENANCE BUILDING FLOOR

ASCOC	Retained as ASCOC?	Justification	CU(s)
Metals			
Arsenic	Yes	Above-FRL concentrations detected within Waste Pits 5 and 6	1
Beryllium	Yes	Above-FRL concentrations detected within Area 6	1
Lead	Yes	Component of material used in maintenance operations material	1

[a] Synonymous with methyl ethyl ketone
[b] Synonymous with methyl isobutyl ketone

TABLE 2-3
FINAL ASCOC LIST FOR AREA 6
LOCOMOTIVE MAINTENANCE BUILDING FLOOR

ASCOC	FRL
PRIMARY	
Total Uranium	82 mg/kg
Radium-226	1.7 pCi/g
Radium-228	1.8 pCi/g
Thorium-228	1.7 pCi/g
Thorium-232	1.5 pCi/g
SECONDARY	
Arsenic	12 mg/kg
Beryllium	1.5 mg/kg
Lead	400 mg/kg
Aroclor-1254	0.13 mg/kg
Aroclor-1260	0.13 mg/kg
Dieldrin	0.015 mg/kg
1,1-Dichloroethene	0.41 mg/kg
1,2-Dichloroethene	0.16 mg/kg
2-Butanone[a]	23.5 mg/kg
4-Methyl-2-pentanone	25,000 mg/kg
Acetone	43,000 mg/kg
Benzene	850 mg/kg
Bromodichloromethane	4.0 mg/kg
Ethylbenzene	5,100 mg/kg
Tetrachloroethene	3.6 mg/kg
Toluene	100,000 mg/kg
Total Xylenes	920,000 mg/kg
Trichloroethene	25 mg/kg
Cesium-137	1.4 pCi/g
Technetium-99	30.0 pCi/g
Thorium-230	280 pCi/g

[a] 2-Butanone (Methyl Ethyl Ketone) does not have an associated soil FRL. The Closure Plan Review Guidance for RCRA Facilities (OEPA 2004) (Table 1) has set the cleanup goal at 23.5 mg/kg.

mg/kg - micrograms per kilogram
pCi/g - picoCuries per gram

TABLE 2-4
ASCOC LIST FOR AREA 7 CONCRETE FLOORS/SLABS

ASCOC	Retained as ASCOC?	Justification	CU(s)
Radionuclides			
Total Uranium	Yes	Primary Radionuclide	All
Radium-226	Yes	Primary Radionuclide	All
Radium-228	Yes	Primary Radionuclide	All
Thorium-228	Yes	Primary Radionuclide	All
Thorium-232	Yes	Primary Radionuclide	All
Lead-210	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
PCB			
Aroclor-1254	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Aroclor-1260	No	Only three out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on these few detections, the constituent is not likely to be at above-FRL concentrations in the concrete floor slabs of the Area 7 support facilities.	All
Dieldrin	No	Only one out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on this single detection, the constituent is not likely to be at above-FRL concentrations in the concrete floor slabs of the Area 7 support facilities.	
N-nitrosodipropylamine	No	Only one out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on this single detection, the constituent is not likely to be at above-FRL concentrations in the concrete floor slabs of the Area 7 support facilities.	
Metals			
Arsenic	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Beryllium	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Cobalt	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Lead	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Molybdenum	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All

1

TABLE 2-5
FINAL ASCOC LIST FOR AREA 7 CONCRETE FLOORS/SLABS

ASCOC	FRL
PRIMARY	
Radium-226	1.7 pCi/g
Radium-228	1.8 pCi/g
Thorium-228	1.7 pCi/g
Thorium-232	1.5 pCi/g
Total Uranium	82 mg/kg
SECONDARY	
Lead-210	38 pCi/g
Aroclor-1254	0.13 mg/kg
Arsenic	12 mg/kg
Beryllium	1.5 mg/kg
Cobalt	740 mg/kg
Lead	400 mg/kg
Molybdenum	2,900 mg/kg

3.0 PRECERTIFICATION METHODOLOGY

The concrete surfaces targeted for certification under this plan will be precertified using a real-time automated radiological detection system specifically designed for scanning building floors and walls. Use of the detection system, referred to as the Surface Contamination Monitor (SCM), in both scanning and stationary measurement modes will provide greater than 95 percent coverage of the concrete walls, with higher coverage on floor areas. Wall corner areas are measured using the same type large area detector in a hand-held configuration. The detector has the ability to monitor for both alpha and beta contamination. All exposed surfaces accessible with the SCM will be covered; inaccessible areas are limited to surfaces covered by structural steel or other fixtures with insufficient clearance for the detector. The SCM has sufficient sensitivity to detect discrete 100 square centimeters (cm^2) areas that contain radiological surface contamination above background levels (i.e., background for clean concrete) expressed in either counts per minute (cpm) or disintegrations per minute (dpm). The system was developed by Shonka Research Associates, Inc. [U.S. Nuclear Regulatory Commission (NRC 1996, NUREG/CR-6450), DOE 1998b, and DOE 1999]; two of these publications were commissioned by the DOE as innovative technology evaluation projects.

3.1 DETECTION SYSTEM DESCRIPTION

The SCM uses a position-sensitive gas-filled proportional counter that is capable of establishing where along the detector the event occurs (the system is described in detail in NUREG/CR-6450). The segmented proportional detector is equivalent to numerous side-by-side detectors. The typical detector is approximately 180 cm long by 10 cm wide and is programmed into an array of 76 side-by-side detectors (each measuring 5 cm x 5 cm). The detectors are often configured to scan in parallel to increase count time or to collect both shielded and unshielded measurements. Four hundred measurements are taken and recorded per square meter of surface area scanned; each measurement corresponds to an area of 25 cm^2 (5 cm x 5 cm). Survey data is spatially correlated which allows for visualization of the distribution of contamination and anomalies in the data. When the SCM data is analyzed, the software considers each 25-cm^2 measurement as one-fourth of a 100 cm^2 area, averaging the four measurements over the 100 cm^2. All 100-cm2 areas that exceed background can be identified and located for sampling, decontamination or removal. The SCM is mechanically equipped to survey floors and walls by rotating and elevating the detector as necessary.

3.2 HISTORICAL BACKGROUND CONCENTRATIONS IN CONCRETE

An investigation of background surface activity levels on concrete was conducted in October 2003 in the Transfer Tank Building and the Silo 1 and 2 Remediation Facility. The investigation was performed by the Oak Ridge Institute for Science and Education (ORISE) using the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) methods (NRC 2000, NUREG-1575); the findings are summarized in a letter report dated November 13, 2003 (ORISE 2003). A total of 19 alpha/beta measurements were taken on the concrete floors and walls prior to receipt of waste into either facility, with gas proportional detectors. The average alpha/beta background level for these 19 measurements was 326 cpm.

3.3 DETERMINATION OF BACKGROUND LEVELS DURING PRECERTIFICATION SCANS

The background level determined by ORISE will be used as a benchmark to verify that alpha/beta background determinations obtained during precertification are in agreement with the pre-production facility measurements. As discussed below, the critical factor in determining if the concrete meets the soil FRLs is the laboratory results for the biased samples collected from the three maximum alpha/beta activity locations and the 16 random samples for each CU.

For precertification alpha/beta scans, background will be evaluated using an *a posteriori* analysis of the vast number of individual measurements collected during the surface scan for each CU (i.e., Locomotive Maintenance Building floor slab); note that 400 individual 25 cm^2 measurements are recorded for every m^2 scanned. This allows the background to be established from unaffected (uncontaminated) surface areas within the specific area being surveyed (i.e., generally a specific wall or floor CU with a minimum of $10m^2$). Figure 3-1 demonstrates this technique with a Cumulative Frequency Distribution (CFD) plot of a data set collected from a 4-m^2 area (1,600 individual 25 cm^2 measurements) on the Transfer Tank Building outer wall (clean) in January 2006.

The activity corresponding to the mean of the data set (50^{th} percentile on the CFD plot) is used as the background value for the given unit area being surveyed. The 95 percent upper confidence level of the mean is nearly coincident with the 50^{th} percentile which demonstrates that there is a high degree of confidence in the value for the mean. The 90^{th} percentile line indicates 90 percent of the data in this background population lie below 1,100 cpm.

A CFD plot will be generated for each CU to determine the background activity in each CU, since the highest three 100 cm^2 alpha/beta measurement locations will be sampled for laboratory analysis for the radiological COCs for each CU. In this conservative manner, a combination of biased and random samples will be used to certify the concrete.

3.4 QUALITY ASSURANCE AND QUALITY CONTROL

The concrete survey methods to be employed were developed based on the MARSSIM. The QC practices and procedures implemented during survey of the concrete surfaces will meet the requirements contained in MARSSIM.

A quality assurance plan and quality control procedures specific to the SCM and the associated survey information management system will be utilized for adherence to all operating parameters and quality criteria to produce high quality and defensible data. The work scope will include the assignment of an individual (QA reviewer) not directly involved with the specific surveying function to independently review survey reports and QC data packages.

Quality control checks of the SCM systems are performed in accordance with the manufacturer's specifications and procedures. These checks include initial set-up and efficiency determination, daily start-up checks, and periodic checks during operation. Data from these checks will be processed to provide a complete evaluation of the equipment operability during the performance of the survey. All calibrations are performed using National Institute of Standards and Technology traceable sources. Acceptance criteria for daily source response checks and performance-based checks (several per day) have been adopted from MARSSIM guidance and are outlined in the QC operating procedure identified in the references.

3.5 DATA MAPS AND DOCUMENTATION

The extensive data generated by the SCM is processed by customized information management software that analyzes the data and generates understandable, objective survey reports, which can be formatted as color-coded two-dimensional or three-dimensional images. Examples of contamination plots from other facilities are included in Appendix A. The maps will identify the alpha/beta radiological distribution (in dpm/100 cm^2) over the concrete surface area which will enable project personnel to identify locations that area above background for further evaluation or to initiate collection of biased physical samples for certification (see Section 4.1.2, Sample Location Design). The survey maps and planned biased sample locations (if above-background hotspots are identified) will be forwarded to the regulatory agencies for approval.

Survey data maps from all concrete surfaces depicting the dpm/100 cm^2 results will also be included as part of the certification report providing the laboratory analytical results.

