CERTIFICATION REPORT
FOR AREA 6 SITEWIDE RAIL LINE SYSTEM

FERNALD CLOSURE PROJECT
FERNALD, OHIO

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U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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TABLE OF CONTENTS

List of Appendices ii
List of Figures ii
List of Tables ii
List of Acronyms and Abbreviations iii

Executive Summary ES-1

1.0 Introduction 1-1
- 1.1 Purpose 1-1
- 1.2 Background 1-1
- 1.3 Scope and Area Description 1-1
- 1.4 Objectives 1-2
- 1.5 Report Format 1-2
- 1.6 FCP Master Certification Map 1-2

2.0 Certification Approach 2-1
- 2.1 Area-Specific Constituents of Concern 2-1
  - 2.1.1 ASCOC Selection Criteria 2-1
  - 2.1.2 ASCOC Selection Process 2-1
- 2.2 Certification Approach 2-2
  - 2.2.1 Soil Sampling 2-2
  - 2.2.2 Ballast Samples 2-3
- 2.3 Statistical Analysis 2-4

3.0 Overview of Field Activities 3-1
- 3.1 Area Preparation and Precertification 3-1
- 3.2 Changes to Scope of Work 3-2

4.0 Analytical Methodologies, Data Validation Processes, and Data Reduction 4-1
- 4.1 Analytical Methodologies 4-1
  - 4.1.1 Chemical Methods 4-1
  - 4.1.2 Radiochemical Methods 4-1
- 4.2 Data Verification and Validation 4-3
- 4.3 Data Reduction 4-5

5.0 Certification Evaluation and Conclusions 5-1
- 5.1 Certification Results and Evaluation 5-1
- 5.2 Risk Evaluations for Soil Under the Rail Trestle 5-4
- 5.3 Former Sitewide Rail Line System Area Certification Conclusions 5-12

TABLE OF CONTENTS (CONT.)

References R-1

LIST OF APPENDICES

Appendix A Soil Precertification Samples, Analytical Results and Final Statistics Tables
Appendix B Ballast Precertification Samples, Analytical Results and Final Statistics Tables
Appendix C Correction of 7-Day Radium-226 Results
Appendix D Variances Associated with the Site wide Rail Line System Certification Effort
Appendix E Risk Assessment Calculations
E.1 Groundskeeper/Sampler
E.2 Undeveloped Park User

LIST OF TABLES

Table 2-1 ASCOC List for Remediation Areas 1, 6, 7, and 8
Table 2-2 Final ASCOC List for the Sitewide Rail Line System
Table 5-1 Exposure Parameters for the Undeveloped Park User
Table 5-2 Exposure Parameters for the Groundskeeper/Sampler
Table 5-3 Summary of Risk to Receptors Under the Rail Trestle

LIST OF FIGURES

Figure 1-1 Sitewide Rail Line System Location Map
Figure 1-2 FCP Controlled Certification Map
Figure 2-1 Sitewide Rail Line System Certification Area Boundaries (CUs 1-9)
Figure 2-2 Sitewide Rail Line System Certification Area Boundaries (CUs 10-16)
Figure 2-3 Certification Sampling Locations (CUs 1-3)
Figure 2-4 Certification Sampling Locations (CUs 4 and 5)
Figure 2-5 Certification Sampling Locations (CUs 6 and 7)
Figure 2-6 Certification Sampling Locations (CU 8)
Figure 2-7 Certification Sampling Locations (CU 9)
Figure 2-8 Certification Sampling Locations (CU 10)
Figure 2-9 Certification Sampling Locations (CUs 11 and 12)
Figure 2-10 Certification Sampling Locations (CUs 13 and 14)
Figure 2-11 Certification Sampling Locations (CUs 15 and 16)
Figure 2-12 Certification Sample Locations Under Rail Trestle (CU A6-UT)
Figure 2-13 Ballast Certification Sample Locations West of Paddys Run
Figure 2-14 Ballast Certification Sample Locations East of Paddys Run
Figure 2-15 Ballast Assessment Sample Locations in Railyard

LIST OF ACRONYMS AND ABBREVIATIONS

ASCOC	area-specific constituent of concern
ASL	analytical support level
CDL	Certification Design Letter
COC	constituent of concern
CRDL	contract required detection limit
CU	certification unit
DOE	U.S. Department of Energy
ECOC	ecological constituent of concern
EPA	U.S. Environmental Protection Agency
FCP	Fernald Closure Project
FRL	final remediation level
FS	Feasibility Study
FTF	Fire Training Facility
MDL	minimum detectable level
mg/kg	milligrams per kilogram
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
PAHs	polyaromatic hydrocarbons
pCi/g	picoCuries per gram
PSP	Project Specific Plan
RI/FS	Remedial Investigation/Feasibility Study
RLS	Rail Line System
ROD	Record of Decision
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
UCL	Upper Confidence Limit
V/FCN	Variance/Field Change Notice
VSL	validation support level
WAC	waste acceptance criteria

EXECUTIVE SUMMARY

This Certification Report presents the information and data used by the U.S. Department of Energy (DOE) to determine that soils and areas of old ballast underneath the railroad track in the Area 6 Sitewide Rail Line System meet established final remediation levels (FRLs). This Certification Report includes details of the certification sampling, analysis, validation, and statistical analysis that took place in the Sitewide Rail Line System. Figure 1-1 depicts the layout and location of the area covered by this document.

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

This document discusses certification of the 20 CUs created for this area. The Area 6 Sitewide Rail Line System Area was made up of sixteen (16) group 1 CUs. CUs RLS-C01 through RLS-C05 were areas that required a stratified certification effort due to the presence of fill at some locations. Those areas where fill was sampled were treated collectively as 1 CU. CU delineation for these 17 CUs is described in the CDL for the Area 6 Sitewide Rail Line System (DOE 2006) and Variance/Field Change Notice (V/FCN) 200600-PSP-0016-48 written to the Project Specific Plan for Excavation Control of Area 6 – Waste Pits and General Area (Supplement to 20300-PSP-0011, DOE 2005). Additionally, two CUs were created from samples collected of ballast located under the railroad tracks to demonstrate that the ballast was not a source of site related contamination. These sampling activities are discussed in the CDL for the Area 6 Sitewide Rail Line System (DOE 2006) as well as V/FCNs 20600-PSP-0016-101, 20600-PSP-0016-107, and 20600-PSP-0016-109 written to the Project Specific Plan for Excavation Control of Area 6 – Waste Pits and General Area (Supplement to 20300-PSP-0011, DOE 2005). Finally, one CU was constructed from sampling activities associated with the soil under the trestle spanning Paddys Run Creek. This sampling event is described in the CDL for the Area 6 Sitewide Rail Line System (DOE 2006) and V/FCN 200600-PSP-0016-110 written to the Project Specific Plan for Excavation Control of Area 6 – Waste Pits and General Area (Supplement to 20300-PSP-0011, DOE 2005).

Although it followed the general approach outlined in Section 3.4 of the Sitewide Excavation Plan (SEP, DOE 1998), this certification effort differed in that it was of both the soil as well as the old ballast located underneath the rail line and it relied on previously collected precertification data. Initially, all soil and ballast sampling done under the above-mentioned V/FCNs were designated as precertification samples utilizing the certification design criteria from the SEP. Upon review, the results were considered to be on the whole consistent with certification requirements.

The Area 6 Sitewide Rail Line System certification units (CUs) were sampled and statistical analysis

conducted as necessary to ensure certification criteria were met for all 20 CUs. These criteria state that: 1) the mean concentration or activities of the primary area-specific constituents of concern (ASCOCs) within a CU must be less than the final remediation levels (FRLs) at the 95 percent upper confidence level (UCL) or the 90 percent UCL for the secondary ASCOCs; and 2) no certification result can exceed two times the FRL (i.e., the hotspot criterion). If either of these criteria is not met, then further investigation and possible excavation is required. If both of these criteria are met for a CU, then it can be released to restoration for development of the final land use.

The Area 6 Sitewide Rail Line System underwent the certification process in the fall of 2006. All samples related to this effort were collected in 2006 and analyzed at an off-site laboratory that is on the FCP Approved Laboratories List, per the Sitewide Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ, DOE 2003). The data were subjected to the required validation and verification process.

After the initial certification samples were collected, analyzed, and validated, the CU for under the rail trestle failed the statistical and/or hotspot criteria for certain PAHs. A risk assessment was performed on this area to evaluate any residual impact due to this condition. This is discussed in Section 5 of this document.

On the basis of this reported information and supporting project files, DOE has determined that no additional remedial actions are required in this portion of the site. The area will be considered certified when the U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency concur that certification criteria have been met.

1.0 INTRODUCTION

1.1 PURPOSE

This Certification Report presents the information and data used by the U.S. Department of Energy (DOE) to determine that soil and areas of old ballast under the Sitewide Rail Line System meet established final remediation levels (FRLs). On the basis of this reported information and supporting project files, DOE has determined that no additional remedial actions are required in this portion of the site.

1.2 BACKGROUND

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

In the OU5 Remedial Action Work Plan (RAWP, DOE 1996b), DOE agreed to prepare a Sitewide Excavation Plan (SEP, DOE 1998) that defined the overall approach to cleaning up soil and at- and below-grade debris in accordance with the OU2 ROD (DOE 1995b), OU3 ROD (DOE 1996c), and OU5 ROD. In the SEP, the FCP was divided into distinct remedial areas and phases for soil remediation, based on the operable units' remediation schedule. After all necessary remediation is completed within each area/phase, the soil is certified as having attained all clean up goals (i.e., FRLs). No excavations were required of the soil under the Sitewide Rail Line System.

1.3 SCOPE AND AREA DESCRIPTION

The scope of this Certification Report includes details of certification sampling, analysis and validation that took place in the Sitewide Rail Line System. The Sitewide Rail Line System is approximately 17.6 acres, and includes both the soil and areas of old ballast underneath the railroad track as well as the soil underneath the rail trestle. The Sitewide Rail Line System is comprised of the Operable Unit (OU) 1 Railyard, which is situated in the northeast portion of Area 6, and the rail lines located in Area 6 and Area 7. A small portion of the rail line that leads to and from the FCP is located in the northern portion of the Area 6 Triangle Area, located just west of Paddys Run Road. Figure 1-1 depicts the layout of the Sitewide Rail Line System.

1.4 OBJECTIVES

The objectives of this Certification Report are to:

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

1.5 REPORT FORMAT

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

Section 1.0	Introduction: Purpose, background, area description, scope, and objectives of the report
Section 2.0	Certification Approach: The approach for certification sampling and analysis
Section 3.0	Overview of Field Activities: Historical data evaluation, precertification, area preparation, excavation and changes to work scope
Section 4.0	Analytical Methodologies, Data Validation Processes and Data Reduction
Section 5.0	Certification Evaluation and Conclusions
Appendix A	Soil Precertification Samples, Analytical Results and Final Statistics Tables
Appendix B	Ballast Precertification Samples, Analytical Results and Final Statistics Tables
Appendix C	Correction of 7-Day Radium-226 Results
Appendix D	Variances Associated with the Site Wide Rail Line System Certification Effort

1.6 FCP MASTER CERTIFICATION MAP

In order to track certification and characterization at the FCP, DOE updates a controlled map (Figure 1-2) showing the status of the soil remediation areas and phased areas with all Certification Reports. This map has been updated to include certification of the Sitewide Rail Line System.

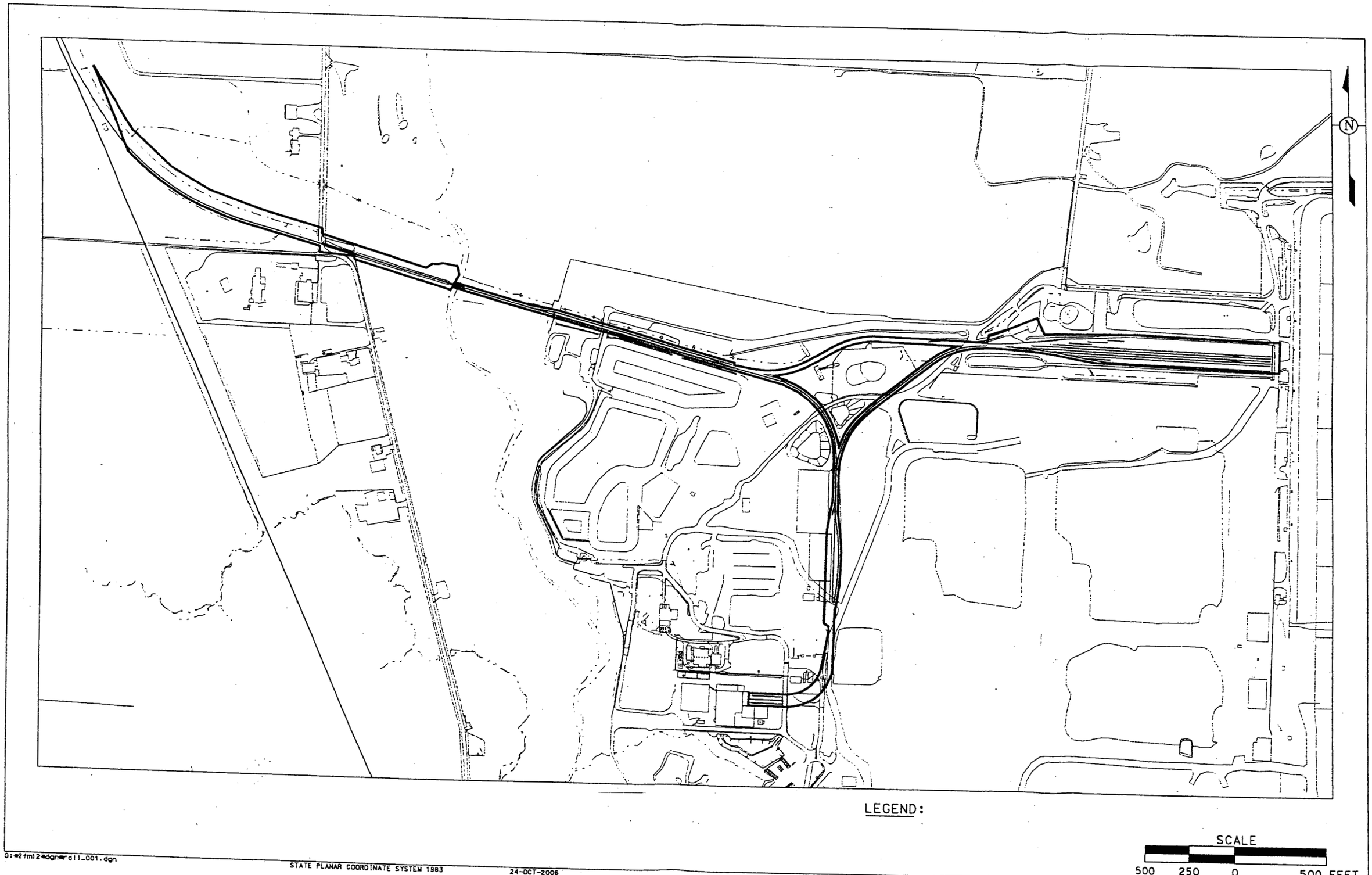
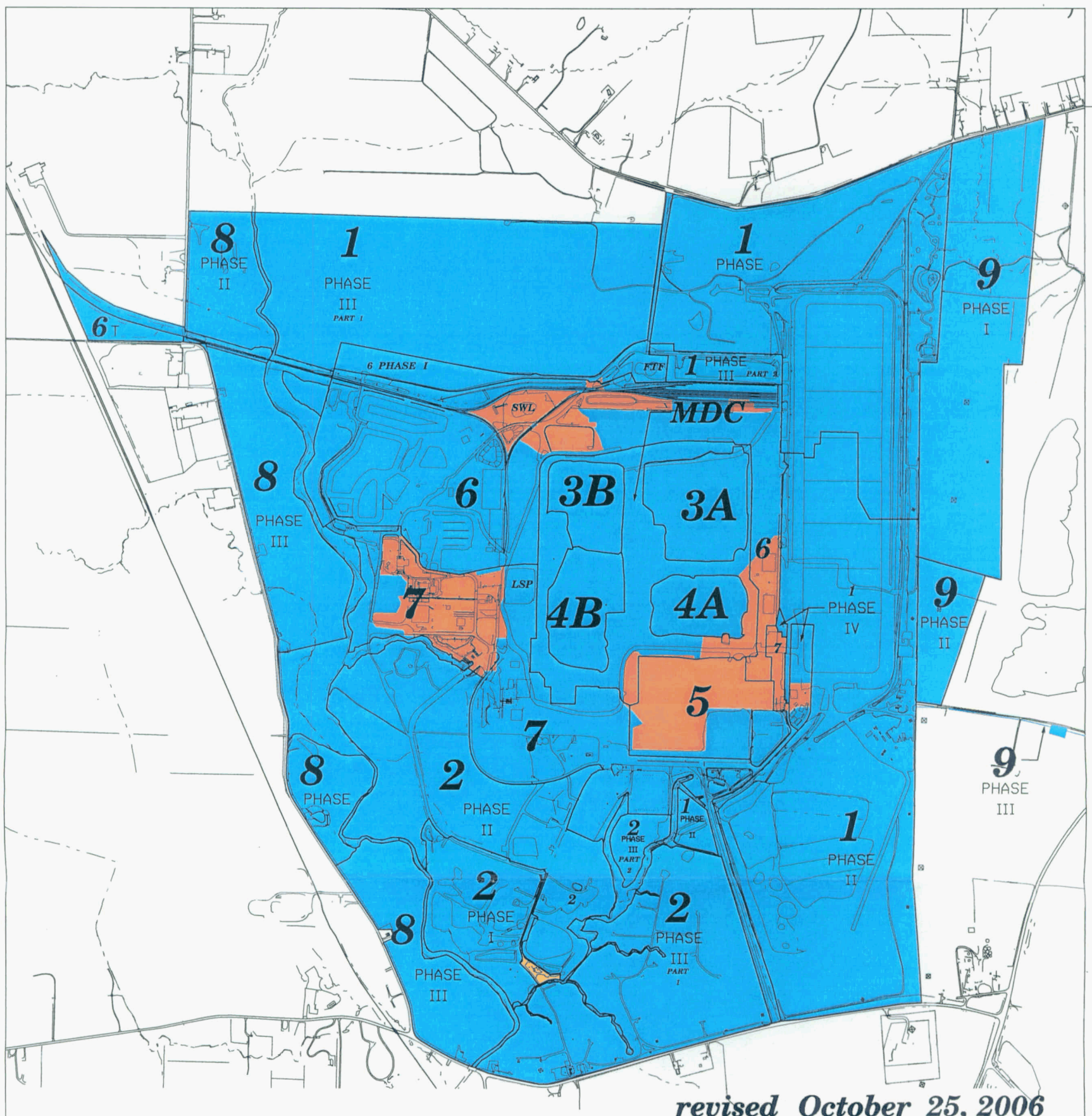


FIGURE 1-1. SITEWIDE RAIL LINE SYSTEM LOCATION MAP



revised October 25, 2006

AREAS	TOTAL ACRES	APPROVED CERT. ACRES	CERT. ACRES IN PROGRESS	REMEDIATION ACRES IN PROGRESS	PREDESIGN ACRES IN PROGRESS	REMAINING ACRES
AREA 1	395.1	394.0	1.0	0	0	0
AREA 2	173.9	173.9	0	0	0	0
AREA 3A/4A	29.3	29.3	0	0	0	0
AREA 3B/4B	25.4	25.4	0	0	0	0
AREA 5	26.9	8.9	18.0	0	0	0
AREA 6	148.9	130.3	18.6	0	0	0
AREA 7	77.0	55.5	21.5	0	0	0
AREA 8	98.9	98.9	0	0	0	0
MDC	39.8	34.3	5.5	0	0	0
PR/SSOD/PPDD	33.3	33.3	0	0	0	0
TOTAL ON SITE	1048.6	983.9	64.6	0	0	0
AREA 9	85.6	85.6	0	0	0	0
TOTAL OFF SITE	85.6	85.6	0	0	0	0

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

SCALE

1100 550 0 1100 FEET

FIGURE 1-2. FCP CONTROLLED CERTIFICATION MAP

v:\5cj31\dgn\bmp\certmap5.dgn

STATE PLANAR COORDINATE SYSTEM 1983

24-OCT-2006

2.0 CERTIFICATION APPROACH

This section summarizes the area-specific constituent of concern (ASCOC) selection process and the certification approach, including CU establishment, sampling design, and statistical analysis. The general certification strategy is described in Section 3.4 of the SEP, and the specific strategy for the Sitewide Rail Line System is described in the Certification Design Letter (CDL) For Area 6 Sitewide Rail Line System.

2.1 AREA-SPECIFIC CONSTITUENTS OF CONCERN

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary constituents of concern (COCs) and were retained as ASCOCs for this remediation effort. The selection of secondary ASCOCs retained for the Sitewide Rail Line System is discussed in section 2.1.2.