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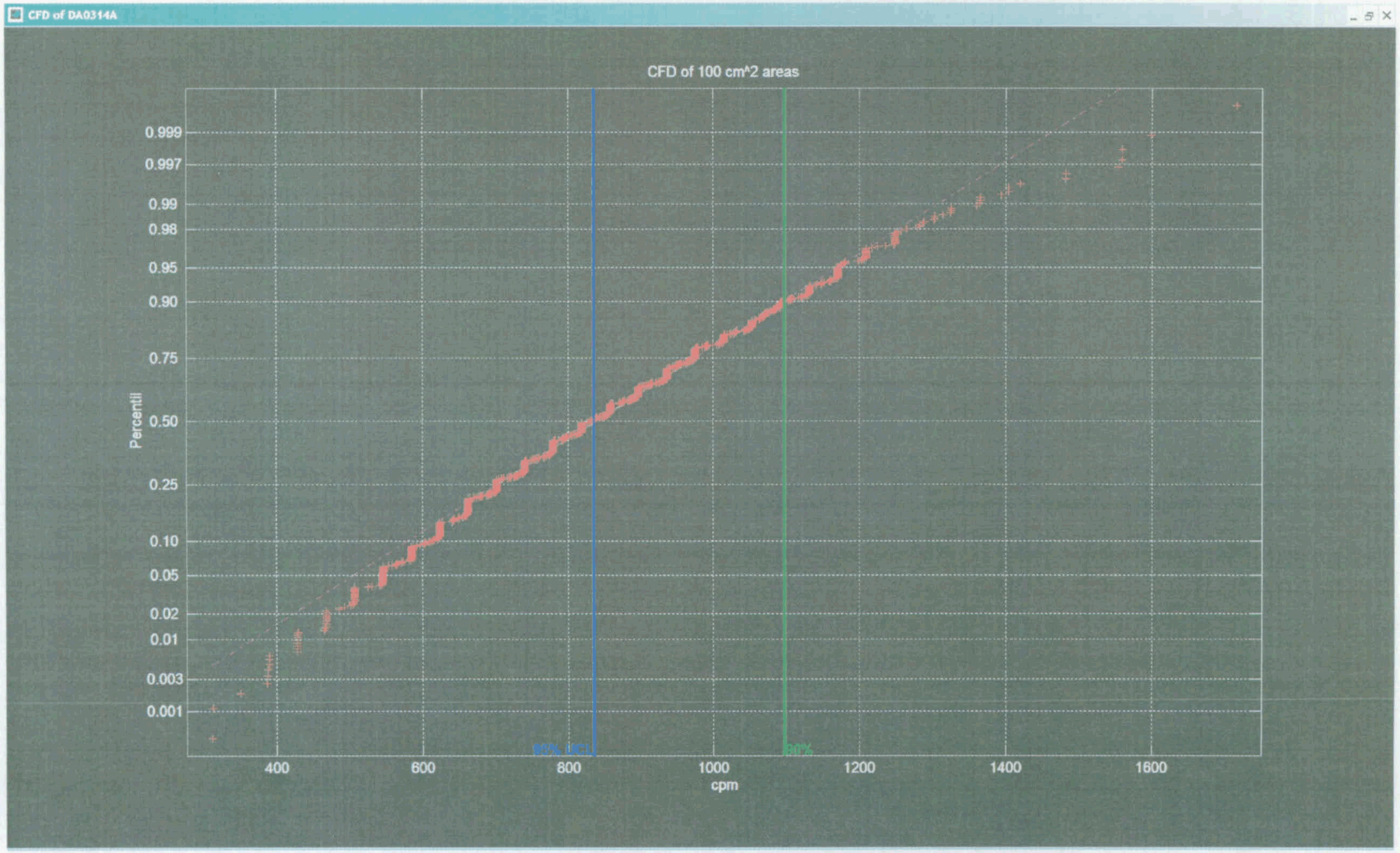
FIGURE 3-1
CUMULATIVE FREQUENCY DISTRIBUTION PLOT OF DATA SET ON TANK TRANSFER BUILDING OUTER WALL



4.0 CERTIFICATION APPROACH

4.1 CERTIFICATION DESIGN

The certification design for concrete within the scope of this CDL/PSP follows the general certification approach established for soil, as outlined in Section 3.4 of the SEP. Conservative provisions for applying the soil certification approach to concrete are described below, including significantly reduced CU sizes, collection of 16 or more samples in each CU, the addition of biased samples from each CU and a modified sample depth for concrete. As discussed in Section 2.0 of this document, the five primary ASCOCs (total uranium, radium-226, radium-228, thorium-228, and thorium-232) apply to each CU, and additional secondary COCs are identified for specific CUs based on the waste source material processed in or near the building and the type of operations conducted in each area. For example, the Area 6 Locomotive Maintenance Building floor slab sampling will include several analytical constituents to assess the presence of contaminants generated from the use of oils, lubricants and fuels during locomotive maintenance operations.

Several factors were taken into consideration when determining the certification design for the subject concrete, including the surface area of each facility's walls and floor slabs, the proximity of the concrete surface to waste processing operations and the potential for contamination. All of the CUs, including those that have been maintained clean in terms of radiological control postings, are significantly smaller than typical Group 1 CUs applied to soil. Table 2-1 summarizes the CU design for each concrete structure. The reduced CU sizes provide for more concentrated sampling to ensure that the impact from waste processing and treatment operations is fully evaluated for certification purposes. An additional factor in determining the target areas for certification and the CU boundaries was the demolition plan and contamination status for the above-grade structures proximal to the target areas.

4.1.1 Certification Unit Design

There are a total of four CUs in the scope of this plan - one in Area 6 (Locomotive Maintenance Building floor slab) and three CUs comprised of floors and slabs in three Area 7 Silos Project area facilities. Each CU surface area was determined by the footprint and boundary of each floor or slab itself. Therefore, the surface areas of the CUs vary from 2,450 to 15,500 ft^2 (compare to Group 1 CU for soil at 65,200 ft^2). Refer to Table 2-1 for a summary of each CU. There are no hazardous waste management units (HWMUs) or underground storage tanks (USTs) associated with any of the facilities, but additional COCs were added in the Area 6 CU to account for the rail operations maintenance history in the building.

Sixteen concrete samples, randomly located in accordance with the SEP, will be collected in each CU. Additionally, biased concrete samples will be collected using the criteria described in the next section.

Operations in the Area 6 Locomotive Maintenance Building and the Area 7 facilities (Trailer Parking pads, Vitrification Pilot Plant Building floor slab and the Test Stand Building pad) were researched to determine past use and history of any spills, and surfaces were inspected for the presence of sumps or drains that would have a bearing upon CU design.

4.1.2 Sample Location Design

The selection of certification sampling locations follows Section 3.4.2 of the SEP. Each CU was first divided into 16 approximately equal sub-CUs. Sample locations were then generated by randomly selecting an easting and northing coordinate within the boundaries of each sub-CU, then testing those locations against the minimum distance criteria for the CU. If the minimum distance criteria were not met, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process continued until all random locations met the minimum distance criteria.

All sixteen sub-CUs will undergo concrete surface sampling with one sample location in each CU designated for a duplicate field sample. Additionally, biased concrete samples will be collected in each CU using the following criteria:

- Up to three locations within each CU that have alpha/beta results above background based on the real-time surface scan. If more than three 100 cm^2 areas exceed background, the highest three areas will be sampled.

- Areas having surface cracks or joints will be inspected to identify up to three core sample locations for each CU. At each sample location, a 0 to 1-inch surface sample and the bottom 1-inch interval of the crack/joint will be collected. All surface cracks and joints will be inspected to select up to three locations having the highest potential for downward migration of contaminants (inspections will consist of field screening for radiological and volatile organic contaminants with hand-held instruments and observations of visible discoloration). In the absence of any indications of contaminants based on the above approach, the low point along the surface crack/joint will be sampled in an effort to capture the area with the highest potential for contaminant accumulation.

- If visible stains remain on the concrete after high-pressure water cleaning of the surface, the location having the highest potential for contamination will be selected for a biased core sample (0-1 inch).

- Collect one biased sample in the bottom of each floor sump (all CUs except the Trailer Parking Area).

The Area 6 Locomotive Maintenance floor slab contains a center inspection pit measuring 55-foot (L) by 3.5-foot (W) by 5-foot (D) that was used to perform maintenance and inspections on the locomotives and rail cars. Additionally, the remainder of the center floor area formerly occupied by the rail line was visibly stained with oil. These two areas have been designated as separate sub-CUs. At a minimum, one biased sample will be collected in the sump or low point of the inspection pit in addition to the 16 random sample locations and other biased locations based on radiological scanning.

The Area 7 Trailer Parking pads consist of five separate parallel pads that were considered as one contiguous unit in determining the 16 sub-CUs for this area. The radiological control posting for this area during Silos shipping operations was for external radiation only, not surface contamination. All outbound shipping containers were decontaminated, surveyed and released prior to being staged in this facility.

The Area 7 Test Stand pad and the Vitrification Pilot Plant Building floor slab have always been controlled for direct radiation only (from surrounding Silos 1, 2 and 3 source material), and there has been no know contamination of the floor slabs. There is a sump in the center of the floor slab in each facility. In addition to the 16 random samples, biased samples will be collected from the sumps and other locations of crack/joints, as needed.

Prior to commencement of certification field activities, all sample locations will be surveyed and field verified to make sure no surface obstacles will prevent sample collection at the planned location. Locations may be moved if a subsurface obstacle prevents sample collection. Requirements for moving a certification sample location are discussed in Section 4.3.1.

4.2 SURVEYING

Before certification sampling activities begin, the North American Datum of 1983 (NAD83) State Planar coordinates for each selected sampling location (with the exception of the archive sample locations) will be surveyed and identified in the field with a flag. All locations will be field verified to ensure no surface obstacles will prevent collection at each of the planned locations.

The Area 6 and Area 7 area CU boundaries and random sample locations are shown on Figures 4-1 through 4-4. All sample location information can be found in Appendix B.

4.3 PHYSICAL CONCRETE SAMPLE COLLECTION

4.3.1 Sample Collection

Concrete samples will be collected in accordance with procedure SMPL-01, Solids Sampling. The specific concrete sample collection requirements for certification samples are as follows:

- The concrete cores will be collected using a concrete coring device to obtain a core sample from the surface to a depth of 1 inch (laboratory sample).

- For sampling of floor slabs, the 1 to 2-inch depth interval will also be collected as an archive sample.

- Special consideration for sampling in floor cracks is necessary to capture any contaminants that have potentially migrated into the crack. These locations will be jointly selected by the Sampling Lead and Characterization Lead in the field; up to three locations per CU will be selected based on the potential for worst-case contaminant accumulation points (e.g., low points) and the results of field surveying for organics and the real-time radiological scan. Samples will be collected from the 0 to 1-inch interval, the 1 to 2-inch interval (as an archive) and the 1-inch depth interval that represents the bottom of the crack/joint as determined during core sampling by inspection of the core hole.

- The planned coring tool diameter will range from 2 to 3 inches but others may be used as necessary.

- During or after each coring operation, any concrete chips or pieces that break away from the sample core will be added to the sample container. In order to ensure that the sample is representative of the 0 to 1-inch depth interval column, chips from outside the core sample column should not be gathered as part of the surface sample. Each core sample and core hole should be inspected to ensure that the target depth interval is captured, within ±¼ inch of the target interval. If necessary, the core sample or the bottom of the core hole may need to be chiseled to obtain the target interval to the extent practical.

- It may be necessary to divide a single core (perpendicular to the surface) into two to three sections to separately containerize samples for various analyses. Technicians shall ensure that a proportional amount of sample is divided to ensure that the sample being containerized is representative of the full 1-inch core thickness. Alternatively, a separate adjacent core may be collected. [Note: For biased sample locations resulting from the highest alpha/beta scan results, the sample submitted for radiological analysis will be collected from the actual high activity location (not an adjacent location)].

- The volume of water used during the coring operation, if necessary, should be kept to a minimum.

The core sampler will be operated by a craft person or laborer under the guidance of the sampling technicians for purposes of ensuring that sample integrity is maintained. The sampling technicians are responsible for containerizing all of the sample core and/or chips following the above requirements for collection of representative samples. A variety of core drilling equipment may be employed including, but not limited to units operated by hydraulics, electricity, pneumatic or Geoprobe® equipment (procedure EQT-06). Following sample collection, each soil core shall be divided, if necessary, and placed into the proper sample containers.

Quality control sample requirements will include a duplicate field samples, a trip blanks, and rinsates; the QC samples will be collected per procedure SMPL-21, Collection of Field Quality Control Samples. For the duplicate field sample, twice the concrete volume (a second core) will be collected at one location in the CU, and the second core will not be homogenized with the original sample. The duplicate sample will be collected from an area as close as possible to the initial core sample (e.g., less than 3 inches). The location that requires the collection of a duplicate sample is identified in Appendix B. A trip blank will be collected each day that VOC samples are collected, or one per 20 VOC samples that are collected, or one per cooler that will be shipped, whichever is more frequent. Rinsate samples will be collected from the decontamination process on the coring tool. Two rinsate samples will be collected under this PSP. All samples will be assigned unique sample identification numbers.

If a subsurface obstacle prevents sample collection at the specified location, it can be moved according to the following guidelines:

- The distance moved must be as small as possible (less than 3 feet);
- It must remain within the boundary of the same CU and sub-CU, and must still meet the minimum distance criterion;
- If the distance moved is greater than 3 feet, the move must be documented in a V/FCN, considered as significant, which will be approved by the agencies prior to collection.
- Anytime a location is moved, the appropriate figure should be used to determine the best direction to move the point to adhere to the above guidelines. The Characterization Manager or designee should be contacted when a sample location is moved. All final sampling locations will be documented in the Area 6 and Area 7 Certification Report for concrete.

Customer sample numbers and FACTS identification numbers will be assigned to all samples collected. The sample labels will be completed with sample collection information, and technicians will complete a Field Activity Log (FAL), a Sample Collection Log, and a Chain of Custody/Request for Analysis form in the field prior to submittal of the samples.

All CU samples with like analyses (including the field duplicate) will be batched and submitted to the Sample Processing Laboratory (SPL) under one set of Chain of Custody/Request for Analysis forms which will represent one analytical release. The rinsate will be listed on a separate Chain of Custody/Request for Analysis form. No alpha/beta screens will be required, as real-time alpha/beta results and historical information can be used for shipping purposes.

4.3.2 Equipment Decontamination

Decontamination is performed to prevent the introduction of contaminants from sampling equipment to subsequent concrete samples. Field Technicians will ensure that sampling equipment (e.g., coring bits) has been decontaminated prior to transport to the field using a Level 2 method described in the Sitewide Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ). As described in SMPL-01, all sampling equipment will have been decontaminated before it is transported to the field site. Decontamination is also necessary in the field if sampling equipment is reused. Following decontamination, clean disposable wipes may be used to replace air-drying of the equipment.

4.3.3 Physical Sample Identification

Each soil certification sample will be assigned a unique sample identification number as *Remediation Area-Specific Area-C##-Location^Analysis-QC,* where:

A6C or A7C	=	Sample collected from Remediation Area 6 or 7 concrete surface (C)
Area	=	"TP" indicates Trailer Parking area; "TS" indicates Test Stand pad; "VP" indicates Vitrification Pilot Plant Pad
C##	=	Certification unit from which sample was collected
Location	=	Sample location number within the CU 1 through 16
Analysis	=	"R" indicates radiological analysis; "M" indicates metals analysis; "P" indicates PCB analysis; and "L" indicates VOC analysis.
QC	=	Quality control sample, if applicable. A "D" indicates a field duplicate sample; "X1" indicates the first rinsate sample; "TB1" indicates the first trip blank collected, and each additional trip blank collected will be consecutively numbered.

For example, a field duplicate sample taken from the 3rd sample location from Area 7 Trailer Parking area concrete surface CU 2 for VOC analysis would be identified as A7C-TP-C02-3^L-D. The first rinsate sample will be identified as A6C- *(or A7C)* -X1-M and A6CS-X1-R. The first trip blank will be identified as A6C-L-TB1. It should be noted that the "^" symbol should not be included in the sample number for rinsates and trip blanks.

4.4 ANALYTICAL METHODOLOGY

All CU concrete samples with like analyses (including the field duplicate) will be batched and submitted to the SPL under one set of Chain of Custody/Request for Analysis forms which will represent one analytical release.

All samples will be prepared for shipment to off-site laboratories per procedure 9501, Shipping Samples to Off-site Laboratories. Samples will only be shipped to off-site laboratories that are listed on the Fluor Fernald Approved Laboratories List. Results from the *in situ* alpha/beta scan and historical data from the area will be used to ship the samples off site.

Samples collected for VOC analysis should be shipped to an off-site laboratory within 24 hours of sample collection. As soon as the samples arrive at the laboratory, all samples should be prepared for analysis (including homogenization for non-VOC samples), and radiological samples should be sealed to begin the in-growth period for radium analysis. Turnaround times for each analyses and data reporting is included in

Table 4-1. The sampling and analytical requirements are listed in Table 4-1 and the Target Analyte Lists (TAL) are shown in Table 4-2.

Laboratory analysis of certification samples will be conducted using an approved analytical method, as discussed in Appendix H of the SEP. Analyses will be conducted to Analytical Support Level (ASL) D or E, where all requirements for ASL E are the same as ASL D, except the minimum detection level for the selected analytical method must be at least 10 percent of the FRL. A minimum of 10 percent of the laboratory data will be validated to Validation Support Level (VSL) D with the remainder validated to VSL B. Samples rejected during validation will be re-analyzed, or an archive sample will be collected and submitted for analysis.

4.5 STATISTICAL ANALYSIS

Once data are validated, results will be entered into the SED and a statistical analysis will be performed to evaluate the pass/fail criteria for each CU. The statistical approach for Area 6 and 7 concrete will be the same as that presented in Section 3.4.3 and Appendix G of the SEP.

Two criteria must be met for the CU to pass certification. If the data distribution is normal or lognormal, the first criterion compares the 95 percent upper confidence limit (UCL) on the mean of each primary ASCOC to its FRL (90 percent UCL on the mean for secondary ASCOCs). On an individual CU basis, any ASCOC with the 95 percent UCL above the FRL results in that CU failing certification. If the data distribution is not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP will be used to evaluate the first criterion. The second criterion is related to individual samples. An individual sample cannot contain a COC that is greater than two times its FRL (i.e., hotspot criterion). When the given UCL on the mean for each ASCOC is less than its FRL, and the hotspot criterion is met, the CU has met both criteria and will be considered certified.

There are three conditions that could result in a CU failing certification: 1) high variability in the data set, 2) localized contamination, and 3) widespread contamination. Details on the evaluation and responses to these possible outcomes are provided in Section 3.4.5 of the SEP. When all CUs within the scope of this CDL have passed certification, a certification report will be issued. The certification report will be submitted to the U.S. Environmental Protection Agency (EPA) and Ohio Environmental Protection Agency (OEPA) to receive acknowledgement that the pertinent OU remedial actions were completed and the individual CUs are certified and ready to be released for interim or final land use. Section 7.4 of the SEP provides additional details and describes the required content of the Certification Report.

TABLE 4-1
SAMPLING AND ANALYTICAL REQUIREMENTS

Analyte[a]	Method[a]	Matrix	Preserve	Hold Time	TAT	Container[b]	Approximate Mass[c]
Rads/Metals/ Pesticides/PCBs (Any combination of TALs A - D, F, and G)	Alpha Spec	Solid	Cool, 4° C	12 months	3 days	Plastic jar	250 g
	Gamma Spec and LSC				10 PEDD 30 days final		
	ICP or ICP/MS			6 months	10 days		
	GC			14 days	10 days		
VOCs (TAL E)	GC/MS	Solid	Cool, 4° C	48 hours	10 days	3 x 40-ml glass with teflon-lined septa	5g / vial
Radiological (TAL A or B)	Gamma Spec	Liquid (rinsate)	HNO_3 pH<2	6 months	30 days	Polyethylene	4 liters
Metals (TAL C or D)	ICP or ICP/MS	Liquid (rinsate)	HNO_3 pH<2	6 months	10 days	Polyethylene	500 ml
VOCs (TALs E)	GC/MS	Liquid (trip blank)	H_2SO_4 pH<2 Cool, 4° C	14 days	10 days	3 x 40-ml glass with teflon-lined septa	120 ml (no headspace)

[a] Samples will be analyzed according to ASL D requirements but the minimum detection level may cause some analyses to be considered ASL E.

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

[c] The laboratory shall select the sample with the greatest mass from each release for the performance of the required quality control analysis.

GC/MS - gas chromatography mass spectroscopy
GC - gas chromatography
ICP/MS - inductively coupled plasma/mass spectroscopy
LSC - liquid scintillation counting
PEDD - preliminary electronic deliverable
TAT - turnaround time

TABLE 4-2
TARGET ANALYTE LISTS

20500-PSP-0011-A
(Radiological - ASL D/E*)

Analyte	On-Property FRL/*WAC*	MDL (soil)	MDL (water)
Total Uranium	82 mg/kg	8.2 mg/kg	3,000 μg/L
Radium-226	1.7 pCi/g	0.17 pCi/g	255 pCi/L
Radium-228	1.8 pCi/g	0.18 pCi/g	270 pCi/L
Thorium-228	1.7 pCi/g	0.17 pCi/g	255 pCi/L
Thorium-232	1.5 pCi/g	0.15 pCi/g	255 pCi/L
Cesium-137	1.4 pCi/g	0.14 pCi/g	210 pCi/L
Technetium-99	30.0 pCi/g *(29.1 pCi/g)*	2.91 pCi/g [a]	45,000 pCi/L
Thorium-230	280 pCi/g	28 pCi/g	3,500 pCi/L

20500-PSP-0011-B
(Radiological - ASL D/E*)

Analyte	On-Property FRL	MDL (soil)[a]	MDL (water)
Total Uranium	82 mg/kg	8.2 mg/kg	3,000 μg/L
Radium-226	1.7 pCi/g	0.17 pCi/g	255 pCi/L
Radium-228	1.8 pCi/g	0.18 pCi/g	270 pCi/L
Thorium-228	1.7 pCi/g	0.17 pCi/g	255 pCi/L
Thorium-232	1.5 pCi/g	0.15 pCi/g	255 pCi/L
Lead-210	38 pCi/g	3.8 pCi/g	110 pCi/L

20500-PSP-0011-C
(Metals - ASL D/E*)

Analyte	On-Property FRL	MDL (soil)	MDL (water)
Arsenic	12 mg/kg	1.2 mg/kg	1.8 mg/L
Beryllium	1.5 mg/kg	0.15 mg/kg	0.22 mg/L
Lead	400 mg/kg	40 mg/kg	30 mg/L

20500-PSP-0011-D
(Metals - ASL D/E*)

Analyte	On-Property FRL	MDL (soil)	MDL (water)
Arsenic	12 mg/kg	1.2 mg/kg	1.8 mg/L
Beryllium	1.5 mg/kg	0.15 mg/kg	0.22 mg/L
Cobalt	740 mg/kg	74 mg/kg	1.7 mg/L
Lead	400 mg/kg	40 mg/kg	30 mg/L
Molybdenum	2,900 mg/kg	290 mg/kg	1.5 mg/L

20500-PSP-0011-E
(VOCs - ASL D/E*)

Analyte	On-Property FRL/ Residential Generic Cleanup Number[b]	MDL (soil)	MDL (water)
1,1-dichloroethene	0.16 mg/kg	0.016 mg/kg	10 μg/L
1,2-dichloroethane	0.015 mg/kg	0.0015 mg/kg	10 μg/L
2-Butanone[b]	23.5 mg/kg[b]	2.35 mg/kg[b]	10 μg/L
4-Methyl-2-pentanone	2,500 mg/kg	250 mg/kg	10 μg/L
Acetone	43,000 mg/kg	4,300 mg/kg	10 μg/L
Benzene	850 mg/kg	85 mg/kg	10 μg/L
Bromodichloromethane	4.0 mg/kg	0.4 mg/kg	10 μg/L
Ethylbenzene	5,100 mg/kg	510 mg/kg	10 μg/L
Tetrachloroethene	3.6 mg/kg	0.36 mg/kg	10 μg/L
Toluene	100,000 mg/kg	10,000 mg/kg	10 μg/L
Trichloroethene	25 mg/kg	2.5 mg/kg	10 μg/L
Total Xylene	920,000 mg/kg	92,000 mg/kg	10 μg/L

20500-PSP-0011-F
(Pesticide/PCBs - ASL D/E*)