2.1.1 ASCOC Selection Criteria

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

- It is listed as a soil COC in the OU5 ROD and, it is listed as an ASCOC in Table 2-7 of the SEP for the Remediation Area of interest;
- It is listed as a COC for a hazardous waste management unit (HWMU) or underground storage tank (UST) that lies within the certification area boundary;
- It can be traced to site use in the remediation area of interest, either through process knowledge or known release of the constituent to the environment;
- Analytical results indicated that a contaminant is present above its FRL, and the above-FRL concentrations are not attributed to false positives or elevated Contract Required Detection Limits (CRDLs);
- Physical characteristics of the contaminant, such as degradation rate or volatility, indicated it is likely to persist in the soil between time of release and remediation; or
- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-238, and thorium-232).

Using the above process, the ASCOCs were refined to those listed in Table 2-7 of the SEP.

2.1.2 ASCOC Selection Process

Since the Sitewide Rail Line System boundary falls within both Area 6 and Area 7, and is situated adjacent to certified Area 1 (Phase I and Phase III Part 2) and Area 8 (Phase II and III), each COC on the Remediation Area 1, Remediation Area 6, Remediation Area 7, and Remediation Area 8 ASCOC list was evaluated for its relevance to the Sitewide Rail Line System. Additionally, portions of the rail line run near

the former Fire Training Facility (FTF) and former Solid Waste Landfill (SWL), both of which are included in Remediation Area 6. Table 2-1 presents the ASCOCs for Remediation Area 1, Remediation Area 6, Remediation Area 7, and Remediation Area 8, and also lists the reasoning for retaining each ASCOC. The ASCOCs carried through the Sitewide Rail Line System CUs reflect the ASCOCs for adjacent Remediation Areas as well as the FTF and SWL. Table 2-2 presents the final list of ASCOCs that will be retained for the soil certification units in the Sitewide Rail Line System.

2.2 CERTIFICATION APPROACH

The certification design for the Sitewide Rail Line System differs from the typical certification effort, as physical certification soil samples have been collected from this area per Variance/Field Change Notices (V/FCNs) 20600-PSP-0016-48 and 20600-PSP-0016-110. Physical certification ballast samples have been collected from this area per V/FCNs 20600-PSP-0016-101, 20600-PSP-0016-106, 20600-PSP-0016-107, and 20600-PSP-0016-109. These V/FCNs are provided in Appendix D.

The soil sampling approach was consistent with the certification criteria established in the SEP, including CU size, minimum distance between points, analytical support levels as well as validation of all analytical data. Based upon the consistency with the SEP, the precertification physical samples that have been collected will be used for final certification. This approach is consistent with other approved certification efforts, such as the former Impacted Material Haul Road in Area 2, Phase II – Subarea 3. All previously collected precertification data will be used for the statistical analysis.

2.2.1 SOIL SAMPLES

The certification soil samples were collected under V/FCNs 20600-PSP-0016-48 and 20600-PSP-0016-110, and discussed in the Sitewide Rail Line System CDL. The intent of this certification effort is to certify that ASCOC concentrations of the soil in the Area 7 Rail Line System Area meet the certification criteria in Section 3.4 of the SEP. Sixteen group 1 CUs were designed as shown in Figures 2-1 and 2-2. One CU was created from fill in the stratified sampling area encompassed by CUs RLS-C01 through RLS-C05. Also, one CU was constructed from soil samples collected under the trestle spanning Paddys Run Creek as shown in Figure 2-12. The 18 soil CUs associated with this document are as follows:

- 16 CUs - Native soil under the rail line and rail yard – CUs RLS-C01 through RLS-C16
- 1 CU - Stratified Fill under the rail yard – Selected sample points in CUs RLS-C01 through RLS-C05 (See Section 2.2.1.1)
- 1 CU – Native soil samples from under the trestle spanning Paddys Run Creek – CU A6-UT (See Section 2.2.1.2)

2.2.1.1 V/FCN 20600-PSP-0016-48

Certification Unit Design

The certification design for the samples collected under V/FCN 20600-PSP-0016-48 follows the general approach outlined in Section 3.4 of the SEP. The CU design for V/FCN 20600-PSP-0016-48 is depicted on Figures 2-1 and 2-2. The following factors were taken into consideration when determining the boundaries for each CU: historical land use, proximity to other areas of the site, and residual COC data. Additionally, some areas along the Sitewide Rail Line System are considered to be impacted areas. Therefore, this design will be comprised of 16 Group 1 CUs to allow for more concentrated sampling and ensure activities that took place within the Sitewide Rail Line System had no effect on the soil.

Certification Sample Design

The selection of certification sampling locations was conducted according to Section 3.4.2 of the SEP. The sub-CUs and certification sampling locations are shown on Figures 2-3 through 2-11.

Physical Soil Sample Collection

All CUs, with the exception of RLS-01 through RLS-05, required sampling of native soil. Due to evidence of fill in the western half of the railyard, CUs RLS-01 through RLS-05 required stratified certification; where both the fill material and the native soil were sampled. Based on topography evaluations completed during predesign, the sampling depth for the native soil was defined for each sample location, as noted in V/FCN 20600-PSP-0016-48 (Appendix D). The top 0 to 6 inches of each soil type was collected. Four of the 16 sample locations were designated with a "V," indicating archive sample locations, which were not collected. One sample location in each CU was designated with a "D," indicating a field duplicate sample collection location.

2.2.1.2 V/FCN 20600-PSP-0016-110

V/FCN 20600-PSP-0016-110 was written to certify the soil under the rail trestle that was built over Paddys Run Creek. Six locations on each side of the Paddys Run bank were identified for sampling. The sample locations were field located in an effort to avoid concrete and any sand/silt material deposited due to stream flows. The top 0 to 6 inches of soil was sampled from locations shown on Figure 2-12.

2.2.2 BALLAST SAMPLES

In addition to the 18 soil CUs, 2 ballast CUs are included in this document. The ballast samples were collected under V/FCNs 20600-PSP-0016-101, 20600-PSP-0016-106, 20600-PSP-0016-107, and 20600-PSP-0016-109, and are discussed in the Sitewide Rail Line CDL.

Unlike soil samples collected along the Sitewide Rail Line System, the ballast sampling was originally designed as a means to characterize the areas of old ballast for disposition options. There was not a set

CU design established prior to sampling. Upon review of the sample locations, it was determined that there would be two CUs, one on the west side of Paddys Run and one on the east side of Paddys Run, shown on Figures 2-13 and 2-14, respectively.

Samples collected from the new ballast in the railyard area (Figure 2-15) were collected to assess arsenic and PAH levels in ballast, and not for the purpose of certification.

2.2.2.1 V/FCN 20600-PSP-0016-101

Samples collected under V/FCN 20600-PSP-0016-101 were of ballast situated along the portions of track that ran north from the northwest corner of the former Lime Sludge Pond and then northwest to Paddys Run Road. The sample locations were chosen randomly prior to sampling. The data objective for this sampling event was to characterize the ballast to assess disposition options.

Sampling was completed using a Geoprobe® to core through the entire depth of ballast. The core of ballast material was then scanned using a beta/gamma frisker. If an interval scanned greater than 450 ccpm, the sample was collected from the 12-inch interval with highest ccpm. If the ballast contained visible staining, a sample was biased towards the 12-inch interval around the stained ballast. If the core of ballast scanned less than 450 ccpm, and there was no evidence of staining, the sample was collected from the 12-inch interval that represented the middle of the core. These samples were analyzed at ASL B. Sample location BLST-1 was not sampled as no ballast was at that location.

2.2.2.1 V/FCN 20600-PSP-0016-106

V/FCN 20600-PSP-0016-106 was written to collect twelve ballast samples from the surface of the railyard. The sample locations were field located due to accessibility issues. The samples were collected for arsenic and polyaromatic hydrocarbons (PAHs), based upon discussion with OEPA at a TIE Meeting held on July 28, 2006. These samples were analyzed at ASL B. See Figure 2-15 for the sample locations.

2.2.2.2 V/FCN 20600-PSP-0016-107

Samples collected under V/FCN 20600-PSP-0016-107 were to characterize the ballast located between the Paddys Run Trestle and the FCP Gate, to assess the possibility of disposition of the ballast to a local company. Again, due to obstacles in the area designated for sampling, the 16 sample locations were field located. The sample collection method was similar to that listed under V/FCN 20600-PSP-0016-101.

2.2.2.3 V/FCN 20600-PSP-0016-109

Due to accessibility issues for samples collected under V/FCN 20600-PSP-0016-107, four surface ballast samples were collected under V/FCN 20600-PSP-0016-109 from the section of track that is west of the FCP Gate, and four surface ballast samples were collected from the section of track that is just north of the former Solid Waste Landfill.

2.3 STATISTICAL ANALYSIS

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

In the event that a CU passes the *a posteriori* test but fails certification, the following two scenarios will be evaluated: 1) localized contamination, and 2) widespread contamination. Details on the evaluation and responses to these possible outcomes are provided in Section 3.4.5 of the SEP.

TABLE 2-1
ASCOC LIST FOR REMEDIATION AREAS 1, 6, 7, AND 8[a]

ASCOC	Retained as ASCOC?	Justification
Radionuclides		
Total Uranium	Yes	Is a Sitewide primary COC
Radium-226	Yes	Is a Sitewide primary COC
Radium-228	Yes	Is a Sitewide primary COC
Thorium-228	Yes	Is a Sitewide primary COC
Thorium-232	Yes	Is a Sitewide primary COC
Cesium-137	Yes	Is an ASCOC in adjacent Waste Pits, FTF
Lead-210	No	Not detected near rail line
Neptunium-237	Yes	Is an ASCOC in adjacent FTF and SWL
Technetium-99	Yes	Is an ASCOC in adjacent Waste Pits, FTF and SWL
Thorium-230	Yes	Is an ASCOC in adjacent Waste Pits, FTF
Organics		
1,1-Dichloroethene	Yes	Is an ASCOC in adjacent Waste Pits, FTF
Aroclor-1254	Yes	Is an ASCOC in adjacent Area1, Waste Pits, FTF, SWL
Aroclor-1260	Yes	Is an ASCOC in adjacent Area1, Waste Pits, FTF, SWL
Benzo(a)anthracene	Yes	Is an ASCOC in adjacent SWL
Benzo(a)pyrene	Yes	Is an ASCOC in adjacent FTF and SWL
Benzo(b)fluoranthene	Yes	Is an ASCOC in adjacent FTF and SWL
Bromodichloromethane	Yes	Is an ASCOC in adjacent Waste Pits
Carbazole	Yes	Is an ASCOC in adjacent SWL
Dibenzo(a,h)anthracene	Yes	Is an ASCOC in adjacent FTF and SWL
Dieldrin	Yes	Is an ASCOC in adjacent Waste Pits, FTF, SWL
Heptachlorodibenzo-p-dioxin	Yes	Is an ASCOC in adjacent Waste Pits and SWL
Indeno(1,2,3-cd)pyrene	Yes	Is an ASCOC in adjacent FTF and SWL
Octochlorodibenzo-p-dioxin	Yes	Is an ASCOC in adjacent Waste Pits and SWL
Tetrachloroethene	Yes	Is an ASCOC in Waste Pits, FTF
Inorganic		
Arsenic	Yes	Is an ASCOC in adjacent Area1, Waste Pits, FTF, SWL
Beryllium	Yes	Is an ASCOC in adjacent Area1, Waste Pits, FTF, SWL
Fluoride	Yes	Is an ASCOC in adjacent Waste Pits and SWL
Lead	No	Not detected near rail line
Manganese	No	Not detected near rail line
Ecological		
Antimony	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Cadmium	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Lead	No	Not an ECOC per Appendix C of the SEP
Molybdenum	No	Not an ECOC per Appendix C of the SEP
Silver	Yes	Is an ECOC in Area 6 per Appendix C of the SEP

TABLE 2-1
ASCOC LIST FOR REMEDIATION AREAS 1, 6, 7, AND 8[a]

ASCOC	Retained as ASCOC?	Justification
Ecological (continued)		
Benzo(a)anthracene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Benzo(a)pyrene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Benzo(b)fluoranthene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Benzo(g,h,i)perylene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Benzo(k)fluoranthene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Chrysene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Dibenzo(a,h)anthracene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Fluoranthene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Indeno(1,2,3-cd)pyrene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Phenanthrene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP
Pyrene	Yes	Is an ECOC in Area 6 per Appendix C of the SEP

[a]As listed in Table 2-7 of the SEP.

TABLE 2-2
FINAL ASCOC LIST FOR THE SITEWIDE RAIL LINE SYSTEM

	ASCOCs																																					
CU	Radium-226	Radium-228	Thorium-228	Thorium-232	Total Uranium	Lead-210	Neptunium-237	Technetium-99	Cesium-137	Thorium-230	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Fluoride	Aroclor-1254	Aroclor-1260	Dieldrin	Carbazole	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Bromodichloromethane	1,1-Dichloroethene	Tetrachloroethene
SOIL																																						
1	X	X	X	X	X							X		X								X	X															
2	X	X	X	X	X							X		X								X	X															
3	X	X	X	X	X							X		X								X	X															
4	X	X	X	X	X			X		X		X		X												X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X			X		X		X		X												X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X			X			X	X		X						X	X	X	X		X	X	X	X				X		X					
7	X	X	X	X	X			X			X	X		X	X					X	X	X	X		X	X	X	X				X		X					
8	X	X	X	X	X			X		X	X				X							X	X																
9	X	X	X	X	X			X			X			X																									
10	X	X	X	X	X			X	X	X	X	X		X						X	X	X	X	X			X	X				X		X			X	X	X
11	X	X	X	X	X			X	X	X	X	X		X							X	X	X	X			X	X				X		X			X	X	X
12	X	X	X	X	X																																		
13	X	X	X	X	X																																		
14	X	X	X	X	X																																		
15	X	X	X	X	X																																		
16	X	X	X	X	X																																		
Stratified Fill	X	X	X	X	X			X		X		X		X								X	X			X	X	X	X	X	X	X	X	X	X	X	X	X
Under Trestle	X	X	X	X	X			X	X	X	X	X		X	X					X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
BALLAST																																						
Ballast West	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X	X	X	X			
Ballast East	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X			

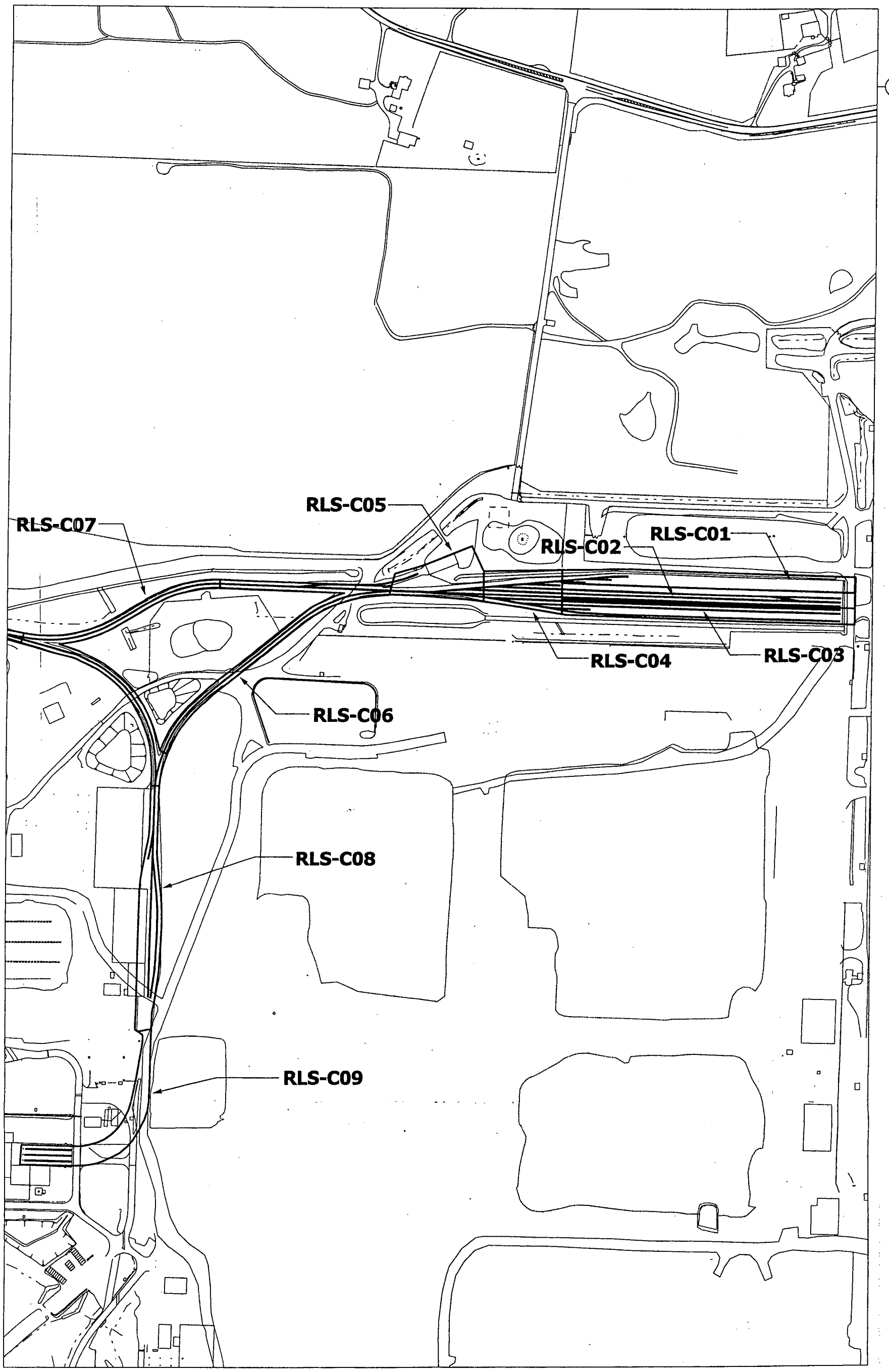


FIGURE 2-1. SITEWIDE RAIL LINE SYSTEM CERTIFICATION AREA BOUNDARIES (CUs 1-9)

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STATE PLANAR COORDINATE SYSTEM 1983

10-JAN-2007

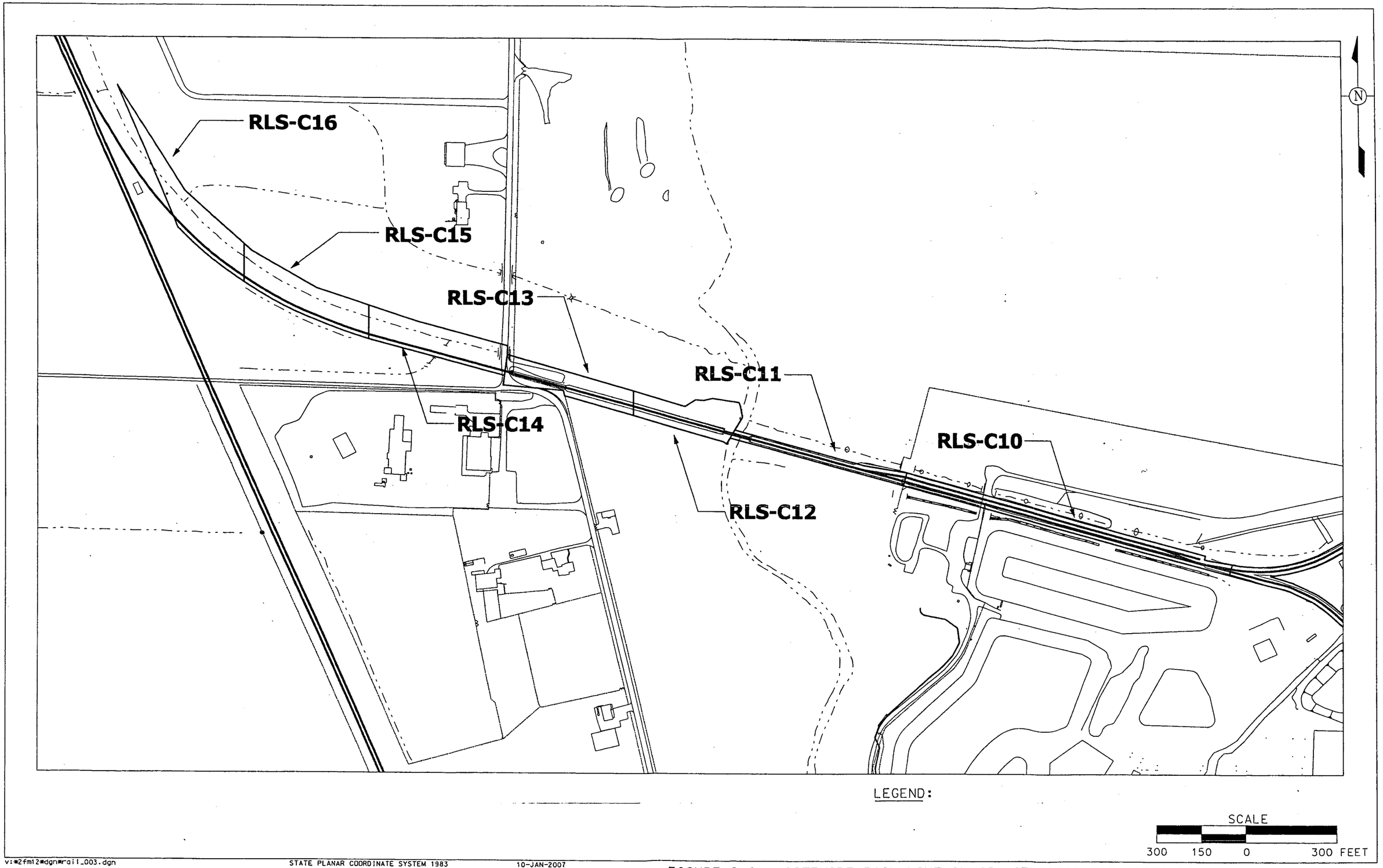

FIGURE 2-2. SITEWIDE RAIL LINE SYSTEM CERTIFICATION AREA BOUNDARIES (CUs 10-16)