Analyte	On-Property FRL	MDL (soil)
Aroclor-1254	0.13 mg/kg	0.013 mg/kg
Aroclor-1260	0.13 mg/kg	0.013 mg/kg
Dieldrin	0.015 mg/kg	0.0015 mg/kg

20500-PSP-0011-G
(Pesticide/PCBs - ASL D/E*)

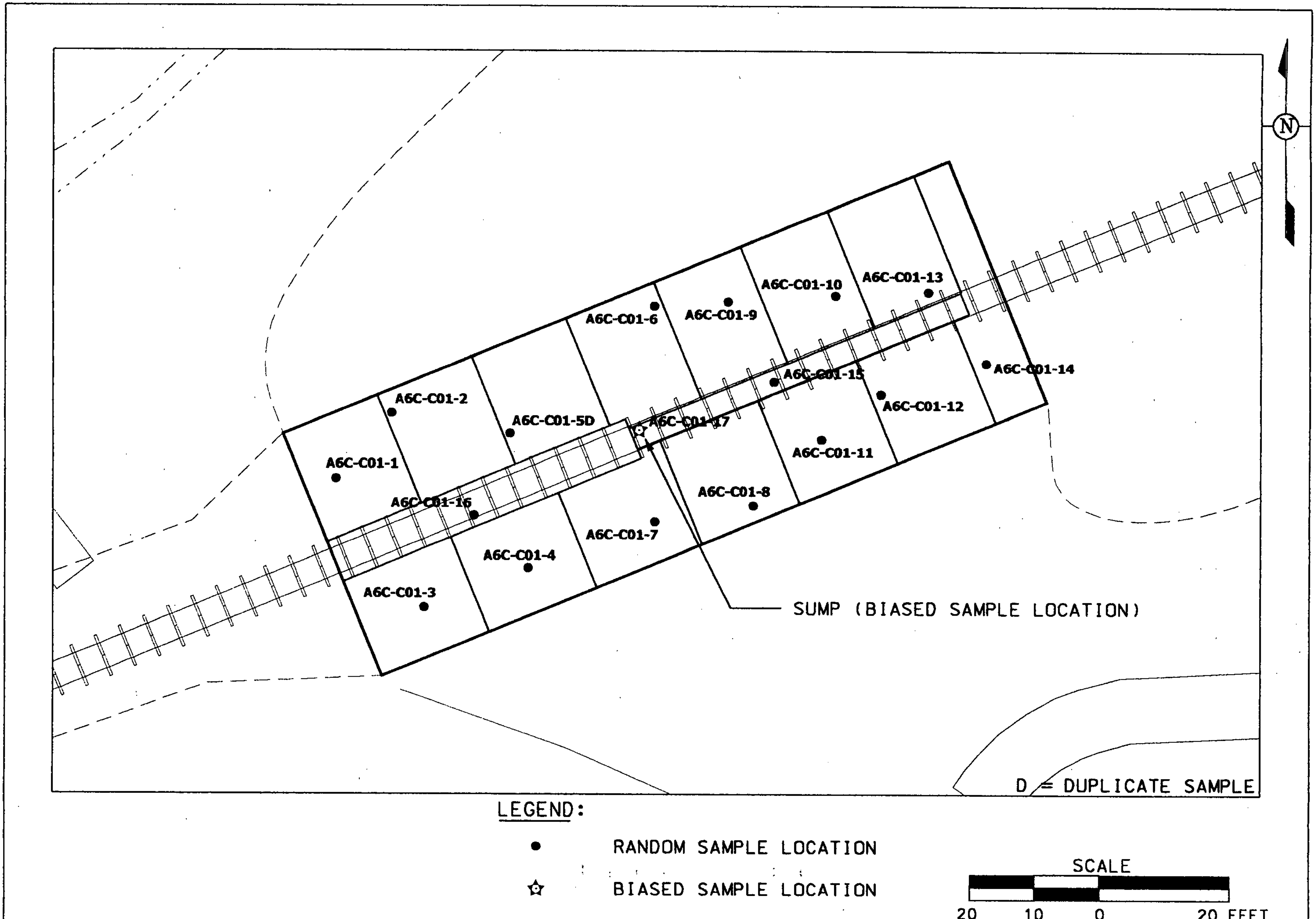
Analyte	On-Property FRL	MDL (soil)
Aroclor-1254	0.13 mg/kg	0.013 mg/kg

*Analytical requirements will meet ASL D but the minimum detection level (MDL) may cause some analyses to be considered ASL E.

[a]The MDL for technetium-99 is 10 percent of the waste acceptance criteria (WAC) limit, which is lower than the FRL.

[b]2-Butanone (Methyl Ethyl Ketone) does not have an associated soil FRL. The Closure Plan Review Guidance for RCRA Facilities (OEPA 2004) (Table 1) has set the cleanup goal at 23.5 mg/kg.

mg/L micrograms per liter
μg/L - micrograms per liter
pCi/L - picoCuries per liter



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STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 4-1. AREA 6 LOCOMOTIVE MAINTENANCE BUILDING (FLOOR SLAB)

02-FEB-2006

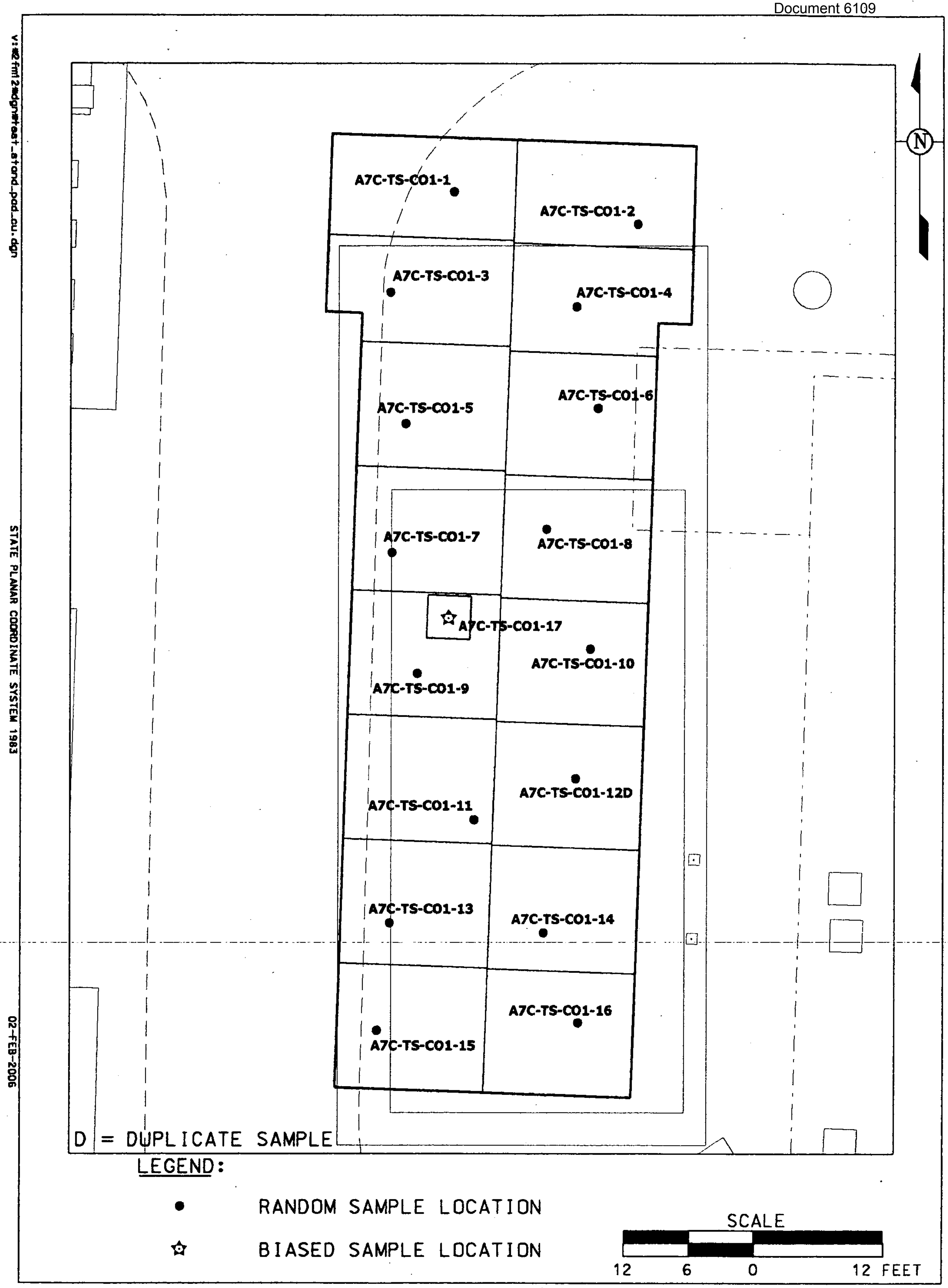


FIGURE 4-2. AREA 7 TEST STAND BUILDING (FLOOR SLAB)