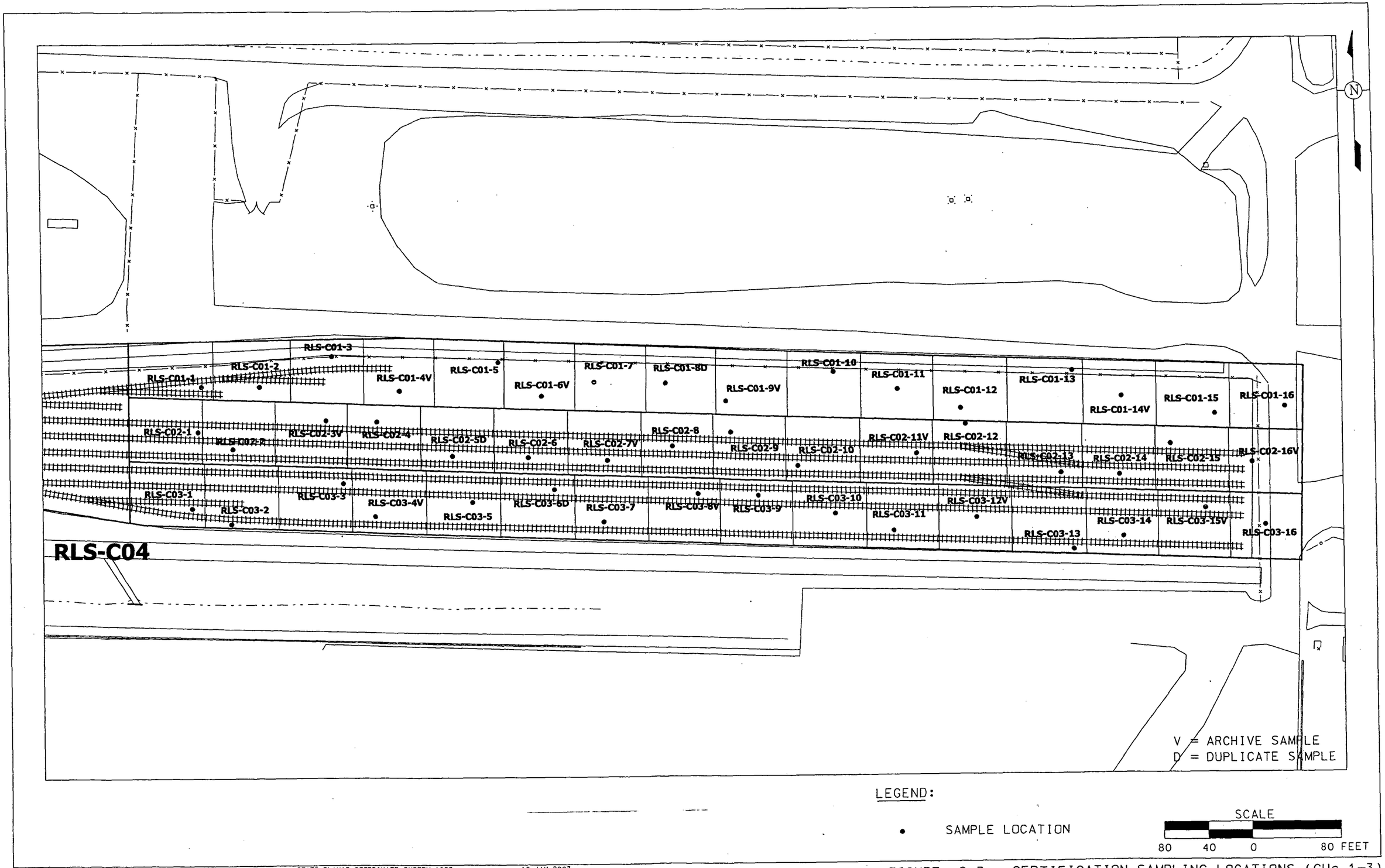

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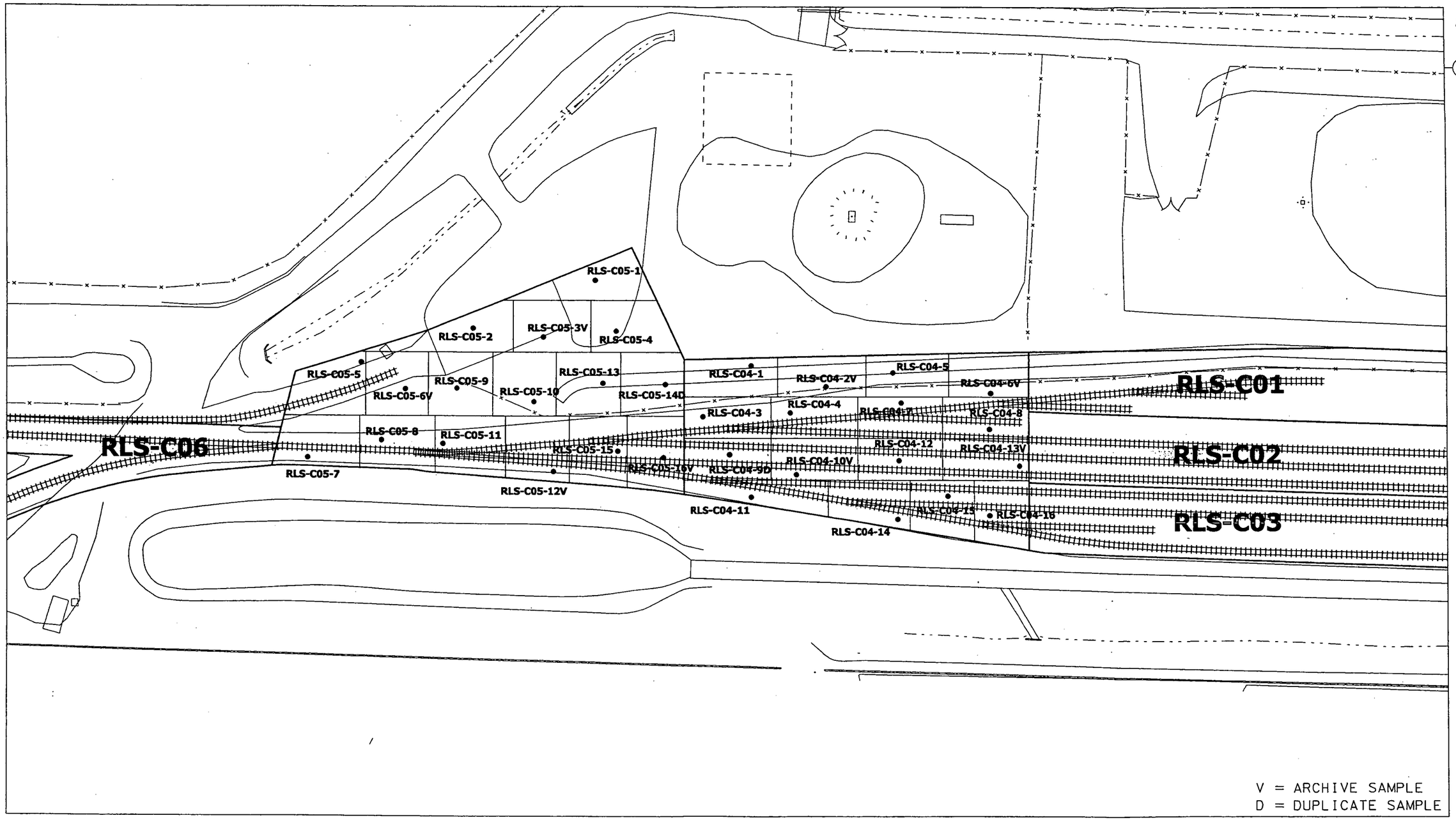
FIGURE 2-3. CERTIFICATION SAMPLING LOCATIONS (CUs 1-3)



LEGEND:

• SAMPLE LOCATION

SCALE

80 40 0 80 FEET

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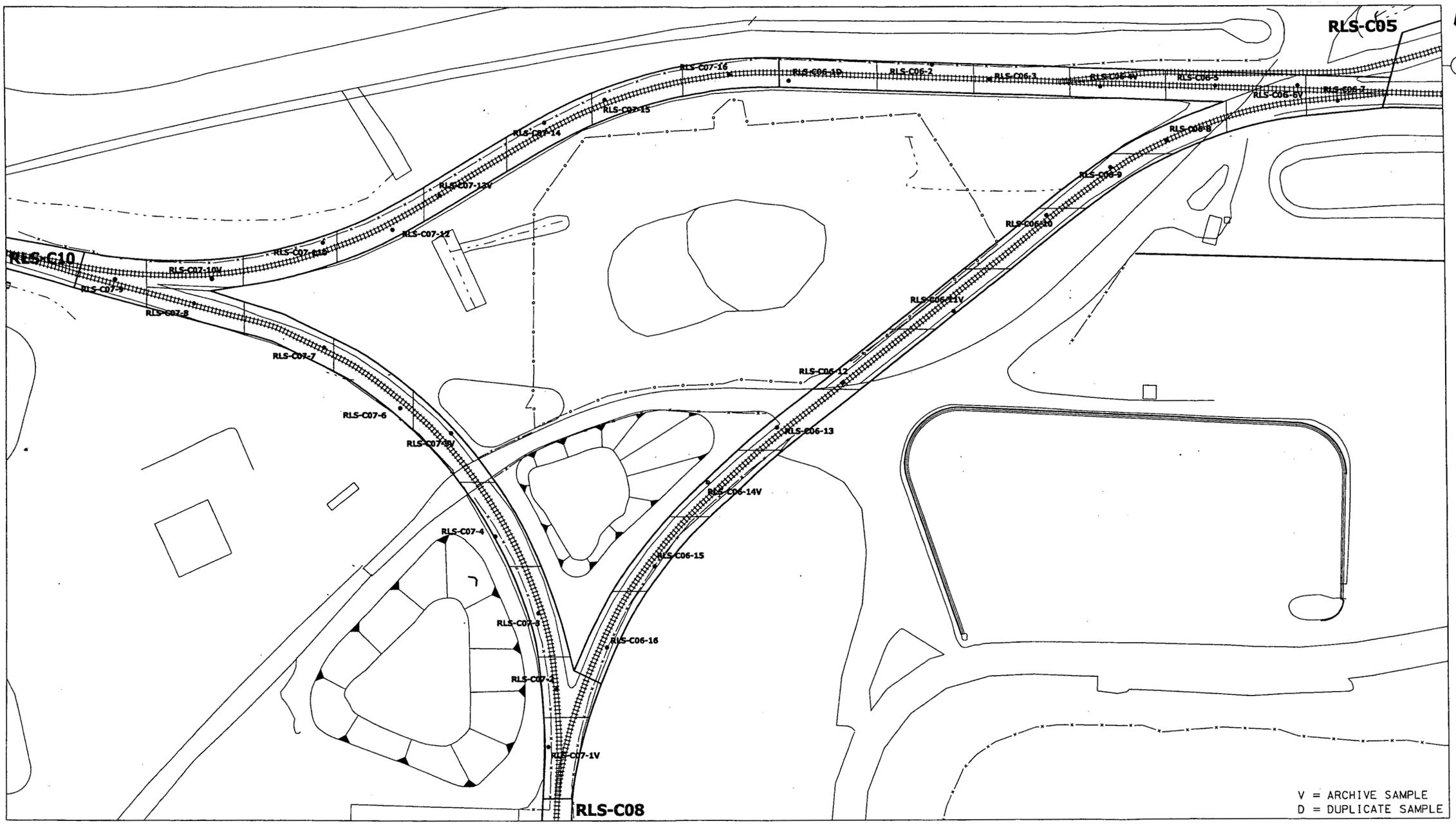
FIGURE 2-4. CERTIFICATION SAMPLING LOCATIONS (CUs 4 & 5)



LEGEND:

• SAMPLE LOCATION

SCALE

100 50 0 100 FEET

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FIGURE 2-5. CERTIFICATION SAMPLING LOCATIONS (CUs 6 & 7)

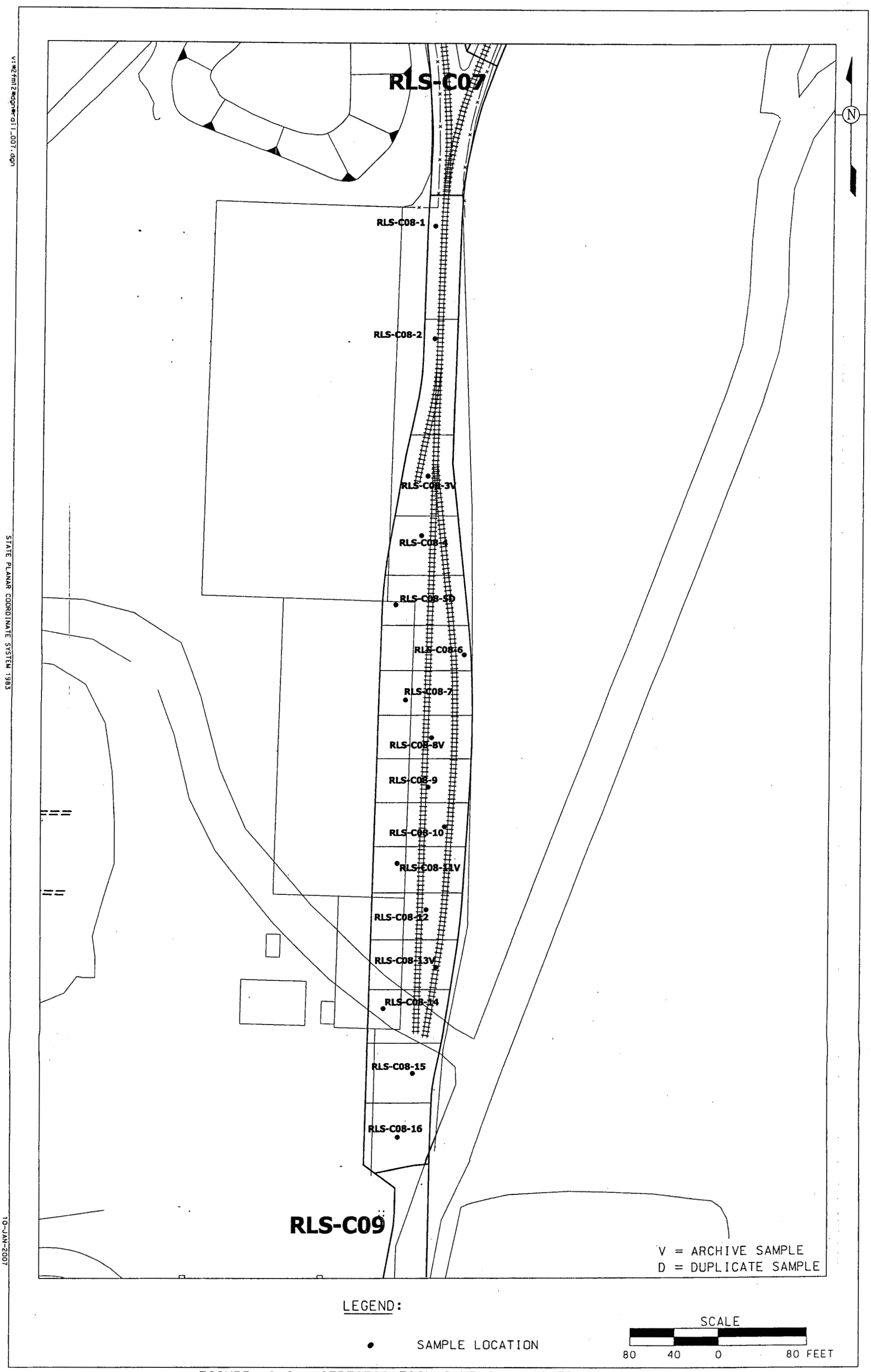

FIGURE 2-6. CERTIFICATION SAMPLING LOCATIONS (CU 8)

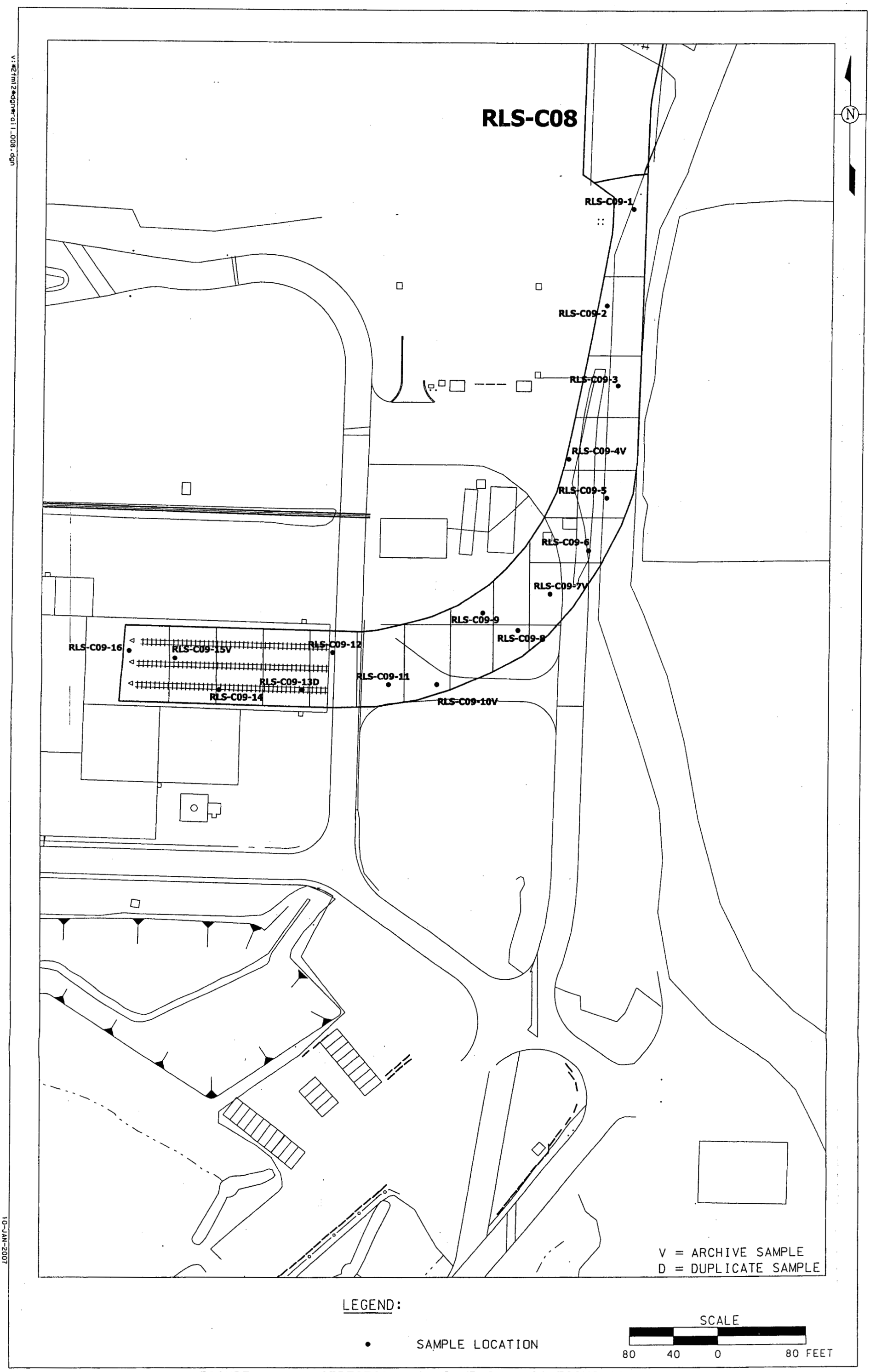

FIGURE 2-7. CERTIFICATION SAMPLING LOCATIONS (CU 9)

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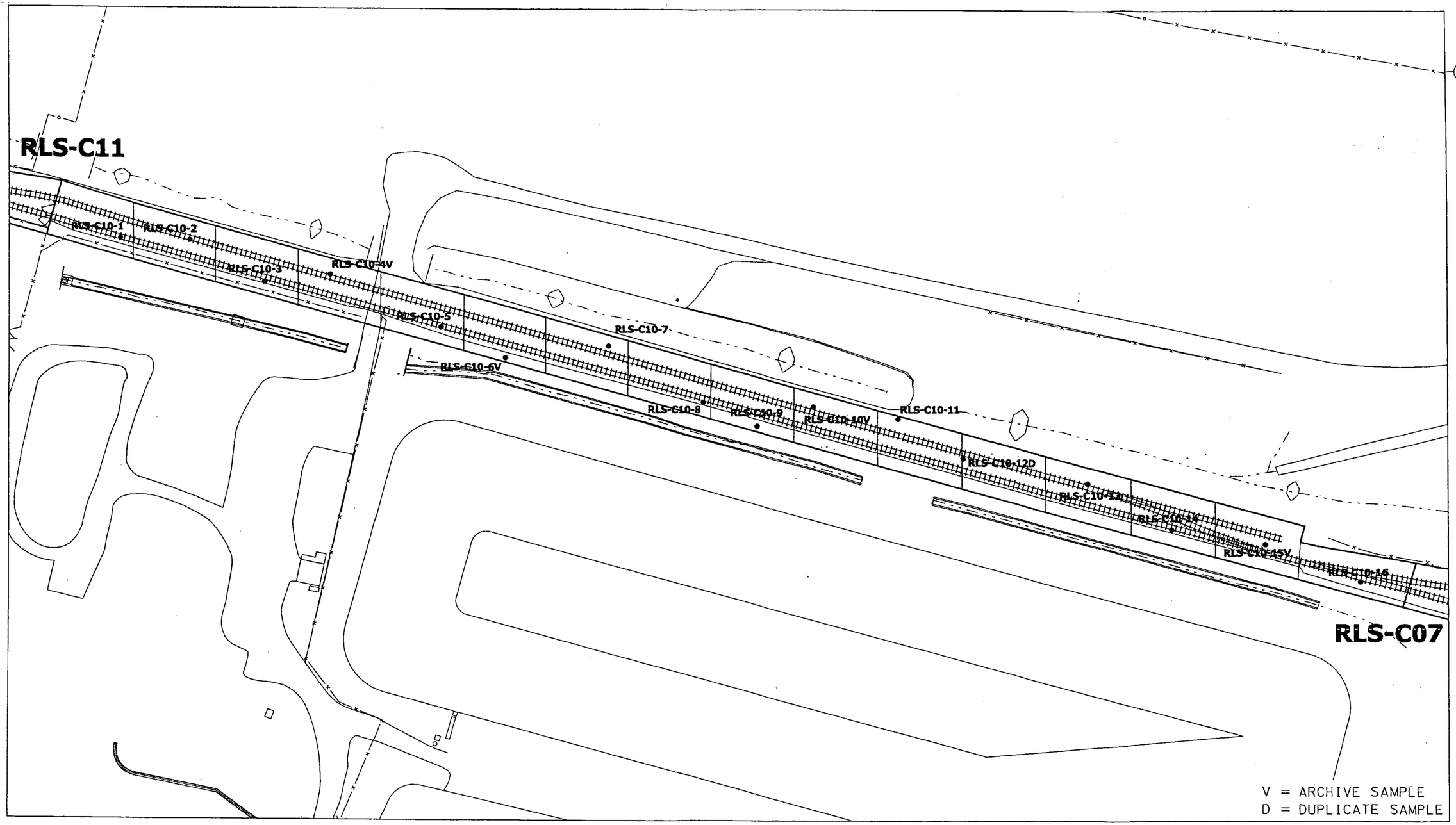
10-JAN-2007



LEGEND:

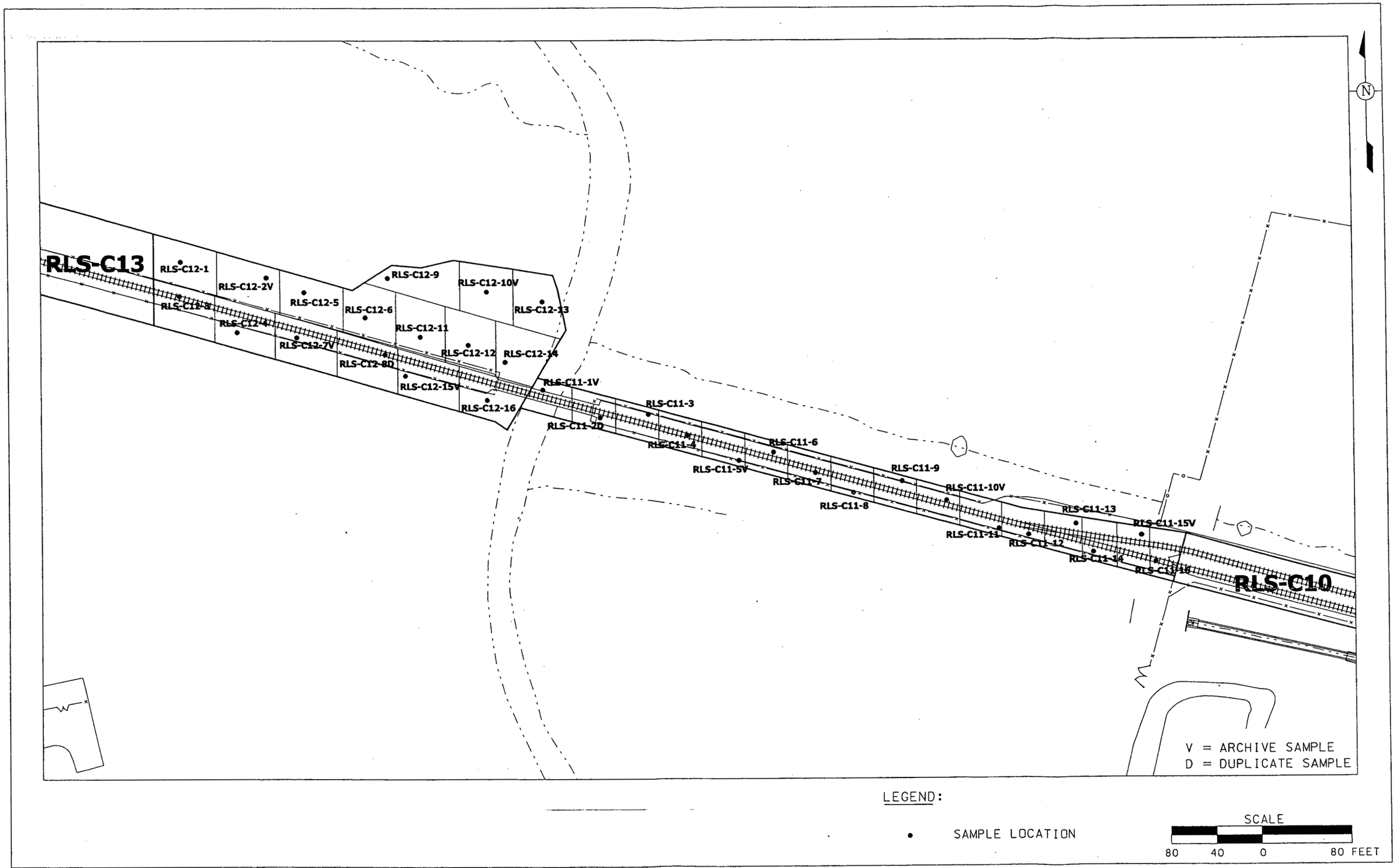
• SAMPLE LOCATION

SCALE

80 40 0 80 FEET

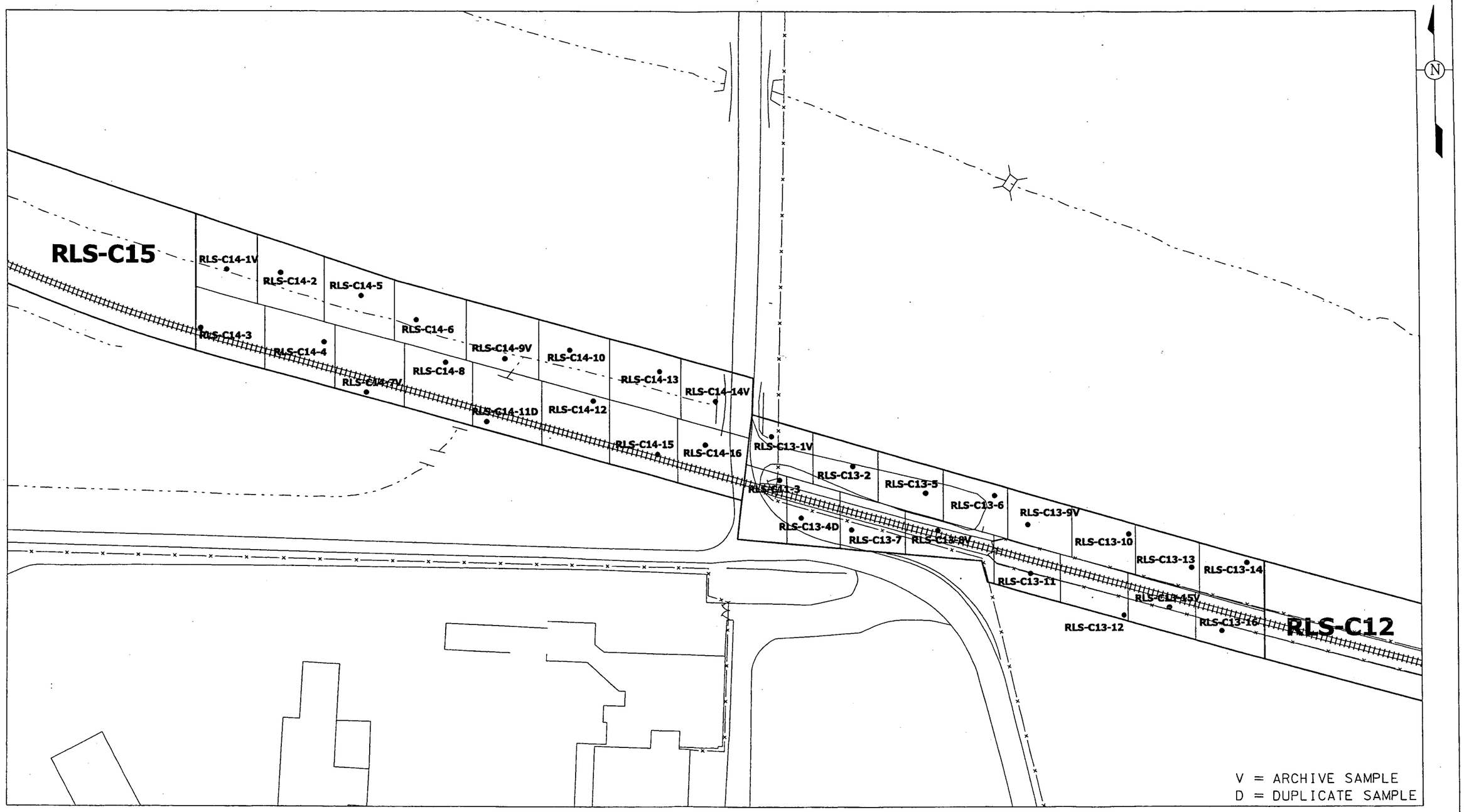
V:\2fm12\dgn\rail_009.dgn STATE PLANAR COORDINATE SYSTEM 1983 10-JAN-2007

FIGURE 2-8. CERTIFICATION SAMPLING LOCATIONS (CU 10)



v:\2fm12\dgn\rail_010.dgn STATE PLANAR COORDINATE SYSTEM 1983 10-JAN-2007

FIGURE 2-9. CERTIFICATION SAMPLING LOCATIONS (CUs 11 & 12)



LEGEND:

• SAMPLE LOCATION

SCALE

80 40 0 80 FEET

v:*2fm12*dgn*rail_011.dgn STATE PLANAR COORDINATE SYSTEM 1983 10-JAN-2007

FIGURE 2-10. CERTIFICATION SAMPLING LOCATIONS (CUs 13 & 14)

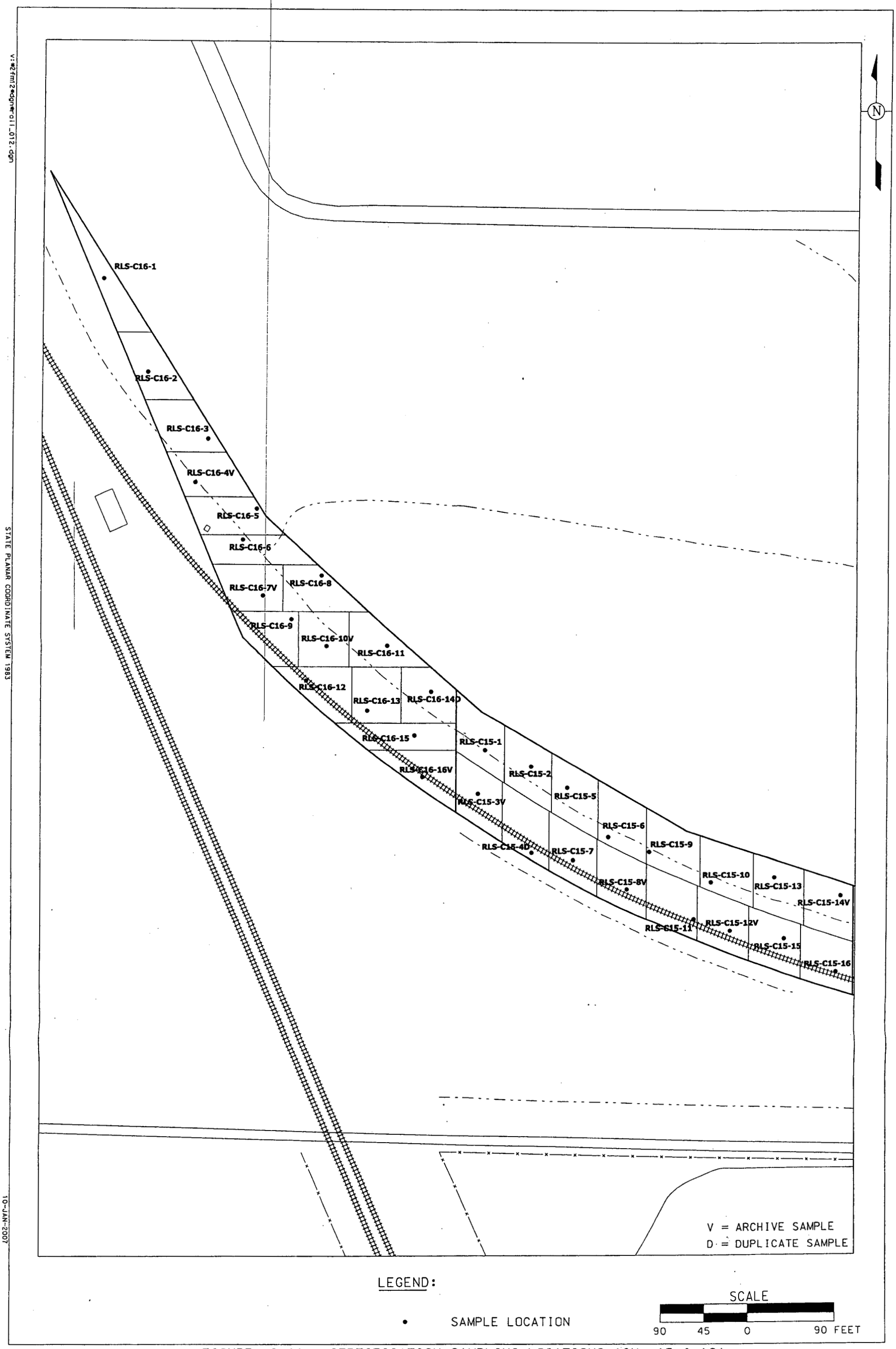


FIGURE 2-11. CERTIFICATION SAMPLING LOCATIONS (CUs 15 & 16)

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STATE PLANAR COORDINATE SYSTEM 1983