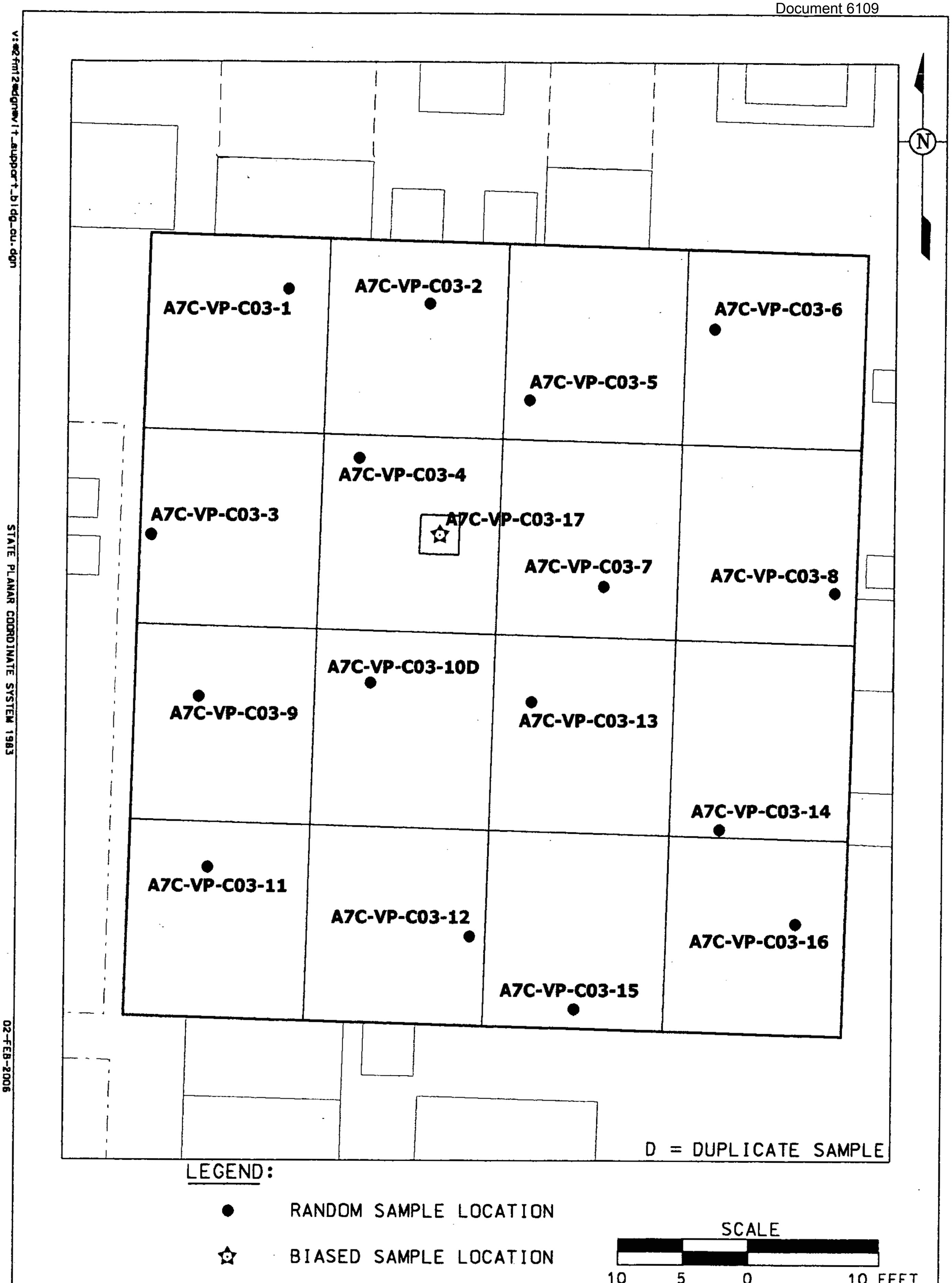
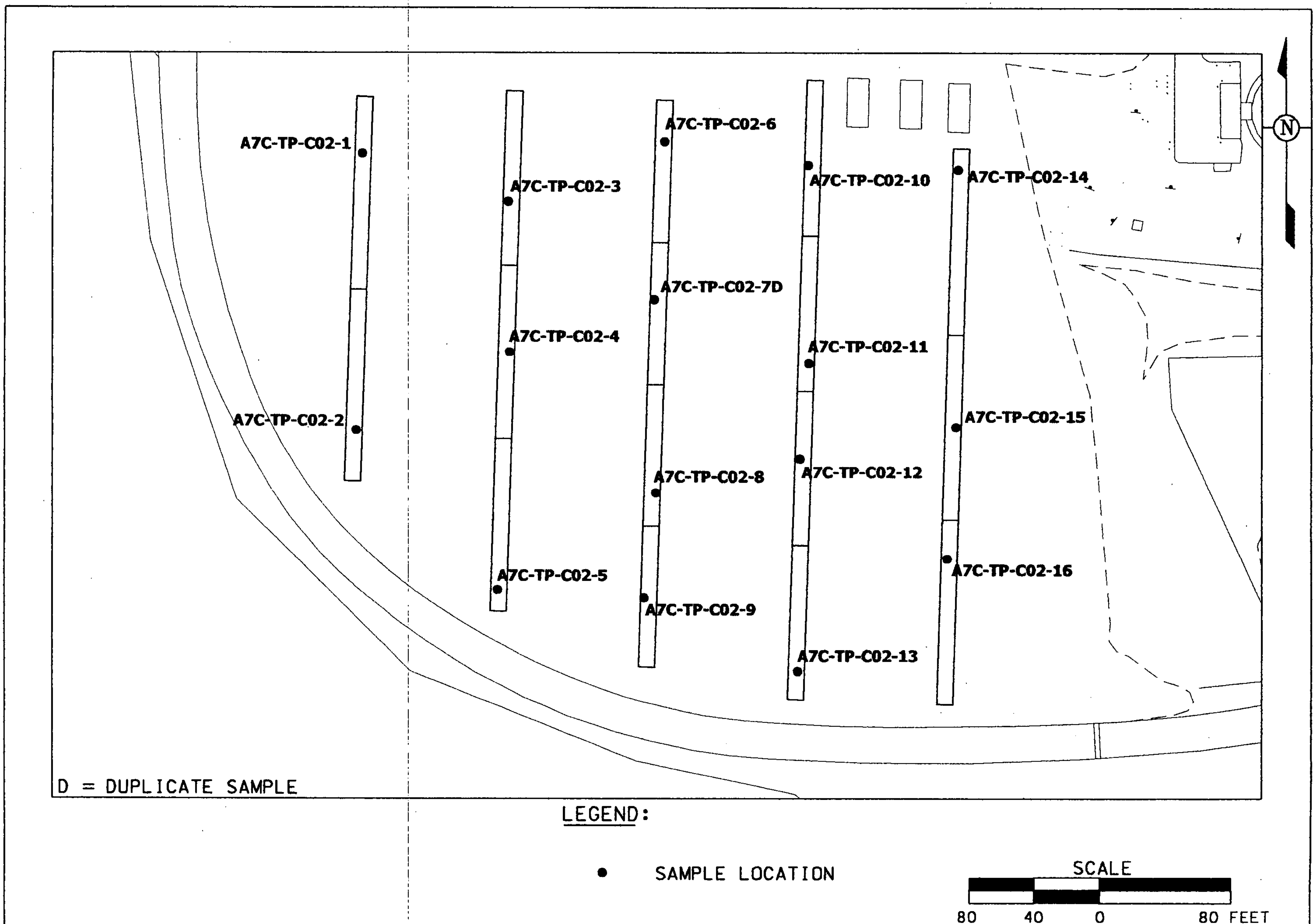


FIGURE 4-3. AREA 7 VITRIFICATION PILOT PLANT (FLOOR SLAB)



v:#2fm12#dgn#sap_cu1.dgn
STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 4-4. AREA 7 TRAILER PARKING AREA (PADS)

02-FEB-2006

5.0 SCHEDULE

The following draft schedule shows key activities for the completion of the work within the scope of this CDL/Certification PSP. Implementation of this schedule is pending funding availability. If necessary, an extension will be requested.

Activity	Target Date
Submittal of Certification Design Letter	February 6, 2006
Start of Precertification Radiological Scanning	February 20, 2006
Start of Certification Sampling	March 7, 2006
Complete Field Work	March 28, 2006
Complete Analytical Work	April 28, 2006
Complete Data Validation and Statistical Analysis	May 4, 2006
Submit Certification Report	May 9, 2006[a]

[a]The date for submittal of the Certification Report is a commitment to EPA and OEPA. Other dates are internal target completion dates.

6.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

6.1 FIELD QUALITY CONTROL SAMPLES, ANALYTICAL REQUIREMENTS AND DATA VALIDATION

Per requirements of the SEP and Data Quality Objectives SL-052, Revision 3 (Appendix C), the field quality control, analytical and data validation requirements are as follows:

- Field QC requirements include one field duplicate for the CU, as noted in Section 2.3 and identified in Appendix B. The field duplicate sample will be analyzed for the same COCs as the other samples in the CU from which the field duplicate has been collected.

  Two rinsates will be collected under this PSP scope and analyzed for all COCs required for Area 6 and/or Area 7.

  A trip blank is required if VOC samples are being collected. The trip blanks will be analyzed for all of the VOC COCs. The frequency for a trip blank is one per day, or one per batch of 20 VOC samples collected, or one per cooler to be shipped, whichever is more frequent.

- All analyses will be performed at ASL D or E, where E meets the minimum detection level of 10 percent of the FRL and is above the SCQ ASL D detection level, but the analyses meet all other SCQ ASL D criteria. An ASL D data package will be provided for all of the data.

- All field data will be validated. A minimum of 10 percent of the laboratory data will be validated to VSL D with the remainder validated to VSL B. If any result is rejected during validation, the sample will be re-analyzed or the location will be re-sampled and analyzed. If necessary, this change will be documented in a V/FCN.

Once all data are validated as required, results will be entered into the SED and a statistical analysis will be performed to evaluate the pass/fail criteria for each CU. The statistical approach is discussed in Section 3.4.3 and Appendix G of the SEP.

If any sample collection or analytical methods are used that are not in accordance with the SCQ, the Project Manager and Characterization Manager must determine if the qualitative data from the samples will be beneficial to certification decision making. If the data will be beneficial, the Project Manager and Characterization Manager will ensure that:

- A variance will be written to document references confirming that the new method supports data needs,

- variations from the SCQ methodology are documented in a variance, or

- data validation of the affected samples is requested or qualifier codes of J (estimated) and R (rejected) be attached to detected and non-detected results, respectively.

6.2 PROJECT SPECIFIC PROCEDURES, MANUALS AND DOCUMENTS

Programs supporting this work are responsible for ensuring team members work to and are trained to applicable documents. Additionally, programs supporting this work are responsible for ensuring team members in their organizations are qualified and maintain qualification for site access requirements. The Project Manager will be responsible for ensuring any project-specific training required to perform work per this PSP is conducted.

To ensure consistency and data integrity, field activities in support of the PSP will follow the requirements and responsibilities outlined in the procedures and guidance documents referenced below.

- 20100-HS-0002, Soil and Disposal Facility Project Integrated Health and Safety Plan
- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ)
- ADM-02, Field Project Prerequisites
- EQT-06, Geoprobe® Model 5400 and Model 6600
- SMPL-01, Solids Sampling
- SMPL-21, Collection of Field Quality Control Samples
- 9501, Shipping Samples to Off-site Laboratories
- Trimble Pathfinder Pro-XL GPS Operation Manual

6.3 INDEPENDENT ASSESSMENT

An independent assessment may be performed by the Fernald Closure Project (FCP) QA/QC organization by conducting a surveillance, consisting of monitoring/observing on-going project activities and work areas to verify conformance to specified requirements. The surveillance will be planned and documented in accordance with Section 12.3 of the SCQ.

6.4 IMPLEMENTATION OF CHANGES

Before the implementation of changes, the Field Sampling Lead will be informed of the proposed changes. Once the Field Sampling Lead has obtained written or verbal approval (electronic mail is acceptable) from the Characterization Manager and QA/QC for the changes to the PSP, the changes may be implemented. Changes to the PSP will be noted in the applicable FALs and on a Variance/Field Change Notice (V/FCN). QA/QC must receive the completed V/FCN, which includes the signatures of the Characterization and Sampling Managers, Project Manager, and QA/QC within seven days of implementation of the change. The EPA and OEPA will be given a 15-day review period prior to implementing the change(s) for any V/FCNs identified as "significant" per project guidelines.

7.0 HEALTH AND SAFETY

Technicians will schedule a project walk down with Health and Safety (Radiological Control, Industrial Hygiene, and Safety) and any other groups that may be working in the same or an adjacent area before the start of the project. Any hazards identified during the project walkdown must be corrected/controlled prior to the start of work. Weekly walkdowns will be conducted throughout the course of the project in accordance with SPR 1-10, Safety Walk-Throughs. All work on this project will be performed according to applicable Environmental Monitoring procedures, the documents identified in Section 3.4, Fluor Fernald work permit, Radiological Work Permit, and other applicable permits as determined by project management. Concurrence with applicable safety permits is required by each technician in the performance of their assigned duties.

A job/safety briefing will be conducted before field activities begin each day. The project lead or designee will document the briefing on form FS-F-2955, Training Attendance Roster. Personnel will also be briefed on any health and safety documents (such as Travelers) that may apply to the project work scope. During the course of this project, no operating heavy-duty equipment within a 50-foot buffer zone will be permitted. Additional safety information can be found in 20100-HS-0002, Soil and Disposal Facility Project Integrated Health and Safety Plan. All personnel have stop-work authority for imminent safety hazards or other hazards resulting from noncompliance with the applicable safety and health practices.

Technicians will be provided with cellular phones for all sampling activities, and **all emergencies will be reported by dialing 911 and 484-2295**. Announcements for severe weather will be provided to select company issued cell phones and alphanumeric pagers. Pagers and cellular phones are provided to the Technicians by FCP, as needed. As soon as possible, field personnel are to contact their supervisor and Health and Safety Representative after any unplanned event or injury.