10-JAN-2007

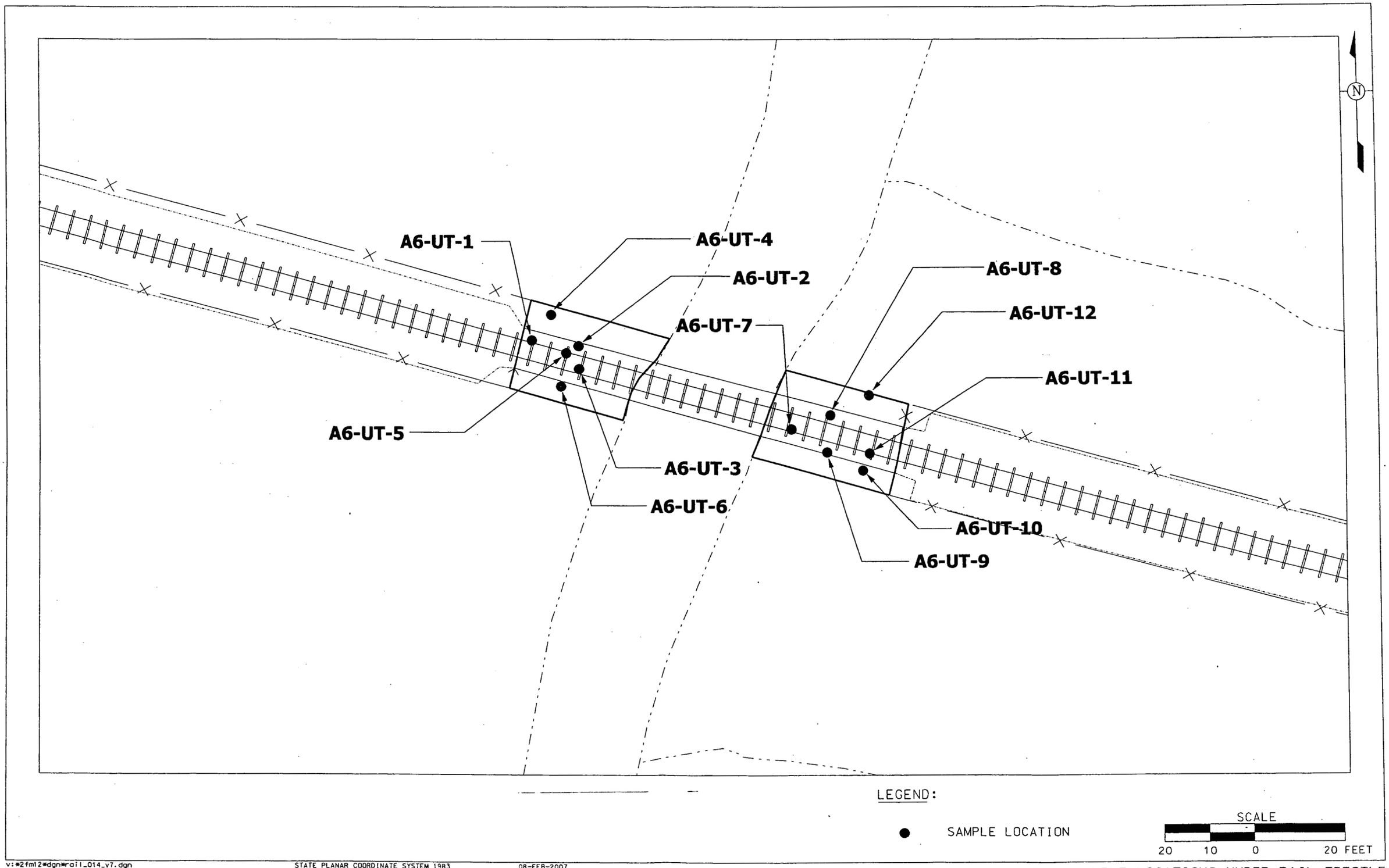

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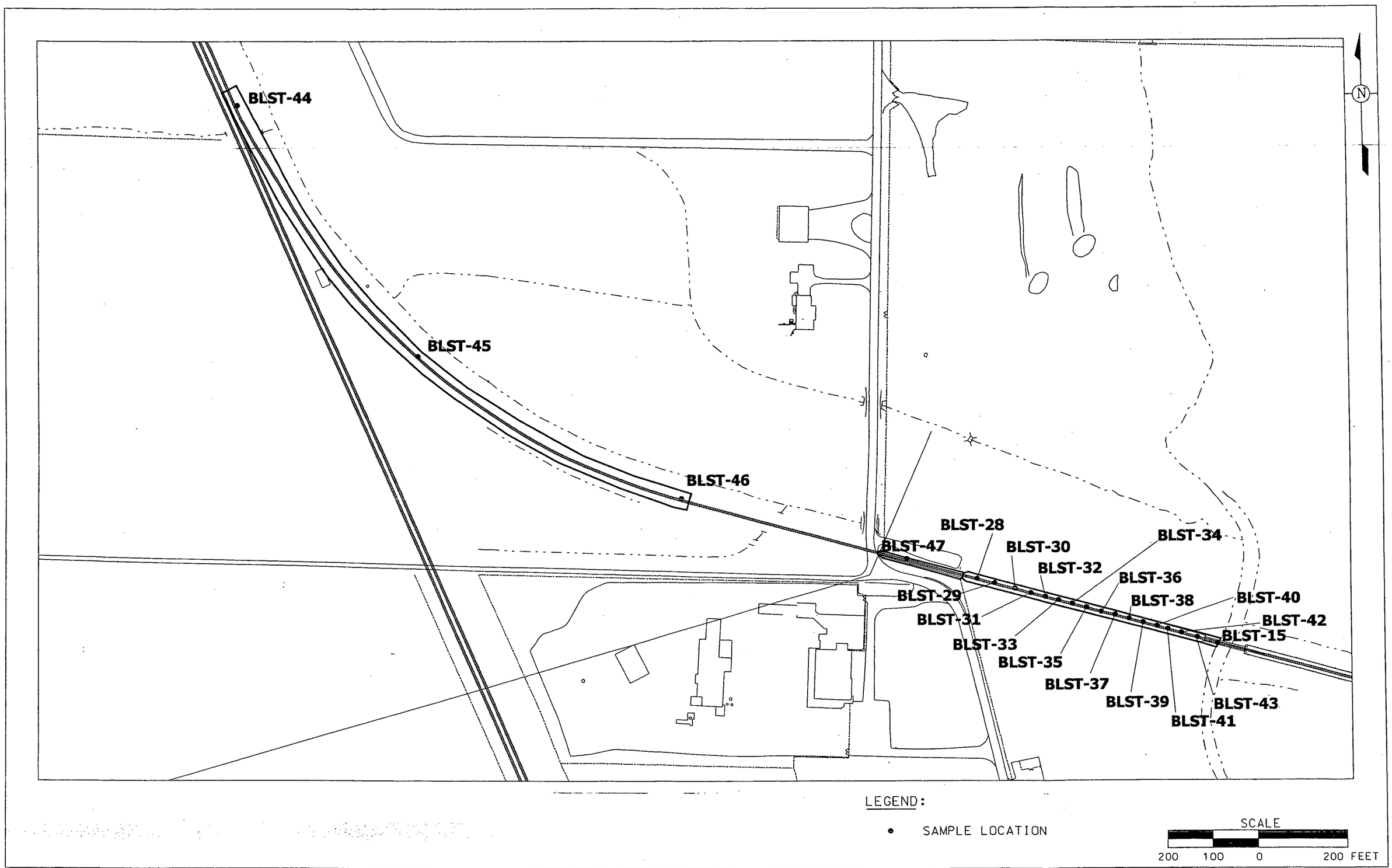
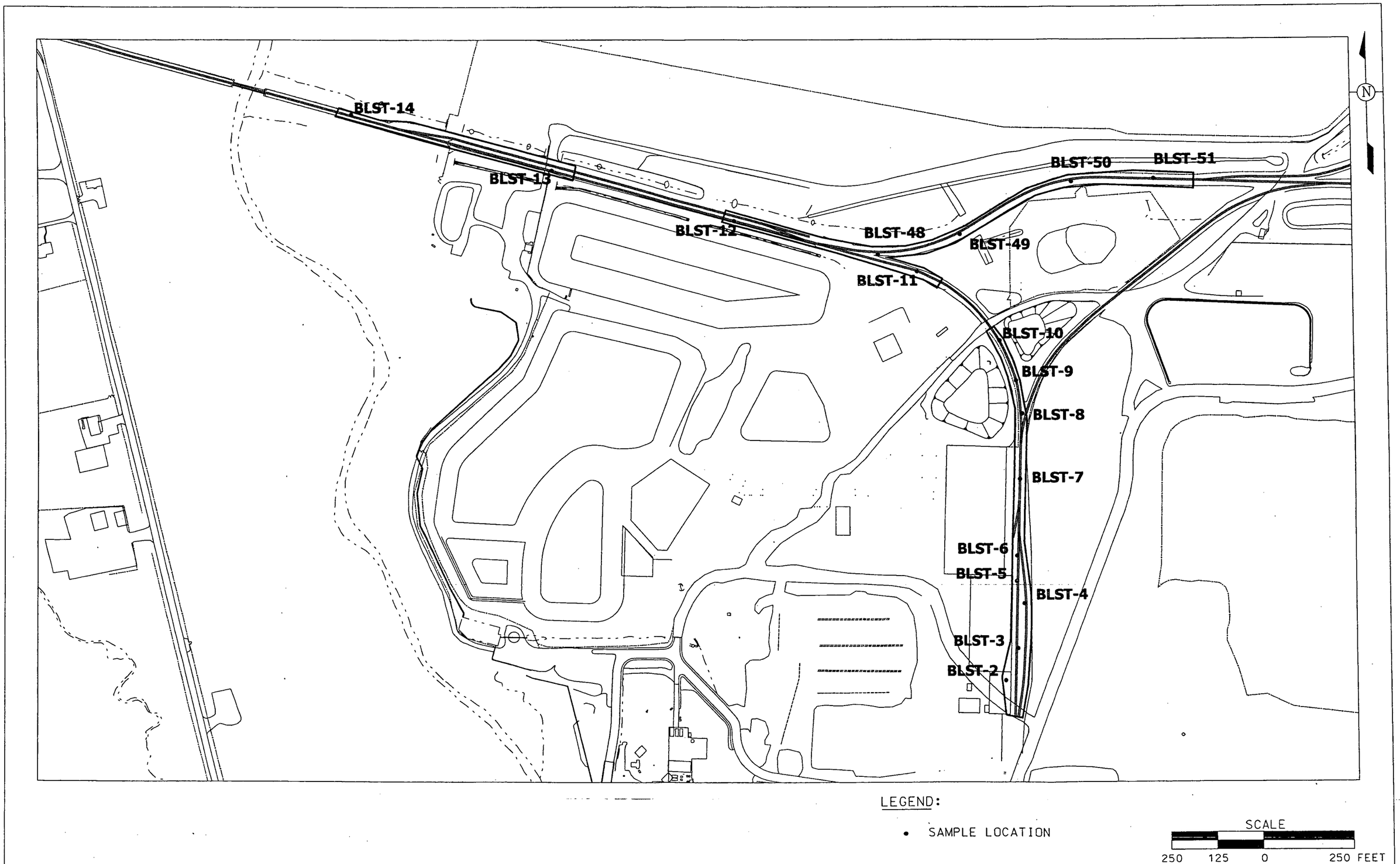
FIGURE 2-12. CERTIFICATION SAMPLE LOCATIONS UNDER RAIL TRESTLE



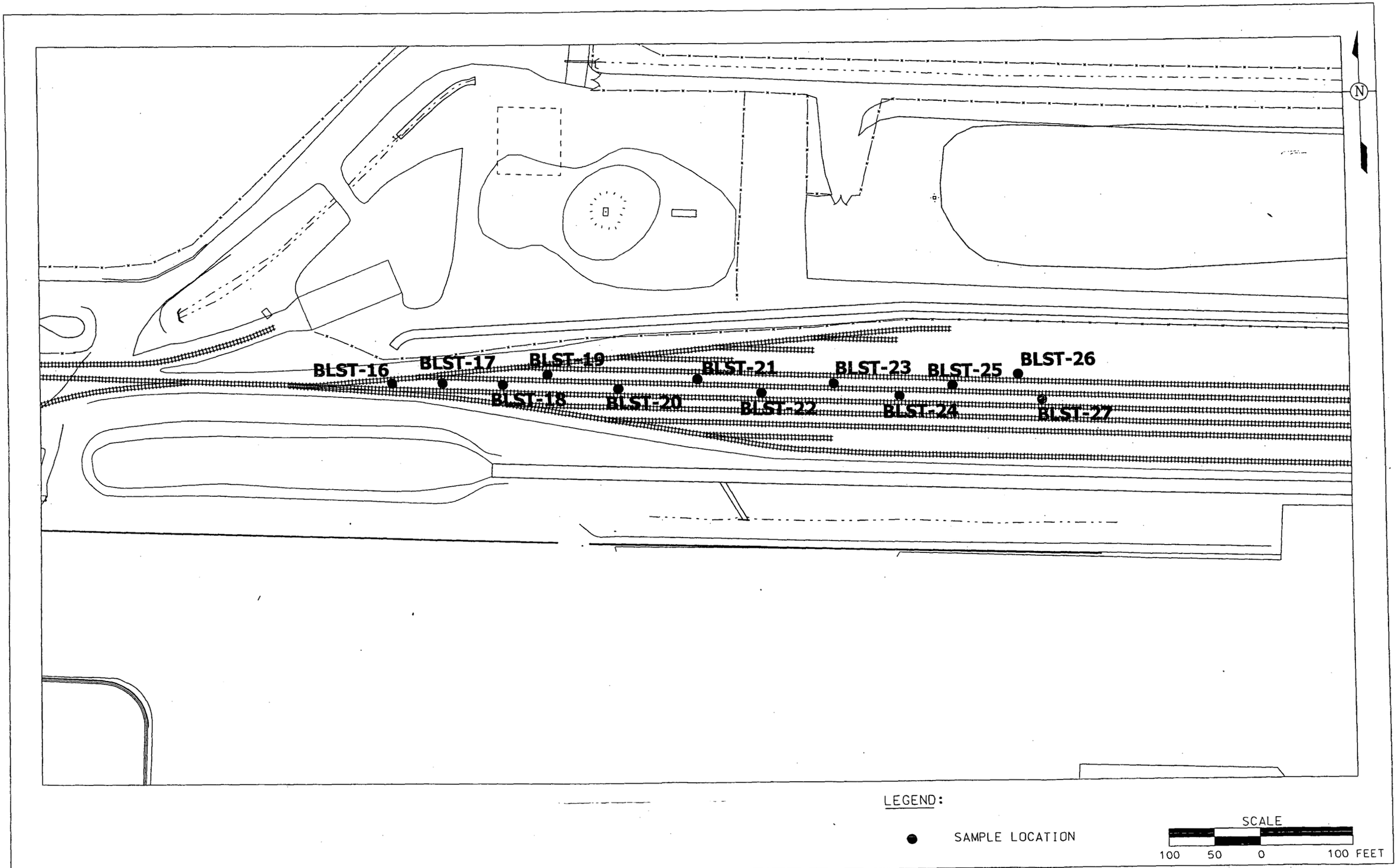
v:\2fm12\dgn\rail_015_V7.dgn STATE PLANAR COORDINATE SYSTEM 1983 08-FEB-2007

FIGURE 2-13. BALLAST CERTIFICATION SAMPLE LOCATIONS WEST OF PADDYS RUN



V:*2fm12*dgn*RAIL_016_V7.dgn STATE PLANAR COORDINATE SYSTEM 1983 08-FEB-2007

FIGURE 2-14 BALLAST CERTIFICATION SAMPLE LOCATIONS EAST OF PADDYS RUN



v:\#2fm12\dgn\RAIL_017_V7.dgn STATE PLANAR COORDINATE SYSTEM 1983 08-FEB-2007

FIGURE 2-15. BALLAST ASSESSMENT SAMPLE LOCATIONS IN RAILYARD (NOT CERTIFICATION SAMPLES)

3.0 OVERVIEW OF FIELD ACTIVITIES

In accordance with the SEP, prior to conducting precertification and certification activities, soil demonstrated to contain contamination above the associated FRLs or other applicable action levels was evaluated for remedial actions. All historical soil data within the boundary of the Sitewide Rail Line System certification area was pulled from the Sitewide Environmental Database (SED). Based on the results of sampling and scanning activities summarized below, it was determined that no remedial actions were necessary to remove above-FRL or above-WAC soil.

3.1 AREA PREPARATION AND PRECERTIFICATION

All historical data are discussed in the Post-Excavation As-Built Report for Area 7, Phase I (DOE 2004), the Excavation Plan for Area 6 Waste Pits and General Area (DOE 2005a), the Excavation Plan for Area 7 Silos and General Area (DOE 2005b), and the Excavation Plan for Area 7 Support and Silos Process Area (DOE 2005c). These include soil data collected during the RI/FS and various predesign investigations. There are no records or data to indicate that the ballast was sampled prior to this effort.

As discussed in the Area 6 Subarea 1 Predesign Project Specific Plan (DOE 2005d), a field survey investigation of the historical topography of the railyard versus the current soil elevation was completed to determine cut and fill areas that post date site production activities. Based on the field survey investigation, the eastern half of the railyard was cut to a maximum depth of four feet below the historic surface, and the western half of the railyard was filled with up to three feet of soil.

During the construction of the railyard, a surface scrape was performed over much of the eastern area to remove surface contamination, and the area was not available for investigation. Samples collected from the western half did not reproduce the historical above-FRL conditions, because of the fill depth. The source of the soil used for fill is unknown, but samples demonstrate no above-FRL condition. Historic operations did not ship waste off site, so the soil beneath the railyard (outside of the former production area) is considered to be below-FRL. As a conservative measure, however, in the Excavation Plan for Area 6 Waste Pits and General Area, the DOE committed to use a stratified certification effort, with the fill soil being a unique CU and the native soil beneath the fill being a unique CU. This stratified certification is discussed further in Section 5.0.

Additional predesign borings were placed along the remaining rail line within the former production area to investigate historical above-FRL contamination, but the borings did not confirm the historical conditions. New predesign borings were also placed to fill data gaps along the trace of the rail lines. All samples exhibited below-FRL conditions, so there were no designed above-WAC or above-FRL area excavations planned for the Sitewide Rail Line System.

Real-time precertification scans were completed on the soil, the old ballast, and new ballast to evaluate residual radiological contamination within the Sitewide Rail Line System. Scanning of the ballast is based upon discussions with OEPA at a TIE Meeting held on July 28, 2006. The scanning results are provided in Appendix A and Appendix B of the CDL for Area 6 Sitewide Rail Line System.

3.2 CHANGES TO SCOPE OF WORK

There were no changes to the scope of work for the Sitewide Rail Line System.

4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES, AND DATA REDUCTION

4.1 ANALYTICAL METHODOLOGIES

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

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

4.1.1 Chemical Methods

Metals

Samples submitted for metals analysis, with the exception of mercury, were analyzed by inductively coupled plasma-mass spectrometry.

Samples submitted for mercury analysis were analyzed by cold vapor atomic absorption.

Volatile Organic Compounds (VOCs)

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

Semi-Volatile Organic Compounds (SVOCs)

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

Pesticides/Polychlorinated Biphenyls (Pest/PCBs)

Samples submitted for pesticide or PCB analysis were analyzed bye gas chromatography.

4.1.2 Radiochemical Methods

The radiochemical analytical methods used performance-based specification criteria, including highest allowable minimum detectable concentration (HAMDC), matrix spike, ASCOC concentrations in method blank, percent recovery of tracer, matrix spike and laboratory control sample, and percent recovery for

duplicate samples were specified for each analyte. Laboratories were required to meet these specifications for the following radionuclides:

Uranium-238

Samples are analyzed for uranium-238 progeny using multiple gamma rays, and the error-weighted average of the emission lines is used to report uranium-238 activity. The uranium-238 activity is used to calculate the total uranium value as follows:

$$\text{Total Uranium (mg/kg)} = 2.998544 \text{ (mg/pCi * g/kg)} \times \text{Uranium-238 (pCi/g)}$$

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

Radium-226

Following a 7-day in-growth for radon-222 (Appendix D), radium-226 progeny are measured using multiple gamma rays, and the error-weighted average of the emission lines is used to report radium-226 activity.

Radium-228 and Thorium-232

Samples are analyzed for radium-228 and thorium-232 progeny using multiple gamma rays, and the error-weighted average of the emission lines is used to report radium-228 and thorium-232 activities. The identical activity is reported for radium-228 and thorium-232, as they are assumed to be in secular equilibrium with the measured daughter.

Thorium-228

Thorium-228 is quantified by direct measurement of its gamma emission lines, and the error-weighted average of the emission lines is used to report the activity.

Cesium-137

Cesium-137 is quantified by direct measurement of its gamma emission lines, and the error-weighted average of the emission lines is used to report the activity.

Technetium-99

Following a chemical separation, technetium-99 is quantified using a liquid Scintillation counter.

Thorium-230

Thorium-230 is quantified by measuring its characteristic alpha emission energies and correcting the activity based on the yield of a thorium-229 tracer.

Lead-210

Lead-210 progeny are measured using multiple gamma rays, and the error-weighted average of the emission lines is used to report lead-210 activity.

4.2 DATA VERIFICATION AND VALIDATION

Data verification and validation (V&V) processes are used to examine the quality of field sampling and handling procedures, laboratory analysis and reporting, and non-conformance and discrepancy resolution. Analytical data are qualified to the appropriate data decision level by assessing the precision, accuracy, completeness, comparability, and representativeness of the measurements. The U.S. Environmental Protection Agency (EPA) National Functional Guidelines for Data Review (Inorganic Data) (EPA 1994), as adapted and approved by EPA Region V, as well as the Section 11.2 and Appendix D of the SCQ, are the appropriate V&V reference documents.

The V&V process evaluated the following parameters:

- Specific field forms for sample collection and handling
- Chain of Custody Forms
- Completeness of laboratory data package
- Holding times
- Instrument calibrations
- Calculation of results
- Laboratory/field duplicate precision
- Field/Laboratory Blank contamination
- Dry weight correction for solid samples
- Correct detection limits reported
- Recovery of laboratory control samples and compliance with established limits.

Parameters unique to the evaluation of radiochemical analyses include:

- Calibration data for specific gamma and alpha energies
- Background checks
- Relative error ratios
- Detector efficiencies
- Background count correction.

For this project, all sample data were reviewed and validated for the criteria noted above. Per project requirements specified in the SEP and Data Quality Objectives SL-052, a minimum 10 percent of the certification data were validated to Validation Support Level (VSL) D, and the remaining data were validated to VSL B. VSL D is a rigorous data review that includes the review process for VSL B plus a systematic review of the raw data and recalculation of all results.

Following V&V, qualifier codes are applied to the results to reflect the level of confidence assigned to a particular datum. These codes can include the following:

- No qualification; the positive result or detection limit is confident as reported

J Positive result is estimated or imprecise; data point is usable for decision-making purposes. Positive results less than the contract required reporting limit are also qualified in this manner

R Positive result or detection limit is considered unreliable; data point should not be used for decision-making purposes

U Undetected result at the stated limit of detection

UJ Undetected result; detection limit is considered estimated or imprecise; the data point is usable for decision-making purposes

N Positive result is tentatively identified - that is, there is some question regarding the actual identification and quantification of the result. Compound reported is best professional judgment of the interpretation of the supporting data, such as mass spectra. Caution must be exercised with the use of this data

NJ Positive result is tentatively estimated; detection limit is considered estimated or imprecise

NV Not validated. The results for this sample were not validated

Z This result, or detection limit in this analysis is not the best one to use; another analysis (e.g., the dilution or re-analysis) contains a more confident and usable result.

The V&V of the data set in this certification report did not identify any analytical problems. All the results are qualified as acceptable (-), estimated (J) and/or non-detects (U). No results were rejected.

4.3 DATA REDUCTION

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

Field Information

- Sample Identification Number - A unique number assigned to each discrete sample point
- Coordinate Information - Northing and Easting locations
- Certification Unit - Each sample is assigned to a CU.

Laboratory Information

For each sample result the following information is entered:

- Laboratory Result - The laboratory reported analytical value.

- Laboratory Qualifier - The qualifier reported from the lab. (Note: radiological non-detect values are assigned a U qualifier by Fluor, because the lab does not).

- Total Propagated Uncertainty (TPU) - This value represents the uncertainty associated with the reported radiological result. TPU includes the counting error, as well as uncertainty from other laboratory measurements and data reduction.

- Units - The units for the reported laboratory result.

Validation Information

- Validation Result - The result based on the validation process. During the validation process, sample results may be adjusted. If the laboratory result is less than the requested minimum detectable concentration (MDC), the validation result becomes the MDC.

- Validation TPU - The TPU based on the validation process.

- Validation Qualifier - The qualifier assigned as a result of the data validation process.

- Validation Units - The units reported by the laboratory, unless corrected by the validation process.

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

1. All the data for each CU are queried from SED.
2. The data from the validation fields are used in the statistical calculations
3. Data with a qualifier of R or Z are not used in the statistical calculations
4. The higher of the two duplicate results is used in the statistical calculations
5. One half of the non-detect (U or UJ) value is used in the statistical calculations.

5.0 CERTIFICATION EVALUATION AND CONCLUSIONS

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

5.1 CERTIFICATION RESULTS AND EVALUATION

The following is a summary of the analytical results and statistical analyses of the data for each CU in the Sitewide Rail Line System:

RLS-C01

CU RLS-C01 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C02

CU RLS-C02 had one sample location above-FRL for radium-226, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C03

CU RLS-C03 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C04

CU RLS-C04 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C05

CU RLS-C06 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C06

CU RLS-C06 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C07

CU RLS-C07 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C08

CU RLS-C08 had one sample result above-FRL for thorium-232, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C09

Within CU RLS-09, one sample location was above-FRL for beryllium. Beryllium, as well as all other ASCOCs, passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C10

CU RLS-C10 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C11

CU RLS-C11 had one sample location above-FRL for arsenic, and it passed statistical analysis as discussed in Section 2.3. Final certification data for the CU are presented in Appendix A.

RLS-C12

CU RLS-C12 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C13

CU RLS-C13 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C14

CU RLS-C14 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C15

Within CU RLS-C15, there were above-FRL sample locations for radium-226, thorium-228, and thorium-232, but each passed statistical analysis as discussed in Section 2.3. Final certification data are presented in Appendix A.

RLS-C16

CU RLS-C16 passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

Stratified Fill CU

The stratified fill CU passed all of the certification criteria as discussed in Section 2.3. Final certification data are presented in Appendix A.