8.0 DISPOSITION OF WASTE

During sampling activities, field personnel may generate small amounts of soil, water, and contact waste. Excess soil generated during sample collection will be replaced in the borehole. Contact waste generation will be minimized by limiting contact with sample media, and by only using disposable materials that are necessary. Contact waste will be bagged and brought back to site for disposal in an uncontrolled area dumpster. Generation of decontamination waters will be minimized in the field. Decontamination water that is generated will be contained in a plastic bucket with a lid and returned to site for disposal. A wastewater discharge form must be completed for disposal. On-site decontamination of equipment will take place at a facility that discharges to the Converted Advanced Wastewater Treatment Facility, either directly or indirectly, through the storm water collection system.

Following analysis, any remaining soil and/or sample residuals will remain at the off-site laboratories for a specified period of time as defined in their contracts with Fluor Fernald. Prior authorization must be obtained from the Characterization Manager, or designee, to disposition samples collected under this PSP.

9.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed to satisfy data end use requirements after completion of field activities. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on a FAL, which should be sufficiently detailed for accurate reconstruction of the events without reliance on memory. Sample Collection Logs will be completed according to protocols specified in Appendix B of the SCQ and in applicable procedures. These forms will be maintained in loose-leaf form and uniquely numbered following the sampling event.

All field measurements, observations, and sample collection information associated with physical sample collection will be recorded, as applicable, on the Sample Collection Log, the FAL, and the Chain of Custody/Request for Analysis form. The PSP number will be on all documentation associated with these sampling activities.

Samples will be assigned a unique sample number as explained in Section 2.3 and listed in Appendix B. This unique sample identifier will appear on the Sample Collection Log and Chain of Custody/Request for Analysis form and will be used to identify the samples during analysis, data entry, and data management.

Technicians will review all field data for completeness and accuracy then forward the field data package to the Field Data Validation Contact for final QA/QC review. Sample Data Management personnel will enter analytical data into the SED. Analytical data that is designated for data validation will be forwarded to the Data Validation Group. The PSP requirements for analytical data validation are outlined in Section 4.1. The Data Management Lead will review analytical data when it is received from the off-site laboratories.

Following field and analytical data validation, the Sample Data Management organization will perform data entry into the SED. The original field data packages, original analytical data packages, and original documents generated during the validation process will be maintained as project records by the Sample Data Management organization. All real-time precertification scan data will be added to the SED and maintained in project files in hard copy form.

To ensure that correct coordinates and survey information are tied to the final sample locations in the database, the following process will take place. Upon surveying all locations identified in the PSP, the Surveying Manager will provide the Data Management Lead (i.e., Characterization) with an electronic file of all surveyed coordinates and surface elevations. The Sampling Manager will provide the Data Management Lead with a list of any locations that must be moved during penetration permitting or sample collection, and the Data Management Lead will update the electronic file with this information.

After sample collection is complete, the Data Management Lead will provide this electronic file to the Database Contact for uploading to SED.

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U.S. Nuclear Regulatory Commission, 2000, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG-1575, Revision 1, NRC, DOE, EPA, and U.S. Department of Defense, Washington, D.C.

APPENDIX A

EXAMPLE OF CONTAMINATION PLOTS

APPENDIX A
EXAMPLE OF CONTAMINATION PLOTS

Figure A-1
Surface Contamination Monitor - Wall/Ceiling Mode

Figure A-2
Surface Contamination Monitor - Floor Mode

APPENDIX A
EXAMPLE OF CONTAMINATION PLOTS

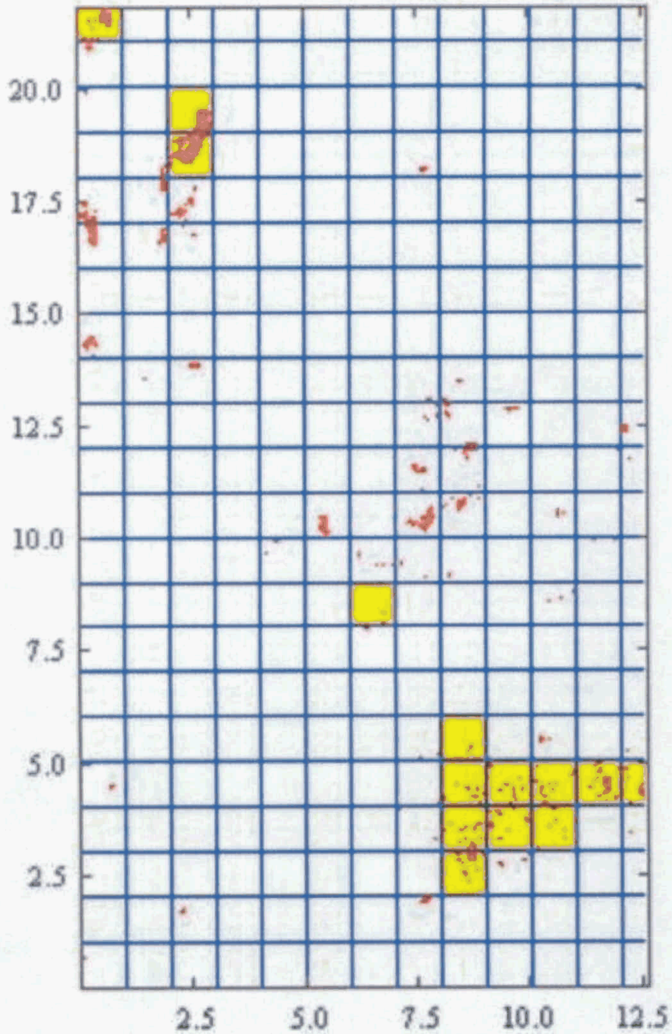

Figure A-3
Example of Alpha/Beta Contamination Distribution Plot (Range Not Specified). X and Y Axis are in Meters

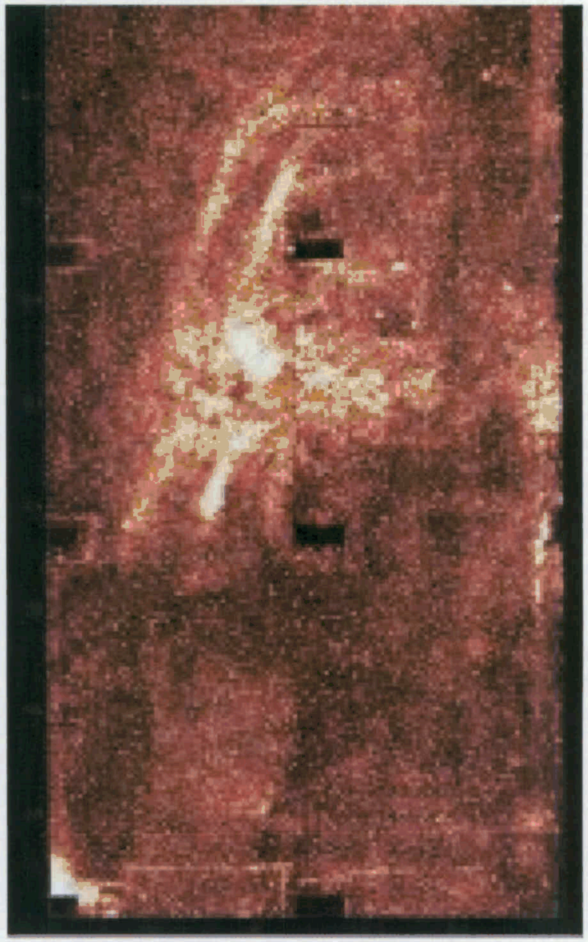

Figure A-4
Example of Alpha/Beta Contamination Distribution Plot (Lighter Color Indicates Higher Contamination) for a Floor Area

APPENDIX B

AREA 6 AND AREA 7 CONCRETE CERTIFICATION SAMPLE LOCATIONS AND IDENTIFIERS

APPENDIX B
AREA 6 AND AREA 7 CONCRETE CERTIFICATION SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth	Sample ID	TAL	North-83	East-83
1 (A6)	1-1	0"-1"	A6C-C01-1^RMP	A,C,F	482471.0	1349049.3
			A6C-C01-1^L	E	482471.0	1349049.3
	1-2	0"-1"	A6C-C01-2^RMP	A,C,F	482481.1	1349057.8
			A6C-C01-2^L	E	482481.1	1349057.8
	1-3	0"-1"	A6C-C01-3^RMP	A,C,F	482451.4	1349062.9
			A6C-C01-3^L	E	482451.4	1349062.9
	1-4	0"-1"	A6CS-C01-4^RMP	A,C,F	482457.5	1349078.8
			A6CS-C01-4^L	E	482457.5	1349078.8
	1-5	0"-1"	A6C-C01-5^RMP	A,C,F	482478.0	1349076.0
			A6C-C01-5^RMP-D	A,C,F	482478.0	1349076.0
		0"-1"	A6C-C01-5^L	E	482478.0	1349076.0
			A6C-C01-5^L-D	E	482478.0	1349076.0
	1-6	0"-1"	A6C-C01-6^RMP	A,C,F	482497.6	1349098.1
			A6C-C01-6^L	E	482497.6	1349098.1
	1-7	0"-1"	A6C-C01-7^RMP	A,C,F	482464.5	1349098.2
			A6C-C01-7^L	E	482464.5	1349098.2
	1-8	0"-1"	A6C-C01-8^RMP	A,C,F	482466.9	1349113.3
			A6C-C01-8^L	E	482466.9	1349113.3
	1-9	0"-1"	A6C-C01-9^RMP	A,C,F	482498.2	1349109.4
			A6C-C01-9^L	E	482498.2	1349109.4
	1-10	0"-1"	A6C-C01-10^RMP	A,C,F	482499.2	1349125.9
			A6C-C01-10^L	E	482499.2	1349125.9
	1-11	0"-1"	A6C-C01-11^RMP	A,C,F	482477.0	1349123.8
			A6C-C01-11^L	E	482477.0	1349123.8
	1-12	0"-1"	A6C-C01-12^RMP	A,C,F	482484.0	1349132.9
			A6C-C01-12^L	E	482484.0	1349132.9
	1-13	0"-1"	A6C-C01-13^RMP	A,C,F	482499.8	1349140.2
			A6C-C01-13^L	E	482499.8	1349140.2
	1-14	0"-1"	A6C-C01-14^RMP	A,C,F	482488.8	1349149.0
			A6C-C01-14^L	E	482488.8	1349149.0
	1-15	0"-1"	A6C-C01-15^RMP	A,C,F	482485.9	1349116.5
			A6C-C01-15^L	E	482485.9	1349116.5
	1-16	0"-1"	A6C-C01-16^RMP	A,C,F	482465.4	1349070.5
			A6C-C01-16^L	E	482465.4	1349070.5
	1-17	0"-1"	A6C-C01-17^RMP	A,C,F	482478.5	1349095.8
			A6C-C01-17^L	E	482478.5	1349095.8