Soil Under Rail Trestle

For the soil under the rail trestle, all primary and secondary ASCOCs passed the certification criteria with the exception of a few PAHs. For those parameters where FRLs were established, benzo(a)pyrene and benzo(b)fluoranthene failed the certification criteria as discussed in Section 2.3. For those parameters without FRLs, BTVs were used as points of comparison. When using this convention, benzo(g,h,i)perylene, fluoranthene, phenanthrene, and pyrene exceeded the BTVs. Benzo(a)pyrene also failed the hotspot criteria. Because these 6 COCs exceed the limits that were used to evaluate them, it was decided to perform a risk assessment on this CU, which is consistent with the SEP protocols which state that the need to excavate secondary COCs will be evaluated on a case by case basis. This was done to demonstrate that the residual contamination values in the CU remain protective of human health and the environment, per Section 10.1.1 of the OU5 ROD. This risk assessment, which is discussed in Section 5.2, determined that no further action was needed for this CU.

Ballast West of Paddys Run

All ASCOCs in this CU passed the certification criteria discussed in Section 2.3. Final certification data are presented in Appendix B.

Ballast East of Paddys Run

With the exception of arsenic, all ASCOCs in this CU passed the certification criteria discussed in Section 2.3. The statistical analysis of the secondary COC arsenic from the ballast in this area showed indications of elevated conditions with the 90% UCL on the mean being 15.2 mg/kg as compared to the FRL of 12 mg/kg. Since the material being certified is ballast rather than soil, an investigation of the source material was conducted. The ballast in the rail yard was considered to be clean source material as it was constructed in the recent past and was therefore sampled for arsenic to establish background conditions. The maximum value for arsenic in the rail yard ballast was 16 mg/kg with a mean of 9.88 mg/kg (See Appendix B). Conversely, the maximum value for arsenic in the ballast east of Paddys Run was 15.2 mg/kg with a mean of 9.26 mg/kg, both of which are less then the rail yard values. However, there is a

large standard deviation for the samples from the ballast east of Paddys Run with values ranging from 1.8 to 15.2 mg/kg of arsenic, which is one of the contributing factors that causes the 90% UCL on the mean for this dataset to be greater than the FRL. Although the 1.8 mg/kg value is not a statistical outlier, it is clearly background. As such, by analyzing the higher values of this dataset, if considered to be attributed to contamination, without the 1.8 mg/kg value, the 90% UCL on the mean is 11.6 mg/kg with a mean of 9.28 mg/kg, which is lower than the soil FRL that was developed based on background levels in soil. Although inconclusive due to the limited number of samples, it indicates that this area should not be of significant concern.

Subsequent evaluation of the characteristics of the ballast from east of Paddys Run shows that no other primary constituent of concern such as uranium, radium, or thorium, which would be indicative of contamination, was found to be elevated in this ballast. This supports the conclusion that the arsenic levels in the ballast east of Paddys Run are consistent with background conditions and are not related to site operations. Therefore, the ballast does not warrant further remediation. Final certification data are presented in Appendix B.

5.2 RISK EVALUATIONS FOR SOIL UNDER THE RAIL TRESTLE

Several PAHs (benzo(a)pyrene, benzo(g,h,i)perlene, fluoranthene, phenantherene, and pyrene) detected in the soil under the rail trestle CU failed the certification process (Appendix A). As habitat for the Indiana bat exists under the rail trestle, and CUs surrounding this CU passed certification with respect to the indicated PAHs, it was determined that further remediation and disturbance of the area should be avoided. Therefore, for this special case, a risk assessment was performed for the soil under the rail trestle (Figure 5-1) to demonstrate that the residual contamination values in this CU remain protective of human health and the environment, per Section 10.1.1 of the OU5 ROD.

The area on Figure 5-1 represents the CU associated with the soil under the rail trestle. Although this area is a very small footprint for full-time recreation or grounds work, it is conservatively assumed that the undeveloped park user and groundskeeper/sampler spend 100% of their exposure time in this footprint. Soil results for the soil-under-rail-trestle CU (Appendix A) and surface-water results for the former waste-pit area are used as the contaminant concentrations in the exposure pathways.

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

The exposure frequency is taken as 20 days per year, about every other week, for child and adult; and 40

days per year for youth and senior adult. A higher frequency for youth and senior adult is driven by the assumption that these receptors will have extra recreation time available to visit the park.

The exposure duration is the number of years over which an individual will visit the park. EPA (1989b) notes that national trends show individuals do not live in a region of the country for more than 30 years. Therefore, 30 years is used as the sum across the age groups, with the years partitioned into 3 years for child, 6 for youth, 14 for adult and 7 for senior adult.

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

TABLE 5-1
EXPOSURE PARAMETERS FOR THE UNDEVELOPED PARK USER

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

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

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

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

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

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

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

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

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

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

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

Exposure duration to surface water remains the same as soil for child, youth, adult and senior adult.

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

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

Body weight is taken from Table 7-11 of EPA's Exposure Factors Handbook (EFH; EPA 1997). The averaging time for non-carcinogens is the exposure duration multiplied by 365 days/yr. For carcinogens, the averaging time is an exposure duration of 70 yrs multiplied by 365 days/yr.

Inhalation rates for short-term exposures for outdoor workers are taken from Table 5-23 of the EFH (EPA 1997). The groundskeeper/sampler is assumed to perform heavy activities outdoors 7 hrs/day and 1 hr/day is spent indoors on breaks.

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

TABLE 5-2

EXPOSURE PARAMETERS FOR THE GROUNDSKEEPER/SAMPLER

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

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

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

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

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

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

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

Conservative assumptions were used in the calculations. First, the average soil concentration is the 95% UCL or maximum value (if 95% UCL was unavailable) of each contaminant listed in the under-rail-trestle CU (Appendix A). This is conservative because the receptor is expected to spend 100% of their time

exposed to the PAHs detected in this small CU, and the PAHs are not detected in the surrounding CUs. Second, if all sample results were below the detection limit for a given COC, the detection limit value was used, rather than one-half of the limit. Lastly, cancer slope factors reflect short-lived radioactive daughters in equilibrium with their parent isotope.

Risk calculations for every COC and each pathway are presented in Appendix C, and a summary of the cumulative results are presented in Table 5-3 in terms of the hazard quotient (HQ) and incremental lifetime cancer risk (ILCR) for each pathway and the sum of all pathways. Non-cancer health risks, due to exposure to non-radiological chemicals, are evaluated by application of a reference dose for oral and inhalation exposure routes. A reference dose estimates the upper bound chronic dose of a chemical that a human receptor can be exposed to without suffering ill effects. The contaminant intake for a receptor is divided by the appropriate reference dose factor to yield the HQ. If the HQ is greater than 1, a negative health impact to the receptor is anticipated. Cancer slope factors are published values that specify a cancer morbidity value (risk) to a receptor for a given quantity of contaminant intake, referred to as an ILCR. The resulting value determines whether post-remedial concentrations of contaminants will result in a cancer risk that is in compliance with CERCLA guidance and the OU5 ROD. Table 5-3 indicates that receptors spending 100% of their time under the rail trestle are in compliance with the CERCLA guidance and OU5 ROD (i.e., cumulative sum for HI is less than 1 and ILCR is less than 10^{-4}).

TABLE 5-3
SUMMARY OF RISK TO RECEPTORS UNDER THE RAIL TRESTLE

PATHWAY	Undeveloped Park User		Groundskeeper/Sampler	
	HQ	ILCR	HQ	ILCR
Inhale	1.20E-04	1.18E-08	2.99E-03	2.74E-07
Dermal Soil	3.14E-03	9.21E-06	1.35E-02	3.29E-05
Ingest Soil	2.10E-02	6.25E-06	4.27E-02	1.07E-05
Dermal Surface Water	5.95E-02	4.83E-05	5.12E-02	3.46E-05
Ingest Surface Water	1.36E-03	1.38E-07	3.65E-04	3.80E-08
External Radiation	NA	1.45E-07	NA	1.47E-06
SUM OF ALL PATHS	**8.52E-02**	**6.40E-05**	**1.11E-01**	**8.00E-05**

NA = calculation not applicable for indicated pathway RB = radiological background

Each pathway in Table 5-3 produces a risk that is dependent on the contaminants present, and the contribution of each contaminant to the risk is provided in Appendix C. For the undeveloped park user, the pathways contributing the most to the sum HQ value are soil ingestion and dermal contact with surface water. Uranium and arsenic are the primary contaminants for the HQ ingest soil, and aroclor-1254 and

aroclor-1260 for the HQ dermal surface water. ILCR for the undeveloped park user is driven primarily by exposure to the dermal surface water, dermal soil, and ingest soil pathways. The ILCR for dermal surface water is driven by benzo(a)pyrene and dibenzo(a,h)anthracene, for dermal soil by benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene, and for ingest soil by benzo(a)pyrene, arsenic, and benzo(b)fluoranthene.

The total HQ for the groundskeeper/sampler is driven by the dermal surface water, ingest soil and dermal soil pathways. HQ for dermal exposure to surface water is driven by aroclor-1260 and aroclor-1254. Arsenic and uranium are the key contaminants responsible for the soil-ingestion HQ, whereas the dermal soil HQ is due primarily to arsenic. The total ILCR value for the worker is largely derived from the same pathways discussed for HQ. Dermal exposure to surface water containing benzo(a)pyrene and dibenzo(a,h)anthracene accounts fpr most of the ILCR for this pathway. Dermal soil ILCR is driven by benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(a,h)anthracene. The ILCR for soil ingestion is due to benzo(a)pyrene, arsenic and benzo(b)fluoranthene.

5.3 FORMER SITEWIDE RAIL LINE SYSTEM CERTIFICATION CONCLUSIONS

Based on the certification analytical results, precertification data, and statistical analysis, DOE has determined that the remedial objectives in the OU5 ROD have been achieved for the former SWRB Area, and no further remedial actions are required. This portion of the FCP will be released for restoration and final land use upon EPA and OEPA concurrence.

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APPENDIX A

SOIL PRECERTIFICATION SAMPLES, ANALYTICAL RESULTS AND FINAL STATISTICS TABLES

APPENDIX A
STATISTICAL ABBREVIATIONS AND SYMBOLS

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

If the maximum result for each analyte is below the FRL, no statistical result needs to be reported. For all statistical evaluations, the maximum value of the two duplicates was used.

Note: Where no FRL was established for an analyte, the BTV was used. When this occurred, the Limit was italicized and a comment of (No FRL) was present.

Abbreviations:

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

W-Statistic Probability - Shapiro-Wilk probability of the "better" fit - either normal or lognormal (note: a value less than 0.05 indicates that neither normality nor lognormality could be accepted, but the highest p-value is still shown). The test is performed on the raw untransformed data (N) and the log-transformed data (LN) to test for lognormality.

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

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

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

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

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

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

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

Number of NDs - number of non-detects.

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C01

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Arsenic	Beryllium	Aroclor-1254	Aroclor-1260
RLS-C01-1	1.07 -	0.941 -	0.975 -	0.941 -	4.76 J	7.34 J	0.683 -	4.5 J	3.9 U
RLS-C01-2	0.981 -	0.759 -	0.752 -	0.759 -	3.66 U	5.1 J	0.425 -	3.8 U	3.8 U
RLS-C01-3	1.6 -	1.24 -	1.3 -	1.24 -	7.89 -	10.8 J	0.571 -	4.5 U	4.5 U
RLS-C01-5	1.11 -	0.84 -	0.883 -	0.84 -	2.89 U	5.89 J	0.517 -	3.9 U	3.9 U
RLS-C01-7	0.935 -	0.769 -	0.733 -	0.769 -	3.28 U	4.93 J	0.468 -	3.8 U	3.8 U
RLS-C01-8	1.68 -	1.27 -	1.27 -	1.27 -	3.96 U	8.96 J	0.809 -	4.1 U	4.1 U
RLS-C01-8-D	1.53 -	1.29 -	1.39 -	1.29 -	10.7 -	12.1 J	0.942 -	4.1 U	4.1 U
RLS-C01-10	0.605 -	0.416 -	0.413 -	0.416 -	2.39 U	7.24 J	0.464 -	3.8 U	3.8 U
RLS-C01-11	0.987 -	0.961 -	1 -	0.961 -	4.05 U	4.61 J	0.472 -	3.9 U	3.9 U
RLS-C01-12	0.978 -	0.735 -	0.755 -	0.735 -	5.53 U	5.51 J	0.445 -	3.7 U	3.7 U
RLS-C01-13	0.997 -	0.741 -	0.753 -	0.741 -	6.05 J	5.32 J	0.596 -	3.9 U	3.9 U
RLS-C01-15	1.05 -	0.691 -	0.627 -	0.691 -	5.9 J	4.53 J	0.364 -	3.8 U	3.8 U
RLS-C01-16	1.06 -	0.683 -	0.684 -	0.683 -	4.7 J	7 J	0.49 -	3.6 U	3.6 U
Limit	1.7	1.8	1.7	1.5	82	12.0	1.5	130	130
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.68	1.29	1.39	1.29	10.7	12.1	0 .942	4.5	4.5 U
Max. >= Limit	No	No	No	No	No	Yes	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	9.2% (LN)	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	Lognormal	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	6	0	0	11	12
% Nondetects	0%	0%	0%	0%	50%	0%	0%	92%	100%
Est. Mean*	- -	- -	- -	- -	- -	6.699	- -	- -	- -
UCL	- -	- -	- -	- -	- -	7.703	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	pass	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	2	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	Pass	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C02

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Arsenic	Beryllium	Aroclor-1254	Aroclor-1260
RLS-C02-1	1.06 -	1 -	1.01 -	1 -	5.35 -	6.6 J	0.62 -	3.9 U	3.9 U
RLS-C02-2	1.16 -	0.992 -	1.33 -	0.992 -	4.27 -	6.7 J	0.64 -	3.8 U	3.8 U
RLS-C02-4	1.82 -	1.41 -	1.4 -	1.41 -	6.09 -	9.3 J	1.2 -	4.1 U	4.1 U
RLS-C02-5	0.946 -	1.11 -	1.12 -	1.11 -	2.26 U	7.2 J	0.79 -	3.9 U	3.9 U
RLS-C02-5-D	0.915 -	1.06 -	1.06 -	1.06 -	5.09 -	9.5 J	0.8 -	4 U	4 U
RLS-C02-6	1.23 J	1.25 J	1.28 J	1.25 J	6.57 -	8.4 -	0.77 J	4.1 U	4.1 U
RLS-C02-8	1.2 -	1.46 -	1.47 -	1.46 -	5.99 -	8 J	0.92 -	4.2 U	4.2 U
RLS-C02-9	1.49 -	1.32 -	1.35 -	1.32 -	5.34 -	9.1 J	0.79 -	4 U	4 U
RLS-C02-10	1.37 J	1.34 J	1.39 J	1.34 J	5.15 -	8.8 -	0.89 J	4.1 U	4.1 U
RLS-C02-12	0.745 -	0.673 -	0.695 -	0.673 -	3.65 -	4.9 J	0.58 -	3.7 U	3.7 U
RLS-C02-13	0.791 J	0.623 J	0.632 J	0.623 J	2.16 J	4.8 -	0.37 J	3.7 U	3.7 U
RLS-C02-14	0.872 J	0.729 J	0.733 J	0.729 J	3.66 J	4.9 -	0.45 J	3.8 U	3.8 U
RLS-C02-15	0.806 -	0.734 -	0.742 -	0.734 -	3.44 -	5.2 J	0.49 -	3.7 U	3.7 U
Limit	1.7	1.8	1.7	1.5	82	12	1.5	130	130
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.82	1.46	1.47	1.46	6.57	9.5	1.2	4.2 U	4.2 U
Max. > Limit	Yes	No	No	No	No	No	No	No	No
W-statistic Prob. #	73.2% (LN)	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	Lognormal	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	0	0	12	12
% Nondetects	0%	0%	0%	0%	0%	0%	0%	100%	100%
Est. Mean*	1.127	- -	- -	- -	- -	- -	- -	- -	- -
UCL	1.322	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	pass	- -	- -	- -	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C03

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Arsenic	Beryllium	Aroclor-1254	Aroclor-1260
RLS-C03-1	1.11 J	1 J	1.03 J	1 J	5.09 -	7 J	0.89 -	3.9 U	3.9 U
RLS-C03-2	0.933 J	0.974 J	0.966 J	0.974 J	8.21 -	4.8 J	0.6 -	4 U	4 U
RLS-C03-3	1.11 J	1.23 J	1.25 J	1.23 J	3.37 U	7.2 J	0.91 -	4 U	4 U
RLS-C03-5	1.12 J	1.27 J	1.3 J	1.27 J	6.64 -	6.1 J	0.74 -	3.9 U	3.9 U
RLS-C03-6	1.66 J	1.29 J	1.29 J	1.29 J	2.7 U	13.1 J	1.1 -	4.2 U	4.2 U
RLS-C03-6-D	1.38 J	1.07 J	1.01 J	1.07 J	5.19 -	7.9 J	0.96 -	4.1 U	4.1 U
RLS-C03-7	1.32 J	1.1 J	1.09 J	1.1 J	6.4 -	7.2 J	1.1 -	4.3 U	4.3 U
RLS-C03-9	1.43 J	1.24 J	1.23 J	1.24 J	3.87 J	7.3 J	1.1 -	4 U	4 U
RLS-C03-10	0.736 J	0.699 J	0.704 J	0.699 J	3.91 J	4.3 J	0.64 -	3.8 U	3.8 U
RLS-C03-11	0.771 J	0.715 J	0.759 J	0.715 J	3.86 J	4.8 J	0.61 -	3.7 U	3.7 U
RLS-C03-13	0.837 J	0.765 J	0.762 J	0.765 J	3.28 J	3.9 J	0.6 -	3.8 U	3.8 U
RLS-C03-14	0.693 J	0.62 J	0.64 J	0.62 J	4.65 J	7.8 J	0.44 -	3.8 U	3.8 U
RLS-C03-16	0.853 J	0.722 J	0.721 J	0.722 J	3.27 U	3.4 J	0.77 -	3.8 U	3.8 U
Limit	1.7	1.8	1.7	1.5	82	12	1.5	130	130
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.66	1.29	1.3	1.29	8.21	13.1	1.1	4.3 U	4.3 U
Max. >= Limit	No	No	No	No	No	Yes	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	49.3% (LN)	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	Lognormal	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	2	0	0	12	12
% Nondetects	0%	0%	0%	0%	17%	0%	0%	100%	100%
Est. Mean*	- -	- -	- -	- -	- -	6.429	- -	- -	- -
UCL	- -	- -	- -	- -	- -	7.589	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	pass	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	3	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	Pass	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C04

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Thorium-230	Arsenic	Beryllium
RLS-C04-1	0.81 J	0.926 J	0.937 J	0.926 J	9.62 -	2.08 U	1.08 J	9.8 -	0.72 -
RLS-C04-3	0.96 -	1.06 -	1.05 -	1.06 -	5.51 J	2.19 U	1.16 J	5.5 -	0.58 J
RLS-C04-4	0.946 -	0.873 -	0.858 -	0.873 -	5.33 J	2.02 U	1.31 J	6.3 -	0.65 J
RLS-C04-5	0.827 J	1.06 J	1.06 J	1.06 J	5.37 -	1.97 U	0.824 J	5.1 -	0.34 -
RLS-C04-7	1.34 -	1.12 -	1.1 -	1.12 -	4.94 J	1.95 U	1.13 J	10.5 -	0.76 J
RLS-C04-8	1 -	1.1 J	1.13 J	1.1 J	4.1 -	1.88 U	1.48 -	13 J	0.73 -
RLS-C04-9	1.29 J	1.13 J	1.18 J	1.13 J	7.49 -	1.56 U	2.1 J	7.7 -	1.1 J
RLS-C04-9-D	0.976 J	1.05 J	1.08 J	1.05 J	5.8 -	1.51 U	1.01 -	8.6 -	0.71 J
RLS-C04-11	0.821 -	0.831 -	0.807 -	0.831 -	4.68 -	1.65 U	1.8 J	6.3 J	0.68 -
RLS-C04-12	1.12 J	1.02 J	1.03 J	1.02 J	4.7 -	1.47 U	1.17 -	7 -	0.65 J
RLS-C04-14	0.834	0.799 -	0.777 -	0.799 -	2.91 U	1.62 U	1.93 J	7.2 J	0.65 -
RLS-C04-15	0.895 -	0.89 J	0.889 J	0.89 J	3.43 -	1.67 U	1.03 -	5.4 -	0.6 -
RLS-C04-16	0.903 -	0.903 J	0.91 J	0.903 J	2.45 U	1.55 U	0.876 -	5 -	0.66 -
Limit	1.7	1.8	1.7	1.5	82	30	280	12	1.5
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.34	1.13	1.18	1.13	9.62	2.19 U	2.1	13	1.1
Max. > Limit	No	No	No	No	No	No	No	Yes	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	36.7% (LN)	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	Lognormal	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	2	12	0	0	0
% Nondetects	0%	0%	0%	0%	17%	100%	0%	0%	0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	7.488	- -
UCL	- -	- -	- -	- -	- -	- -	- -	8.568	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	Pass	- -

a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	3	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	Pass	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C04

SAMPLE ID	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene
RLS-C04-1	49.5 U	62.8 J	49.5 U	169 -	49.5 U	49.5 U	49.5 U
RLS-C04-3	38.6 U	38.6 U	38.6 U	38.6 U	38.6 U	38.6 U	38.6 U
RLS-C04-4	37.6 U	37.6 U	37.6 U	37.6 U	37.6 U	37.6 U	37.6 U
RLS-C04-5	43.2 U	43.2 U	43.2 U	43.2 U	43.2 U	43.2 U	43.2 U
RLS-C04-7	39.7 U	39.7 U	39.7 U	39.7 U	39.7 U	39.7 U	39.7 U
RLS-C04-8	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U
RLS-C04-9	39 U	39 U	39 U	39 U	39 U	39 U	39 U
RLS-C04-9-D	38.9 U	38.9 U	38.9 U	38.9 U	38.9 U	38.9 U	38.9 U
RLS-C04-11	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U
RLS-C04-12	39 U	39 U	39 U	39 U	39 U	39 U	39 U
RLS-C04-14	38 U	38 U	38 U	38 U	38 U	38 U	38 U
RLS-C04-15	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U
RLS-C04-16	38 U	38 U	38 U	38 U	38 U	38 U	38 U
Limit	20000	2000	20000	*1000 (No FRL)*	200000	2000000	2000
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	49.5 U	62.8	49.5 U	169	49.5 U	49.5 U	49.5 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	12	11	12	11	12	12	12
% Nondetects	100%	92%	100%	92%	100%	100%	100%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C04

SAMPLE ID	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	1,1-Dichloroethene	Bromodichloromethane	Tetrachloroethene
RLS-C04-1	49.5 U	49.5 U	49.5 U	49.5 U	0.9 U	0.9 U	0.9 U
RLS-C04-3	38.6 U	38.6 U	38.6 U	38.6 U	0.9 U	1.1 U	0.9 U
RLS-C04-4	37.6 U	37.6 U	37.6 U	37.6 U	0.9 U	0.9 U	0.9 U
RLS-C04-5	43.2 U	43.2 U	43.2 U	43.2 U	1.1 U	1 U	1.1 U
RLS-C04-7	39.7 U	39.7 U	39.7 U	39.7 U	1 U	1 U	1 U
RLS-C04-8	39.1 U	39.1 U	39.1 U	39.1 U	1 U	1 U	1 U
RLS-C04-9	39 U	39 U	39 U	39 U	0.9 U	0.9 U	0.9 U
RLS-C04-9-D	38.9 U	38.9 U	38.9 U	38.9 U	1.1 U	1.1 U	1.1 U
RLS-C04-11	37.9 U	37.9 U	37.9 U	37.9 U	1.1 U	1.1 U	1.1 U
RLS-C04-12	39 U	39 U	37.6 U	39 U	0.9 U	0.9 U	0.9 U
RLS-C04-14	38 U	38 U	38 U	38 U	1 U	1 U	1 U
RLS-C04-15	39.1 U	39.1 U	39.1 U	39.1 U	1 U	1 U	1 U
RLS-C04-16	38 U	38 U	38 U	38 U	1 U	1 U	1 U
Limit	*10000 (No FRL)*	20000	*5000 (No FRL)*	*10000 (No FRL)*	410	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	49.5 U	49.5 U	49.5 U	49.5 U	1.1 U	1.1 U	1.1 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12
Nondetects	12	12	12	12	12	12	12
% Nondetects	100%	100%	100%	100%	100%	100%	100%
Est. Mean*	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C05

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Thorium-230	Arsenic	Beryllium
RLS-C05-1	0.89 J	0.79 J	0.823 J	0.79 J	4.31 -	1.59 U	0.382 U	6.1 -	0.46 -
RLS-C05-2	0.769 J	0.822 J	0.835 J	0.822 J	5.09 -	1.86 U	0.701 J	6.2 -	0.54 -
RLS-C05-4	0.707 J	0.648 J	0.663 J	0.648 J	4.93 -	1.8 U	0.586 U	5.6 -	0.38 -
RLS-C05-5	0.818 J	0.755 J	0.732 J	0.755 J	4.44 -	1.7 U	0.919 J	5.9 -	0.62 -
RLS-C05-7	1 -	0.827 -	0.885 -	0.827 -	5.43 -	1.92 U	0.687 J	7.4 J	0.78 -
RLS-C05-8	0.911 -	0.886 -	0.921 -	0.886 -	4.3 J	1.79 U	2.01 J	6.2 J	0.66 -
RLS-C05-9	0.775 J	0.68 J	0.662 J	0.68 J	3.99 -	1.49 U	1.1 J	5.1 -	0.42 -
RLS-C05-10	1.1 J	1.19 J	1.22 J	1.19 J	6.02 -	1.7 U	1.23 J	6.8 -	0.67 -
RLS-C05-11	0.991 -	0.988 -	0.992 -	0.988 -	3.78 J	1.93 U	1.4 J	6.4 -	0.69 J
RLS-C05-13	0.859 J	0.812 J	0.806 J	0.812 J	4.27 -	1.74 U	0.991 J	7.6 -	0.63 -
RLS-C05-14	0.948 J	0.868 J	0.85 J	0.868 J	4.63 -	1.92 U	1.28 J	8 -	0.68 -
RLS-C05-14-D	0.758 J	1.06 J	1.07 J	1.06 J	4.93 -	1.91 U	0.623 J	7.9 -	0.77 -
RLS-C05-15	1.47 J	1.32 J	1.32 J	1.32 J	5.83 -	1.57 U	1.68 -	9 -	0.91 J
Limit	1.7	1.8	1.7	1.5	82	30	280	12	1.5
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.47	1.32	1.32	1.32	6.02	1.93 U	2.01	9	0.91
Max. > Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	2	0	0
% Nondetects	0%	0%	0%	0%	0%	100%	17%	0%	0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C05

SAMPLE ID	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene
RLS-C05-1	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U
RLS-C05-2	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U
RLS-C05-4	38.2 U	52.8 J	38.2 U	131 -	38.2 U	38.2 U	38.2 U
RLS-C05-5	39.5 U	39.5 U	39.5 U	39.5 U	39.5 U	39.5 U	39.5 U
RLS-C05-7	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U	38.1 U
RLS-C05-8	38.2 U	38.2 U	38.2 U	38.2 U	38.2 U	38.2 U	38.2 U
RLS-C05-9	37.7 U	37.7 U	37.7 U	37.7 U	37.7 U	37.7 U	37.7 U
RLS-C05-10	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U
RLS-C05-11	39.3 U	39.3 U	39.3 U	39.3 U	39.3 U	39.3 U	39.3 U
RLS-C05-13	44.7 U	54.2 J	44.7 U	44.7 U	44.7 U	44.7 U	44.7 U
RLS-C05-14	45.8 U	45.8 U	45.8 U	45.8 U	45.8 U	45.8 U	45.8 U
RLS-C05-14-D	44.5 U	44.5 U	44.5 U	44.5 U	44.5 U	44.5 U	44.5 U
RLS-C05-15	40 U	40 U	40 U	40 U	40 U	40 U	40 U
Limit	20000	2000	20000	*1000 (No FRL)*	200000	2000000	2000
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	45.8 U	54.2	45.8 U	131	45.8 U	45.8 U	45.8 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12
Nondetects	12	10	12	11	12	12	12
% Nondetects	100%	83%	100%	92%	100%	100%	100%
Est. Mean*	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C05

SAMPLE ID	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	1,1-Dichloroethene	Bromodichloromethane	Tetrachloroethene
RLS-C05-1	38.1 U	38.1 U	38.1 U	38.1 U	1 U	1 U	1 U
RLS-C05-2	38.1 U	38.1 U	38.1 U	38.1 U	0.9 U	0.9 U	0.9 U
RLS-C05-4	44.5 J	154 -	38.2 U	38.2 U	0.8 U	0.8 U	0.8 U
RLS-C05-5	39.5 U	39.5 U	39.5 U	39.5 U	0.8 U	0.8 U	0.8 U
RLS-C05-7	38.1 U	38.1 U	38.1 U	38.1 U	1 U	1 U	1 U
RLS-C05-8	38.2 U	38.2 U	38.2 U	38.2 U	0.8 U	0.8 U	0.8 U
RLS-C05-9	37.7 U	37.7 U	37.7 U	37.7 U	1.1 U	1.1 U	1.1 U
RLS-C05-10	38.5 U	38.5 U	38.5 U	38.5 U	0.8 U	0.8 U	0.8 U
RLS-C05-11	39.3 U	39.3 U	39.3 U	39.3 U	0.9 U	0.9 U	0.9 U
RLS-C05-13	56.4 J	44.7 U	44.7 U	44.7 U	1 U	1 U	1 U
RLS-C05-14	45.8 U	45.8 U	45.8 U	45.8 U	1.3 U	1.3 U	1.3 U
RLS-C05-14-D	44.5 U	44.5 U	44.5 U	44.5 U	1.2 U	1.2 U	1.2 U
RLS-C05-15	40 U	40 U	40 U	40 U	0.9 U	0.9 U	0.9 U
Limit	*10000 (No FRL)*	20000	*5000 (No FRL)*	*10000 (No FRL)*	410	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	56.4	154	45.8 U	45.8 U	1.3 U	1.3 U	1.3 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12
Nondetects	11	11	12	12	12	12	12
% Nondetects	92%	92%	100%	100%	100%	100%	100%
Est. Mean*	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C06

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Antimony	Arsenic	Beryllium
RLS-C06-1	0.826 J	0.718 J	0.715 J	0.718 J	3.3 J	1.43 U	2.12 UJ	6.4 J	0.52 -
RLS-C06-1-D	1.07 J	0.94 J	0.963 J	0.94 J	3.32 U	1.32 U	3.4 U	5.1 J	0.47 -
RLS-C06-2	0.801 J	0.766 J	0.753 J	0.766 J	3.89 -	1.2 U	2.17 UJ	8.1 J	0.45 -
RLS-C06-3	0.922 J	0.79 J	0.787 J	0.79 J	5.01 -	1.18 U	0.74 U	5 J	0.43 -
RLS-C06-5	0.889 -	0.852 -	0.848 -	0.852 -	4.2 -	1.8 U	2.18 UJ	5.8 J	0.55 -
RLS-C06-7	1.18 -	0.994 -	1.01 -	0.994 -	6.46 -	1.66 U	0.92 U	7 J	0.69 -
RLS-C06-8	0.769 -	0.739 -	0.753 -	0.739 -	4.27 -	1.94 U	0.78 J	5 -	0.52 -
RLS-C06-9	0.884 -	0.722 -	0.762 -	0.722 -	2.93 U	1.92 U	0.442 UJ	6.4 -	0.61 -
RLS-C06-10	0.808 -	0.771 -	0.757 -	0.771 -	4.6 -	1.85 U	2.15 UJ	5.1 -	0.56 -
RLS-C06-12	1.5 -	1.21 -	1.22 -	1.21 -	6.62 -	0.884 U	0.652 U	4.87 -	0.561 -
RLS-C06-13	1.12 -	0.768 -	0.786 -	0.768 -	3.95 J	0.848 U	0.728 U	11.3 -	1.1 -
RLS-C06-15	1.11 -	1.07 -	1.02 -	1.07 -	2.65 J	0.846 U	0.667 U	2.94 -	0.902 -
RLS-C06-16	1.2 -	1.12 -	1.25 -	1.12 -	4.71 J	0.853 U	0.745 U	9.87 -	0.877 -
Limit	1.7	1.8	1.7	1.5	82	30	96	12	1.5
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.5	1.21	1.25	1.21	6.62	1.94 U	0.78	11.3	1.1
Max. > Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	1	12	11	0	0
% Nondetects	0%	0%	0%	0%	8%	100%	92%	0%	0%
Est. Mean*	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--	--

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C06

SAMPLE ID	Silver	Fluoride	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Carbazole	Dibenzo(a,h)anthracene
RLS-C06-1	0.054 J	2 J	37 U	37 U	37 U	370 U	37 U
RLS-C06-1-D	0.045 J	1.9 J	37.1 U	37.1 U	37.1 U	371 U	37.1 U
RLS-C06-2	0.045 J	2 J	36.9 U	36.9 U	36.9 U	369 U	36.9 U
RLS-C06-3	0.0439 U	2.2 J	37.3 U	37.3 U	37.3 U	373 U	37.3 U
RLS-C06-5	0.055 J	2.32 J	37.5 U	37.5 U	37.5 U	375 UJ	37.5 U
RLS-C06-7	0.067 J	2.5 J	39.1 U	39.1 U	39.1 U	391 UJ	39.1 U
RLS-C06-8	0.047 J	2.34 J	36.8 U	36.8 U	36.8 U	368 U	36.8 U
RLS-C06-9	0.049 J	2.65 J	37.1 U	37.1 U	37.1 U	371 U	37.1 U
RLS-C06-10	0.054 J	2.71 J	37 U	37 U	37 U	370 U	37 U
RLS-C06-12	0.611 U	1.02 U	38.4 U	38.4 U	38.4 U	384 U	38.4 U
RLS-C06-13	0.683 U	1 U	40.6 U	40.6 U	40.6 U	406 U	40.6 U
RLS-C06-15	0.625 U	2.26 U	40.1 U	40.1 U	40.1 U	401 U	40.1 U
RLS-C06-16	0.698 U	1.87 U	40.2 U	40.2 U	40.2 U	402 U	40.2 U
Limit	29000	78000	20000	2000	20000	12000.0	2000
Units	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	0 .067	2.71	40.6 U	40.6 U	40.6 U	406 U	40.6 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	5	4	12	12	12	12	12
% Nondetects	42%	33%	100%	100%	100%	100%	100%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C06

SAMPLE ID	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260
RLS-C06-1	37 U	3.7 U	3.7 U
RLS-C06-1-D	37.1 U	3.7 U	3.7 U
RLS-C06-2	36.9 U	3.7 U	3.7 U
RLS-C06-3	37.3 U	3.7 U	3.7 U
RLS-C06-5	37.5 U	3.8 U	3.8 U
RLS-C06-7	39.1 U	3.9 U	3.9 U
RLS-C06-8	36.8 U	3.7 U	3.7 U
RLS-C06-9	37.1 U	3.7 U	3.7 U
RLS-C06-10	37 U	3.7 U	3.7 U
RLS-C06-12	38.4 U	3.8 U	3.8 U
RLS-C06-13	40.6 U	4.1 U	4.1 U
RLS-C06-15	40.1 U	4 U	4 U
RLS-C06-16	40.2 U	4 U	4 U
Limit	20000	130	130
Units	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%
Max. Result	40.6 U	4.1 U	4.1 U
Max. > Limit	No	No	No
W-statistic Prob. #	- -	- -	- -
Test Procedure	- -	- -	- -
Sample Size	12	12	12
Nondetects	12	12	12
% Nondetects	100%	100%	100%
Est. Mean*	- -	- -	- -
UCL	- -	- -	- -
Prob. > Limit	- -	- -	- -
Pass / Fail	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C07

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Antimony	Arsenic	Beryllium
RLS-C07-2	1.27 -	0.885 -	0.834 -	0.885 -	6.95 -	0.854 U	0.724 U	8.67 -	0.988 -
RLS-C07-3	1.34 -	1.13 -	1.09 -	1.13 -	4.17 -	0.9 U	0.627 UJ	9.5 -	0.879 -
RLS-C07-4	1.03 -	0.822 -	0.83 -	0.822 -	7.14 -	0.941 U	0.744 UJ	9.2 -	0.895 -
RLS-C07-6	1.16 -	0.878 -	0.82 -	0.878 -	2.66 U	0.932 U	0.716 U	8.62 -	0.7 -
RLS-C07-7	1.24 -	0.95 -	0.984 -	0.95 -	7.57 -	2.72 -	0.738 U	7.8 -	0.944 -
RLS-C07-8	0.934 J	0.873 J	0.904 J	0.873 J	2.68 U	1.37 U	3.6 U	7.9 J	0.65 -
RLS-C07-9	0.922 J	0.749 J	0.739 J	0.749 J	4.09 -	1.25 U	2.23 UJ	6 J	0.52 -
RLS-C07-11	0.73 J	0.786 J	0.813 J	0.786 J	4.2 -	1.3 U	0.66 U	5.5 J	0.46 -
RLS-C07-11-D	0.819 J	0.727 J	0.718 J	0.727 J	3.5 U	1.31 U	0.425 UJ	4.5 J	0.49 -
RLS-C07-12	1.02 J	0.829 J	0.846 J	0.829 J	4.04 U	1.28 U	2.19 UJ	5.8 J	0.52 -
RLS-C07-14	0.799 J	0.81 J	0.826 J	0.81 J	4.85 -	1.21 U	0.66 U	6.5 J	0.43 -
RLS-C07-15	0.973 J	0.954 J	0.936 J	0.954 J	4.44 -	1.42 U	2.22 UJ	6.5 J	0.58 -
RLS-C07-16	0.882 J	0.709 J	0.647 J	0.709 J	4.8 J	1.29 U	1.2 U	6.4 J	0.51 -
Limit	1.7	1.8	1.7	1.5	82	30	96	12	1.5
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.34	1.13	1.09	1.13	7.57	2.72	3.6 U	9.5	0 .988
Max. > Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	3	11	12	0	0
% Nondetects	0%	0%	0%	0%	25%	92%	100%	0%	0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C07

SAMPLE ID	Cadmium	Silver	Fluoride	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Carbazole
RLS-C07-2	0.56 J	0.679 U	0.977 U	39.9 U	39.9 U	39.9 U	399 U
RLS-C07-3	0.325 J	0.603 U	3.46 J	39.7 UJ	49.1 J	39.7 UJ	397 UJ
RLS-C07-4	0.301 J	0.698 U	2.92 J	38 UJ	44.6 J	38 UJ	380 UJ
RLS-C07-6	0.28 U	0.671 U	0.873 U	40.2 U	40.2 U	40.2 U	402 U
RLS-C07-7	0.366 J	0.692 U	0.756 U	40.9 U	40.9 U	40.9 U	409 U
RLS-C07-8	0.32 J	0.069 J	2.49 J	38 U	38 U	38 U	380 UJ
RLS-C07-9	0.26 J	0.048 J	1.73 J	37.5 U	37.5 U	37.5 U	375 U
RLS-C07-11	0.24 J	0.049 J	1.85 J	36.7 U	36.7 U	36.7 U	367 U
RLS-C07-11-D	0.27 J	0.055 J	1.61 J	36.6 U	36.6 U	36.6 U	366 U
RLS-C07-12	0.26 J	0.053 J	2.12 J	36.5 U	36.5 U	36.5 U	365 U
RLS-C07-14	0.28 J	0.058 J	2.42 J	37.5 U	37.5 U	37.5 U	375 U
RLS-C07-15	0.3 J	0.062 J	1.99 J	37 U	37 U	37 U	370 U
RLS-C07-16	0.25 J	0.054 J	1.94 J	36.7 U	36.7 U	36.7 U	367 U
Limit	82	29000	78000	20000	2000	20000	12000.0
Units	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	0 .56	0 .069	3.46	40.9 U	49.1	40.9 U	409 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	1	5	3	12	10	12	12
% Nondetects	8%	42%	25%	100%	83%	100%	100%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C07

SAMPLE ID	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260
RLS-C07-2	39.9 U	39.9 U	4 U	4 U
RLS-C07-3	39.7 UJ	39.7 UJ	4 U	4 U
RLS-C07-4	38 UJ	38 UJ	3.8 U	3.8 U
RLS-C07-6	40.2 U	40.2 U	4 U	4 U
RLS-C07-7	40.9 U	40.9 U	4.1 U	4.1 U
RLS-C07-8	38 U	38 U	3.8 U	3.8 U
RLS-C07-9	37.5 U	37.5 U	3.8 U	3.8 U
RLS-C07-11	36.7 U	36.7 U	3.7 U	3.7 U
RLS-C07-11-D	36.6 U	36.6 U	3.7 U	3.7 U
RLS-C07-12	36.5 U	36.5 U	3.7 U	3.7 U
RLS-C07-14	37.5 U	37.5 U	3.8 U	3.8 U
RLS-C07-15	37 U	37 U	3.7 U	3.7 U
RLS-C07-16	36.7 U	36.7 U	3.7 U	3.7 U
Limit	2000	20000	130	130
Units	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	40.9 U	40.9 U	4.1 U	4.1 U
Max. > Limit	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -
Sample Size	12	12	12	12
Nondetects	12	12	12	12
% Nondetects	100%	100%	100%	100%
Est. Mean*	- -	- -	- -	- -
UCL	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C08