APPENDIX B
AREA 6 AND AREA 7 CONCRETE CERTIFICATION SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth	Sample ID	TAL	North-83	East-83
1 (A7)	1-1	0"-1"	A7C-TS-C01-1^RMP	B,D,G	480636.3	1347237.6
	1-2	0"-1"	A7C-TS-C01-2^RMP	B,D,G	480633.3	1347254.7
	1-3	0"-1"	A7C-TS-C01-3^RMP	B,D,G	480627.0	1347231.7
	1-4	0"-1"	A7C-TS-C01-4^RMP	B,D,G	480625.6	1347249.0
	1-5	0"-1"	A7C-TS-C01-5^RMP	B,D,G	480614.8	1347233.2
	1-6	0"-1"	A7C-TS-C01-6^RMP	B,D,G	480616.2	1347251.0
	1-7	0"-1"	A7C-TS-C01-7^RMP	B,D,G	480602.8	1347231.9
	1-8	0"-1"	A7C-TS-C01-8^RMP	B,D,G	480605.0	1347246.2
	1-9	0"-1"	A7C-TS-C01-9^RMP	B,D,G	480591.6	1347234.2
	1-10	0"-1"	A7C-TS-C01-10^RMP	B,D,G	480593.8	1347250.3
	1-11	0"-1"	A7C-TS-C01-11^RMP	B,D,G	480577.9	1347239.5
	1-12	0"-1"	A7C-TS-C01-12^RMP	B,D,G	480581.8	1347249.0
			A7C-TS-C01-12^RMP-D	B,D,G	480581.8	1347249.0
	1-13	0"-1"	A7C-TS-C01-13^RMP	B,D,G	480568.4	1347231.7
	1-14	0"-1"	A7C-TS-C01-14^RMP	B,D,G	480567.4	1347245.9
	1-15	0"-1"	A7C-TS-C01-15^RMP	B,D,G	480558.4	1347230.6
	1-16	0"-1"	A7C-TS-C01-16^RMP	B,D,G	480559.1	1347249.2
	1-17	0"-1"	A7C-TS-C01-17^RMP	B,D,G	480596.7	1347237.1
2 (A7)	2-1	0"-1"	A7C-TP-C02-1^RMP	B,D,G	479141.6	1347856.3
	2-2	0"-1"	A7C-TP-C02-2^RMP	B,D,G	478972.8	1347852.7
	2-3	0"-1"	A7C-TP-C02-3^RMP	B,D,G	479112.6	1347946.0
	2-4	0"-1"	A7C-TP-C02-4^RMP	B,D,G	479021.0	1347946.9
	2-5	0"-1"	A7C-TP-C02-5^RMP	B,D,G	478874.7	1347939.3
	2-6	0"-1"	A7C-TP-C02-6^RMP	B,D,G	479148.7	1348042.0
	2-7	0"-1"	A7C-TP-C02-7^RMP	B,D,G	479052.7	1348035.7
			A7C-TP-C02-7^RMP-D	B,D,G	479052.7	1348035.7
	2-8	0"-1"	A7C-TP-C02-8^RMP	B,D,G	478934.4	1348036.6
	2-9	0"-1"	A7C-TP-C02-9^RMP	B,D,G	478869.9	1348029.5
	2-10	0"-1"	A7C-TP-C02-10^RMP	B,D,G	479134.3	1348130.1
	2-11	0"-1"	A7C-TP-C02-11^RMP	B,D,G	479013.8	1348130.5
	2-12	0"-1"	A7C-TP-C02-12^RMP	B,D,G	478955.1	1348125.2
	2-13	0"-1"	A7C-TP-C02-13^RMP	B,D,G	478824.8	1348123.9
	2-14	0"-1"	A7C-TP-C02-14^RMP	B,D,G	479131.6	1348222.5
	2-15	0"-1"	A7C-TP-C02-15^RMP	B,D,G	478974.6	1348221.1
	2-16	0"-1"	A7C-TP-C02-16^RMP	B,D,G	478893.6	1348215.8

APPENDIX B

AREA 6 AND AREA 7 CONCRETE CERTIFICATION SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth	Sample ID	TAL	North-83	East-83
3 (A7)	3-1	0"-1"	A7C-VP-C03-1^RMP	B,D,G	480585.8	1347380.4
	3-2	0"-1"	A7C-VP-C03-2^RMP	B,D,G	480584.7	1347391.3
	3-3	0"-1"	A7C-VP-C03-3^RMP	B,D,G	480566.9	1347370.1
	3-4	0"-1"	A7C-VP-C03-4^RMP	B,D,G	480572.8	1347386.0
	3-5	0"-1"	A7C-VP-C03-5^RMP	B,D,G	480577.3	1347399.0
	3-6	0"-1"	A7C-VP-C03-6^RMP	B,D,G	480582.8	1347413.2
	3-7	0"-1"	A7C-VP-C03-7^RMP	B,D,G	480563.0	1347404.8
	3-8	0"-1"	A7C-VP-C03-8^RMP	B,D,G	480562.5	1347422.5
	3-9	0"-1"	A7C-VP-C03-9^RMP	B,D,G	480554.5	1347373.8
	3-10	0"-1"	A7C-VP-C03-10^RMP	B,D,G	480555.5	1347387.0
			A7C-VP-C03-10^RMP-D	B,D,G	480555.5	1347387.0
	3-11	0"-1"	A7C-VP-C03-11^RMP	B,D,G	480541.4	1347374.6
	3-12	0"-1"	A7C-VP-C03-12^RMP	B,D,G	480536.1	1347394.7
	3-13	0"-1"	A7C-VP-C03-13^RMP	B,D,G	480554.1	1347399.3
	3-14	0"-1"	A7C-VP-C03-14^RMP	B,D,G	480544.4	1347413.8
	3-15	0"-1"	A7C-VP-C03-15^RMP	B,D,G	480530.6	1347402.7
	3-16	0"-1"	A7C-VP-C03-16^RMP	B,D,G	480537.2	1347419.7
	3-17	0"-1"	A7C-VP-C03-17^RMP	B,D,G	480566.9	1347392.2

APPENDIX C

DATA QUALITY OBJECTIVES SL-052, REV. 3

Control Number ___________

Fernald Environmental Management Project

Data Quality Objectives

Title: Sitewide Certification Sampling and Analysis

Number: SL-052

Revision: 3

Effective Date: March 13, 2000

Contact Name: Mike Rolfes

Approval: ______________________ Date: 3/13/00
James Chambers
DQO Coordinator

Approval: ______________________ Date: 3/13/00
J.D. Chiou
SCEP Project Director

Rev. #	0	1	2	3			
Effective Date:	4/28/99	6/10/99	2/3/00	3/13/00			

DATA QUALITY OBJECTIVES
Sitewide Certification Sampling and Analysis

Members of Data Quality Objectives (DQO) Scoping Team

The members of the scoping team included individuals with expertise in QA, analytical methods, field sampling, statistics, laboratory analytical methods and data management.

Conceptual Model of the Site

Soil sampling was conducted at the Fernald Environmental Management Project (FEMP) during the Operable Unit 5 (OU5) Remedial Investigation/Feasibility Study (RI/FS). Final Remediation Levels (FRLs) for constituents of concern (COCs), along with the extent of soil contaminated above the FRLs, were identified in the OU5 Record of Decision (ROD). Actual soil remediation activities now fall under the guidance of the final Sitewide Excavation Plan (SEP).

As outlined in the SEP, the FEMP has been divided into individual Remediation Areas (or phased areas within a Remediation Area) to sequentially carry out soil remedial activities. Under the strategy identified in the SEP, pre-design investigations are first conducted to better define the limits of soil excavation requirements. Following any necessary excavation, pre-certification real-time scanning activities are conducted to evaluate residual patterns of soil contamination. Pre-certification scan data should provide a level of assurance that the FRLs will be achieved. When pre-certification data indicate that remediation goals are likely to be met, they are used to define certification units (CUs) within the Remediation Area of interest. Table 2-9 of the final SEP identifies a list of area-specific COCs (ASCOCs) for each Remediation Area at the FEMP. Based on existing data and production knowledge, a subset of these ASCOCs are conservatively identified within each CU as potentially present in the CU. This suite of CU-specific COCs is the subset of the ASCOCs to be evaluated against the FRLs within that CU. At a minimum, the five primary radiological COCs (total uranium, radium-226, radium-228, thorium-228, thorium-232) will be retained as CU-specific COCs for certification of each CU.

Delineation and justification for the final CU boundaries, along with each corresponding suite of CU-specific ASCOCs is documented in a Certification Design Letter. Upon approval of the Certification Design Letter by the EPA, certification activities can begin. Section 3.4 of the final SEP presents the general certification strategy.

1.0 Statement of Problem

FEMP soil and potentially impacted adjacent off-property soil must be certified on a CU by CU basis for compliance with the FRLs of all CU-specific ASCOCs. The appropriate sampling, analytical and information management criteria must be developed to provide the required qualified data necessary to demonstrate attainment of certification statistical criteria. For every area undergoing certification, a sampling plan must be in place that will direct soil samples to be collected which are representative of the CU-specific COC concentrations within the framework of the certification approach identified in the final SEP. The appropriate analytical methodologies must be selected to provide the required data.

Exposure to Soil
The cleanup standards, or FRLs, were developed for a final site land use as an undeveloped park. Under this exposure scenario, receptors could be directly exposed to contaminated soil through dermal contact, external radiation, incidental ingestion, and/or inhalation of fugitive dust while visiting the park. Exposure to contaminated soil by the modeled receptor is expected to occur at random locations within the boundaries of the FEMP and would not be limited to any single area. Some soil FRLs were developed based on the modeled cross-media impact potential of soil contamination to the underlying aquifer. In these instances, potential exposure to contaminants would be indirect through the groundwater pathway, and not directly linked to soil exposure. Off-site soil FRLs were established at more conservative levels than the on-property soil FRLs, based on an agricultural receptor. Benchmark Toxicity Values (BTVs) are also being considered in the cleanup process by assessing habitat impact of individual BTVs under post-remedial conditions.

Available Resources
Time: Certification sampling will be accomplished by the field sampling team prior to interim or final regrading or release of soil for construction activities. The certification sampling schedule must allow sufficient time, in the event additional remediation is required, to demonstrate certification of FRLs prior to permanent construction or regrading. Certification sampling will have to be completed and analytical results validated and statistical analysis completed prior to submission of a Certification Report to the regulatory agencies.

Project Constraints: Certification sampling and analytical testing must be performed with existing manpower, materials and equipment to support the certification effort. Remediation areas are prioritized for certification sampling and analysis according to the date required for initiation of sequential construction activities in those areas. Fluor Daniel Fernald (FDF) and DOE must demonstrate post-remedial compliance with the CU-specific COC FRLs to release the designated Remediation Area for planned interim grading, eventual restoration under the Natural Resources Restoration Plan (NRRP), and other final land use activities.

2.0 Identify the Decision

Decision

Demonstrate within each CU if all CU-specific COCs pass the certification criteria. These criteria are as follows: 1) The average concentration of each CU-specific COC is below the FRL and within the agreed upon confidence limits (95% for primary ASCOCs and 90% for secondary ASCOCs); and 2) the hot-spot criteria, that no result for any CU-specific COC is more than two times the associated soil FRL. The certification criteria are discussed in greater detail in Section 3.4.4 of the final SEP.

Possible Results

1. The average concentration of each CU-specific COC is demonstrated to be below the FRLs within the confidence level, with no single result for any CU-specific COC greater than two times the associated FRL. The CU can then be certified as attaining remediation goals.

2. The average concentration of at least one CU-specific COC is demonstrated to be above the FRL at the given confidence level. The CU will fail certification and require additional remedial action, per Section 3.4.5 of the final SEP.

3. If a result(s) of one or more CU-specific COC is demonstrated to be at or above two times the FRL, the CU will fail certification. The CU will fail certification and require additional remedial action per Section 3.4.5 of the final SEP. A combination of results 2 and 3 also constitutes certification failure.

3.0 Inputs That Affect the Decision

Required Information

Certification data will be obtained through physical soil sampling. Based on the certification analytical results, the average concentrations of each CU-specific COC with specified confidence levels will be calculated using the statistical methods identified in Appendix G of the final SEP.

Source of Information

Per the SEP, analysis of certification samples for each CU-specific COC will be conducted at analytical support level (ASL) D in accordance with methods and QA/QC standards in the FEMP Sitewide CERCLA Quality Assurance Project Plan [SCQ].

Contaminant-Specific Action Levels
The cleanup levels are the soil FRLs published in the OU5 and OU2 RODs. BTVs being considered in the remediation process are discussed for consideration during certification in Appendix C of the NRRP.

Methods of Sampling and Analysis
Physical soil samples will be collected in accordance with the applicable site sampling procedures. Per the SEP, laboratory analysis will be conducted at ASL D using QA/QC protocols specified in the SCQ. Full raw data deliverables will be required from the laboratory to allow for appropriate data validation. For FEMP-approved on- and off-site laboratories, the analytical method used will meet the required precision, accuracy and detection capabilities necessary to achieve FRL analyte ranges.

4.0 The Boundaries of the Situation

Spatial Boundaries
Domain of the Decision: The boundaries of this certification DQO extend to all surface, stockpile and fill soil in areas that are undergoing certification as part of FEMP remediation.

Population of Soil: Soil includes all excavated surfaces, undisturbed relatively unimpacted native soil, and sub-surface intervals (stockpile or fill areas only) in areas undergoing certification sampling and analysis.

Scale of Decision Making
Based on considerations of the final certification units and the COC evaluation process, the CU-specific COCs are determined. The area undergoing certification will be evaluated on a CU basis, based on physical sample results, as to whether it has passed or failed the criteria for attainment of certification (final SEP Section 3.4.4).

Temporal Boundaries
Time frame: Certification sampling must be performed in time to sequentially release certified areas for scheduled interim grading, restoration, and other final land use activities. Certification sampling data received from the laboratory will be validated and statistically evaluated. Certification results and findings will be documented in Certification Reports, which must be submitted to and approved by the regulatory agencies prior to release of the areas for scheduled interim grading, restoration, and other final land use activities.

Practical Considerations: Some areas undergoing remediation will not be accessible for certification sampling until decontamination/demolition and remedial excavation activities are complete. Other areas, such as wood lots, that are relatively uncontaminated and not planned for excavation, may require preparation, such as cutting of grass or removal of undergrowth prior to certification sampling, thus requiring coordination with FEMP Maintenance personnel.

5.0 Decision Rule

Successful certification of soil within the boundaries of a certification unit (CU) demonstrates that the certified soil (surface or subsurface) has concentrations of CU-specific COC(s) that meet the established criteria for attainment of Certification.

Parameters of Interest
The parameters of interest are the individual and average surface soil concentrations of CU-specific COCs and confidence limits on the calculated average within a CU. OU2 and OU5 ROD identify all applicable soil FRLs. The SEP identifies the ASCOCs, a subset of which will be used to establish CU-specific COCs within each Remediation Area undergoing certification sampling and analysis.

Action Levels
The applicable action levels are the on- and off-property soil FRLs published in the OU5 or OU2 ROD for each ASCOC.

Decision Rules
If the average concentration for each CU-specific COC is demonstrated to be below the FRLs within the agreed upon confidence level (95% for primary COCs; 90% for secondary COCs), and no analytical result exceeds two times the soil FRL, then the CU can be certified as complying with the cleanup criteria. If a CU does not meet the FRLs within the agreed upon confidence level for one or more CU-specific COCs, or one or more analytical results for one or more CU-specific COCs is greater than two times the associated soil FRL, then the CU fails certification and requires further assessment as per the SEP.

6.0 Limits on Decision Errors

Types of Decision Errors and Consequences

Definition
Decision Error 1: This decision error occurs when the decision maker decides that a CU has met the certification criteria, when in reality, the certification criteria have not been met. This situation could result in an increased risk to human health and the environment. In addition, this type of error could result in regulatory fees and penalties.

Decision Error 2: This decision error occurs when the decision maker decides a CU does not met the certification criteria, when actually, the certification criteria have been met. This error would result in unnecessary added costs due to the excavation of soil containing COC concentrations below their FRLs, and an increased volume of soil assigned to the OSDF. In addition, unnecessary delays in the remediation schedule may result.

True State of Nature for the Decision Errors
The true state of nature for Decision Error 1 is that the certification criteria are not met (average CU-specific COC concentrations not below the FRL within the specified confidence limits; or a single sample result above two times the FRL). The true state of nature for Decision Error 2 is that certification criteria are met (average CU-specific COC concentrations are below the FRL within the specified confidence limits, and no result is above two times the FRL). Decision Error 1 is the more severe error due to the potential threat this poses to human health and the environment.

Null Hypothesis
H_0: The average concentration of at least one CU-specific COC within a CU is equal to or greater than the associated FRL.

H_1: The average concentration of all CU-specific COCs within a CU is less than the action levels.

False Positive and False Negative Errors
A false positive is Decision Error 1: less than or equal to five percent ($p=.05$) is considered the acceptable decision error in determination of compliance with FRLs for primary ASCOCs, while ten percent ($p=.10$) is acceptable for secondary ASCOCs.

A false negative is Decision Error 2: less than or equal to 20 percent is considered the acceptable decision error. This decision error is controlled through the determination of sample sizes (see Section G.1.4.1 of the final SEP).

7.0 Design for Obtaining Quality Data

Section 3.4.2 of the final SEP presents the specifics of the certification sampling design. The following text describes the general certification sampling design.

Soil Sample Locations
In order to select certification sampling locations, each CU is divided into 16 approximately equal sub-CUs. Certification sample locations are then generated by randomly selecting an easting and northing coordinate within the boundaries of each cell. Additional alternative sample locations are also generated in case the original random sample location fails the minimum distance criterion. The minimum distance criterion is defined as the minimum distance allowed between random sample locations in order to eliminate the chance of random sample points clustering within a small area. This clustering would tend to over emphasize a small area and, conversely, under represent a large area in certification determination. By not allowing sample locations to be too closely arranged, the sample locations are spread out and provide a more uniform coverage, thus reducing the possibility of large unsampled areas. The equation for determining minimum distance criterion is presented in Section 3.4.2.1 of the SEP.

In the event that the original random sample location failed the minimum distance criterion, the first alternate location was selected and all the locations were retested. This process continued until all 16 random locations passed the minimum distance criteria.

Each CU is also divided into four quadrants, each of which contains 4 sub-CUs and 4 sample locations. Three of the four locations per quadrant (12 per CU) are then selected for sample collection and analysis. The other one per quadrant (4 per CU) are designated as "archives", and samples will not be collected and analyzed unless need arises due to analytical or validation problems warrant. Per Section 3.4.2 of the SEP, as few as 8 samples may be collected from Group 2 CUs for analysis of secondary COCs.

Physical Samples
Physical soil certification samples will be collected from the surface according to SMPL-01 at locations identified in the PSP (generally 12 of the 16 locations per CU).

If stockpiled soil is to be certified, two CUs will be established, on for the stockpile and one for the underlying soil (i.e., the "footprint"). To certify the stockpile, samples will be collected from predetermined random intervals from within the stockpiled soil at each certification sampling location identified in the PSP. To certify the footprint, the first 6-inches of native soil present at each sampling location will also be collected for certification. If fill soil is to be certified, the strategy (surface or sampling at depth) will be based on results from the precertification scan of the fill area(s), as discussed in the Certification Design Letter and the certification PSP.

Laboratory Analysis

As defined in the PSP, a minimum of 8 to 12 samples per CU will be submitted to the on-site laboratory or a FDF approved off-site laboratory for analysis. All certification analyses will meet ASL D requirements per the SCQ except for the HAMDC. Samples will be analyzed for all CU-specific ASCOCs, with minimum detection levels set according to the SCQ and applicable project guidelines.

Validation

All field data will be validated. Also, a minimum of 10 percent of the analytical data from each laboratory will be subject to analytical validation to ASL D requirements in the SCQ, and will require an ASL D package. The remaining analytical data will be validated to a minimum of ASL B, and will require an ASL B package.

8.0 Use of Data to Test Null Hypothesis

Appendix G of the final SEP discusses in detail, the statistical evaluations of certification data used to determine attainment of certification criteria.

Data Quality Objectives
Sitewide Certification Sampling and Analysis

1A. Task Description:

1B. Project Phase: (Put an X in the appropriate selection.)

RI☐ FS☐ RD☐ RA☒ RvA☐ Other (specify) ____________________

1C. DQO No.: SL-052, Rev. 2 DQO Reference No.: ______________

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2. Media Characterization: (Put an X in the appropriate selection.)

Air☐ Biological☐ Groundwater☐ Sediment☒ Soil☒
Waste☐ Wastewater☐ Surface Water☐ Other (specify) ______________

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3. Data Use with Ananlytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable data use)

Site Characterization
A☐ B☐ C☐ D☐ E☐
Evaluation of Alternatives
A☐ B☐ C☐ D☐ E☐
Monitoring During Remediation
A☐ B☐ C☐ D☐ E☐

Risk Assessment
A☐ B☐ C☐ D☐ E☐
Engineering Design
A☐ B☐ C☐ D☐ E☐
Other
A☐ B☐ C☐ D☒ E☐

4A. Drivers: Remediation Area Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and Operable Unit 2 and Operable Unit 5 Records of Decision (ROD), Sitewide Excavation Plan (SEP).

4B. Objective: Confirmation that remediation areas at the FEMP, or adjacent off-property areas, have met certification criteria on a CU by CU basis.

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5. Site Information (Description):

The OU2 and OU5 RODs have identified areas at the FEMP that require soil remediation activities. The RODs specify that the soil in these areas will be demonstrated to be below the FRLs. Certification is necessary for all FEMP soil and some adjacent off-property soil to demonstrate that the residual soil does not contain COC contamination exceeding the FRL at a specified confidence level.

6A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH	☐	2. Uranium	☒ *	3. BTX	☐
Temperature	☐	Full Radiological	☒ *	TPH	☐
Specific Conductance	☐	Metals	☒ *	Oil/Grease	☐
Dissolved Oxygen	☐	Cyanide	☐		
Technetium-99	☒ *	Silica	☐		
4. Cations	☐	5. VOA	☒ *	6. Other (specify)	
Anions	☐	BNA	☐		
TOC	☐	PEST	☒ *		
TCLP	☐	PCB	☒ *		
CEC	☐	COD	☐		

* As identified in the area certification PSP

6.B. Equipment Selection and SCQ Reference:

Equipment Selection	Refer to SCQ Section
ASL A ______	SCQ Section ______
ASL B ______	SCQ Section ______
ASL C ______	SCQ Section ______
ASL D Per SCQ and PSP	SCQ Section Appendix G, Tbls. 1&3
ASL E Per PSP	SCQ Section Appendix H (final)

7A. Sampling Methods: (Put an X in the appropriate selection.)

Biased☐ Composite☐ Grab☒ Environmental☐ Grid☐
Intrusive☒ Non-Intrusive☐ Phased☐ Source☐ Random☒ *
*Systematic random samples, selected one per cell and meeting the minimum distance criterion

7B. Sample Work Plan Reference: Project Specific Plan for the associated Remediation area Remedial Action Work Plan

Background samples: OU5 RI

7C. Sample Collection Reference: Associated PSP(s), SMPL-01

8. Quality Control Samples: (Put an X in the appropriate selection.)

8A. Field Quality Control Samples:

Trip Blanks	☒[1]	Container Blanks	☒
Field Blanks	☒[2]	Duplicate Samples	☒
Equipment Rinsate Blanks	☒	Split Samples	☒[3]
Preservative Blanks	☐	Performance Evaluation Samples	☐
Other (specify) ____________			

1) Collected for volatile organic sampling
2) As noted in the PSP
3) Split samples will be taken where required by the EPA

8B. Laboratory Quality Control Samples:

Method Blank	☒	Matrix Duplicate/Replicate	☒
Matrix Spike	☒	Surrogate Spikes	☒
Tracer Spike	☒	Other (specify) ____________	

9. Other: Please identify any other germane information that may impact the data quality or gathering of this particular objective, task, or data use.

Sample density will be dependent upon the CU size (Group 1 [250'x250'] or Group 2 [500'x500']), as determined by historical and pre-certification scan data.