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Thorium-230	Antimony	Cadmium
RLS-C08-1	1.08 J	0.98 J	1 J	0.98 J	10.6 -	1.89 U	2.64 -	2.34 UJ	0.37 J
RLS-C08-2	1 J	1.18 J	1.17 J	1.18 J	8.42 -	1.98 U	2.08 -	2.25 UJ	0.34 J
RLS-C08-4	0.899 J	0.907 J	0.926 J	0.907 J	9.07 -	1.76 U	2.13 -	0.428 UJ	0.42 J
RLS-C08-5	1.27 J	0.997 J	0.996 J	0.997 J	11.2 -	1.84 U	1.76 -	0.89 U	0.4 J
RLS-C08-5-D	0.911 J	0.806 J	0.842 J	0.806 J	11.9 -	1.67 U	1.75 -	2.21 UJ	0.4 J
RLS-C08-6	1.12 J	1.14 J	1.16 J	1.14 J	4.84 -	1.96 U	1.46 J	2.31 UJ	0.37 J
RLS-C08-7	0.797 J	0.775 J	0.769 J	0.775 J	8.15 -	1.82 U	1.56 J	0.444 UJ	0.34 J
RLS-C08-9	1.16 J	1.52 J	1.53 J	1.52 J	6.1 -	1.93 U	2.09 -	2.46 UJ	0.22 J
RLS-C08-10	1.06 J	0.959 J	1.14 J	0.959 J	13.7 -	2.03 U	2.09 -	2.34 UJ	0.37 J
RLS-C08-12	1.31 J	1.27 J	1.3 J	1.27 J	10.3 -	1.99 U	1.47 J	2.34 UJ	0.38 J
RLS-C08-14	0.977 -	0.964 -	0.94 -	0.964 -	12.6 -	1.84 U	2.72 -	0.932 UJ	0.23 U
RLS-C08-15	0.984 J	1.01 J	0.982 J	1.01 J	11.3 -	1.96 U	1.64 -	0.454 UJ	0.37 J
RLS-C08-16	1 J	0.855 J	0.858 J	0.855 J	13.1 -	1.88 U	1.85 -	2.14 UJ	0.32 J
Limit	1.7	1.8	1.7	1.5	82	30	280	96	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.31	1.52	1.53	1.52	13.7	2.03 U	2.72	2.46 UJ	0.42
Max. > Limit	No	No	No	Yes	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	68.2% (LN)	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	Lognormal	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	0	12	0	12	1
% Nondetects	0%	0%	0%	0%	0%	100%	0%	100%	8%
Est. Mean*	- -	- -	- -	1.047	- -	- -	- -	- -	- -
UCL	- -	- -	- -	1.159	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	pass	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	3	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	Pass	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C08

SAMPLE ID	Aroclor-1254	Aroclor-1260
RLS-C08-1	4 U	4 U
RLS-C08-2	3.9 U	3.9 U
RLS-C08-4	3.7 U	3.7 U
RLS-C08-5	3.9 U	3.9 U
RLS-C08-5-D	3.8 U	3.8 U
RLS-C08-6	4 U	4 U
RLS-C08-7	3.8 U	3.8 U
RLS-C08-9	4.1 U	4.1 U
RLS-C08-10	4 U	4 U
RLS-C08-12	4.1 U	4.1 U
RLS-C08-14	6.1 J	3.9 U
RLS-C08-15	4 U	4 U
RLS-C08-16	3.7 U	3.7 U
Limit	130	130
Units	ug/kg	ug/kg
Conf. Level	90%	90%
Max. Result	6.1	4.1 U
Max. > Limit	No	No
W-statistic Prob. #	- -	- -
Test Procedure	- -	- -
Sample Size	12	12
Nondetects	11	12
% Nondetects	92%	100%
Est. Mean*	- -	- -
UCL	- -	- -
Prob. > Limit	- -	- -
Pass / Fail	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C09

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Antimony	Beryllium
RLS-C09-1	0.902 -	0.803 J	0.802 -	0.803 J	10.8 -	1.78 U	6.1 J	1.5 -
RLS-C09-2	1.51 -	1.11 J	1.08 -	1.11 J	6.38 -	1.9 U	9.51 UJ	0.77 -
RLS-C09-3	1.1 -	1.08 -	1.07 -	1.08 -	5.53 -	2.41 U	0.483 UJ	0.82 J
RLS-C09-5	1.07 -	1.13 J	1.14 -	1.13 J	4.48 J	2.2 U	4.62 UJ	0.69 -
RLS-C09-6	1.07 -	1.09 J	1.09 -	1.09 J	6.2 -	1.88 U	9.5 UJ	0.94 -
RLS-C09-8	0.931 -	0.934 J	0.905 -	0.934 J	4.89 -	1.64 U	4.59 UJ	0.63 -
RLS-C09-9	1.39 -	1.09 J	1.1 -	1.09 J	4.35 -	1.94 U	9.37 UJ	0.91 -
RLS-C09-11	1.02 -	0.908 -	0.883 -	0.908 -	3.69 -	2.05 U	0.921 UJ	0.82 J
RLS-C09-12	0.84 -	0.693 -	0.694 -	0.693 -	2.87 U	2.41 U	0.941 UJ	0.72 J
RLS-C09-13	1.1 -	0.825 -	0.802 -	0.825 -	3.21 J	2.28 U	2.8 J	1.6 J
RLS-C09-13-D	0.916 -	0.878 -	0.873 -	0.878 -	4.31 -	2.26 U	0.921 UJ	0.73 J
RLS-C09-14	1.01 -	0.879 -	0.898 -	0.879 -	2.77 J	2.35 U	0.957 UJ	0.4 J
RLS-C09-16	1.03 -	0.752 -	0.725 -	0.752 -	3.05 J	1.02 U	0.501 U	0.603 -
Limit	1.7	1.8	1.7	1.5	82	30	96	1.5
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.51	1.13	1.14	1.13	10.8	2.41 U	6.1	1.6
Max. > Limit	No	No	No	No	No	No	No	Yes
W-statistic Prob. #	--	--	--	--	--	--	--	47.1% (LN)
Test Procedure	--	--	--	--	--	--	--	Lognormal
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	1	12	10	0
% Nondetects	0%	0%	0%	0%	8%	100%	83%	0%
Est. Mean*	--	--	--	--	--	--	--	0.870
UCL	--	--	--	--	--	--	--	1.030
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	pass

a posteriori Sample	--	--	--	--	--	--	--	3
Size calculation	--	--	--	--	--	--	--	Pass

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-10

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230	Antimony
RLS-C10-1	0.71 J	0.683 -	0.701 -	0.683 -	2.86 J	0.0277 U	1.09 -	1.49 J	0.419 U
RLS-C10-2	0.704 J	0.525 -	0.514 -	0.525 -	4.95 -	0.0295 U	0.853 U	1.19 J	0.391 U
RLS-C10-3	1.17 J	1.01 -	0.958 -	1.01 -	2.78 U	0.0498 U	3.56 -	1.77 J	0.551 J
RLS-C10-5	1.01 -	1.05 J	1.06 J	1.05 J	4.77 -	0.0738 U	1.97 U	2.87 -	1.02 UJ
RLS-C10-7	0.898 -	1.06 -	1.06 -	1.06 -	3.56 -	0.031 U	2.04 U	1.67 -	4.81 UJ
RLS-C10-8	1.05 -	1.05 J	1.06 J	1.05 J	5.78 -	0.0384 U	2.02 U	0.777 J	0.464 UJ
RLS-C10-9	0.897 -	0.89 J	0.895 J	0.89 J	5.44 -	0.0359 U	2.03 U	0.961 J	0.53 U
RLS-C10-11	1.19 -	1.05 -	1.08 -	1.05 -	12.7 -	0.222 -	2.25 U	2.23 -	9.7 UJ
RLS-C10-12	1.06 -	1.11 J	1.15 J	1.11 J	4.72 -	0.0743 U	1.63 U	1 J	0.486 UJ
RLS-C10-12-D	0.909 -	0.6 J	0.592 J	0.6 J	4.04 -	0.0314 U	1.66 U	0.99 J	3.4 U
RLS-C10-13	1.03 -	0.975 J	0.974 J	0.975 J	5.47 -	0.0344 U	1.76 U	1.6 -	0.466 UJ
RLS-C10-14	1.14 -	1.16 J	1.17 J	1.16 J	5.65 -	0.0587 U	1.77 U	0.843 J	0.475 UJ
RLS-C10-16	1.16 -	1 J	0.979 J	1 J	9.65 -	0.0511 U	1.82 U	0.82 J	0.472 UJ
Limit	1.7	1.8	1.7	1.5	82	1.4	30	280	96
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.19	1.16	1.17	1.16	12.7	0 .222	3.56	2.87	0.551
Max. > Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	1	11	10	0	11
% Nondetects	0%	0%	0%	0%	8%	92%	83%	0%	92%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-10

SAMPLE ID	Arsenic	Beryllium	Silver	Fluoride	Benzo(a)pyrene	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene
RLS-C10-1	9.18 J	0.536 -	0.592 U	1.28 U	39.1 U	39.1 U	39.1 U
RLS-C10-2	6.99 J	0.212 -	0.552 U	1.39 U	190 -	205 -	38.9 U
RLS-C10-3	12.2 J	0.81 -	0.661 U	1.92 U	39.6 U	39.6 U	39.6 U
RLS-C10-5	7.5 J	1.1 -	0.075 J	1.06 U	42.7 U	42.7 U	42.7 U
RLS-C10-7	11.3 -	0.9 -	0.08 J	2.34 U	40.1 U	40.1 U	40.1 U
RLS-C10-8	5.5 J	0.66 -	0.06 J	1.35 U	39.2 U	47.5 J	39.2 U
RLS-C10-9	6 J	0.58 -	0.055 J	1.18 U	40.5 U	48.2 J	40.5 U
RLS-C10-11	5.1 -	0.46 -	0.052 J	2.27 U	40.6 U	40.6 U	40.6 U
RLS-C10-12	2.3 J	0.42 -	0.0484 U	1.19 U	40.5 U	40.5 U	40.5 U
RLS-C10-12-D	4.9 J	0.43 -	0.047 J	1.12 U	36.4 U	36.4 U	36.4 U
RLS-C10-13	5.6 J	0.53 -	0.055 J	1.02 U	39.7 U	39.7 U	39.7 U
RLS-C10-14	5.3 J	0.64 -	0.061 J	1.34 U	41.3 U	41.3 U	41.3 U
RLS-C10-16	9.1 J	0.79 -	0.072 J	0.87 U	41.1 U	41.1 U	41.1 U
Limit	12	1.5	29000	78000	2000	20000	2000
Units	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	12.2	1.1	0 .08	2.34 U	190	205	42.7 U
Max. > Limit	Yes	No	No	No	No	No	No
W-statistic Prob. #	21.0% (LN)	- -	- -	- -	- -	- -	- -
Test Procedure	Lognormal	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	3	12	11	9	12
% Nondetects	0%	0%	25%	100%	92%	75%	100%
Est. Mean*	7.406	- -	- -	- -	- -	- -	- -
UCL	8.511	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	pass	- -	- -	- -	- -	- -	- -

a posteriori Sample	3	- -	- -	- -	- -	- -	- -
Size calculation	Pass	- -	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-10

SAMPLE ID	Indeno(1,2,3-cd)pyrene	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene	Bromodichloromethane	Tetrachloroethene
RLS-C10-1	39.1 U	3.9 U	3.9 U	1.6 U	1.2 U	1.2 U	1.2 U
RLS-C10-2	292 -	3.9 U	3.9 U	1.6 U	1.2 U	1.2 U	1.2 U
RLS-C10-3	39.6 U	4 U	4 U	1.6 U	1.2 U	1.2 U	1.2 U
RLS-C10-5	42.7 U	4.3 U	4.3 U	1.7 U	1 U	1 U	1 U
RLS-C10-7	40.1 U	4 U	4 U	1.6 U	1.1 U	1.1 U	1.1 U
RLS-C10-8	116 -	3.9 U	3.9 U	1.6 U	1.2 U	1.2 U	1.2 U
RLS-C10-9	118 -	4.1 U	4.1 U	1.6 U	1.3 U	1.3 U	1.3 U
RLS-C10-11	40.6 U	4.1 U	4.1 U	1.6 U	1.4 U	1.4 U	1.4 U
RLS-C10-12	40.5 U	4.1 U	4.1 U	1.6 U	1 U	1 U	1 U
RLS-C10-12-D	36.4 U	3.6 U	3.6 U	1.5 U	1.5 U	1.5 U	1.5 U
RLS-C10-13	39.7 U	4 U	4 U	1.6 U	1 U	1 U	1 U
RLS-C10-14	41.3 U	4.1 U	4.1 U	1.7 U	1.2 U	1.2 U	1.2 U
RLS-C10-16	107 -	4.1 U	4.1 U	1.6 U	1.1 U	1.1 U	1.1 U
Limit	20000	130	130	15	410	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	292	4.3 U	4.3 U	1.7 U	1.5 U	1.5 U	1.5 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	8	12	12	12	12	12	12
% Nondetects	67%	100%	100%	100%	100%	100%	100%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C11

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230	Antimony
RLS-C11-2	1.25 J	1.25 -	1.25 -	1.25 -	6.1 -	0.073 U	1.9 U	1.67 J	1.2 J
RLS-C11-2-D	1.16 J	1.12 -	1.15 -	1.12 -	4.96 -	0.0428 U	1.74 U	1.16 J	0.98 J
RLS-C11-3	1.09 -	1.01 -	1.03 -	1.01 -	5.61 -	0.0549 U	1.62 U	1.31 -	4.95 UJ
RLS-C11-4	1.26 -	1.05 -	1.03 -	1.05 -	2.77 J	0.0555 U	1.43 U	1.29 -	4.93 UJ
RLS-C11-6	1.06 -	0.99 -	0.955 -	0.99 -	6.32 -	0.0528 U	1.35 U	2.24 -	9.56 UJ
RLS-C11-7	1.23 -	0.924 -	0.904 -	0.924 -	5.82 -	0.0334 U	0.84 U	1.54 J	0.751 U
RLS-C11-8	1.15 -	0.996 -	1.04 -	0.996 -	4.25 J	0.0594 U	0.771 U	3.28 J	0.674 U
RLS-C11-9	1.16 -	0.907 -	0.878 -	0.907 -	4.77 J	0.0562 U	1.46 U	1.2 -	4.76 UJ
RLS-C11-11	1.33 J	1.04 -	1.01 -	1.04 -	6.74 -	0.0411 U	0.847 U	2.2 J	0.552 J
RLS-C11-12	1.22 J	1.02 -	1.07 -	1.02 -	5.11 -	0.037 U	0.816 U	1.58 J	0.459 U
RLS-C11-13	1.05 J	0.985 -	0.991 -	0.985 -	2.39 U	0.0383 U	1.76 U	0.882 J	0.62 J
RLS-C11-14	1.35 J	1.11 -	1.07 -	1.11 -	5.91 -	0.0358 U	0.845 U	2.03 J	0.539 J
RLS-C11-16	1.12 J	0.997 -	0.992 -	0.997 -	6.96 -	0.0555 U	0.887 U	2.14 J	0.506 J
Limit	1.7	1.8	1.7	1.5	82	1.4	30	280	96
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.35	1.25	1.25	1.25	6.96	0.073 U	1.9 U	3.28	1.2
Max. > Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	1	12	12	0	7
% Nondetects	0%	0%	0%	0%	8%	100%	100%	0%	58%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C11

SAMPLE ID	Arsenic	Beryllium	Fluoride	Benzo(a)pyrene	Benzo(b)fluoranthene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene
RLS-C11-2	6.6 J	0.76 -	1.99 J	40.9 U	40.9 U	40.9 U	40.9 U
RLS-C11-2-D	6.5 J	0.78 -	1.68 J	41.1 U	124 J	41.1 U	41.1 U
RLS-C11-3	10.2 -	0.89 -	1.71 U	40 U	40 U	40 U	40 U
RLS-C11-4	6.9 -	0.73 -	1.91 U	63.3 J	77.5 J	40.6 U	40.6 U
RLS-C11-6	6 -	0.7 -	1.31 U	50.9 J	41 U	41 U	41 U
RLS-C11-7	5.15 -	0.733 -	2.33 J	42.6 U	129 -	42.6 U	42.6 U
RLS-C11-8	7.87 -	0.6 -	2.01 J	47.1 J	131 -	41.8 U	41.8 U
RLS-C11-9	6.1 -	0.94 -	1.66 U	50.8 J	41 U	41 U	41 U
RLS-C11-11	11.2 J	0.507 -	1.38 U	41.5 U	41.5 U	41.5 U	41.5 U
RLS-C11-12	6.29 J	0.536 -	0.987 U	119 -	99.7 J	40.7 U	40.7 U
RLS-C11-13	5.7 J	0.55 -	1.5 J	41 U	41 U	41 U	41 U
RLS-C11-14	12.8 J	0.843 -	1.23 U	40.9 U	40.9 U	40.9 U	40.9 U
RLS-C11-16	10.9 J	0.757 -	1.29 U	40.5 U	40.5 U	40.5 U	40.5 U
Limit	12	1.5	78000	2000	20000	2000	20000
Units	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	12.8	0 .94	2.33	119	131	42.6 U	42.6 U
Max. > Limit	Yes	No	No	No	No	No	No
W-statistic Prob. #	18.5% (LN)	- -	- -	- -	- -	- -	- -
Test Procedure	Lognormal	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	0	8	7	7	12	12
% Nondetects	0%	0%	67%	58%	58%	100%	100%
Est. Mean*	7.995	- -	- -	- -	- -	- -	- -
UCL	9.136	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	pass	- -	- -	- -	- -	- -	- -
a posteriori Sample	3	- -	- -	- -	- -	- -	- -
Size calculation	Pass	- -	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C11

SAMPLE ID	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene	Bromodichloromethane	Tetrachloroethene
RLS-C11-2	4.1 U	4.1 U	1.6 U	1 U	1 U	1 U
RLS-C11-2-D	4.1 U	4.1 U	1.6 U	1.1 U	1.1 U	1.1 U
RLS-C11-3	4.1 U	4.1 U	1.7 U	1 U	1 U	1 U
RLS-C11-4	4.1 U	4.1 U	1.7 U	1.1 U	1.1 U	1.1 U
RLS-C11-6	4 U	4 U	1.6 U	1 U	1 U	1 U
RLS-C11-7	4.3 U	4.3 U	1.7 U	1 U	1 U	1 U
RLS-C11-8	4.2 U	4.2 U	1.7 U	1.2 U	1.2 U	1.2 U
RLS-C11-9	4.1 U	4.1 U	1.6 U	1 U	1 U	1 U
RLS-C11-11	4.2 U	4.2 U	1.7 U	1.1 U	1.1 U	1.1 U
RLS-C11-12	5.8 J	4.1 U	1.6 U	1.2 U	1.2 U	1.2 U
RLS-C11-13	4.1 U	4.1 U	1.6 U	1.1 U	1.1 U	1.1 U
RLS-C11-14	4.1 U	4.1 U	1.6 U	1.2 U	1.2 U	1.2 U
RLS-C11-16	4.1 U	4.1 U	1.6 U	1.1 U	1.1 U	1.1 U
Limit	130	130	15	410	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	5.8	4.3 U	1.7 U	1.2 U	1.2 U	1.2 U
Max. > Limit	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12
Nondetects	11	12	12	12	12	12
% Nondetects	92%	100%	100%	100%	100%	100%
Est. Mean*	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C12

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
RLS-C12-1	0.997 -	0.871 J	0.898 J	0.871 J	7.18 -
RLS-C12-3	1.14 -	0.953 J	0.923 J	0.953 J	3.46 U
RLS-C12-4	1.04 -	0.744 J	0.688 J	0.744 J	7.36 -
RLS-C12-5	1.14 -	0.864 J	0.892 J	0.864 J	7.28 -
RLS-C12-6	1.11 -	1.02 J	1.09 J	1.02 J	8.12 -
RLS-C12-8	1.31 -	1.06 J	1.08 J	1.06 J	3.25 U
RLS-C12-8-D	1.27 -	1.19 J	1.24 J	1.19 J	4.38 -
RLS-C12-9	0.908 -	0.669 J	0.657 J	0.669 J	7.76 -
RLS-C12-11	1.43 -	0.982 J	1.02 J	0.982 J	6.61 -
RLS-C12-12	0.994 -	0.785 J	0.775 J	0.785 J	7.57 -
RLS-C12-13	0.793 -	0.603 J	0.616 J	0.603 J	4.29 -
RLS-C12-14	0.761 -	0.853 J	0.846 J	0.853 J	4.09 J
RLS-C12-16	1.11 -	0.907 J	0.849 J	0.907 J	3.73 J
Limit	1.7	1.8	1.7	1.5	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%
Max. Result	1.43	1.19	1.24	1.19	8.12
Max. > Limit	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12
Nondetects	0	0	0	0	1
% Nondetects	0%	0%	0%	0%	8%
Est. Mean*	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C13

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
RLS-C13-2	1.2 J	0.752 -	0.837 -	0.752 -	7.46 J
RLS-C13-3	0.753 J	0.475 -	0.481 -	0.475 -	2.97 U
RLS-C13-4	0.707 J	0.597 -	0.602 -	0.597 -	3.3 U
RLS-C13-4-D	0.843 J	0.686 -	0.641 -	0.686 -	3.6 U
RLS-C13-5	1.14 J	0.749 -	0.799 -	0.749 -	4.7 J
RLS-C13-6	0.975 J	0.647 -	0.673 -	0.647 -	3.83 U
RLS-C13-7	0.977 J	0.667 -	0.674 -	0.667 -	2.12 U
RLS-C13-10	0.973 J	0.691 -	0.703 -	0.691 -	6.37 -
RLS-C13-11	1.12 J	0.751 -	0.739 -	0.751 -	8.63 -
RLS-C13-12	1.33 J	1.06 -	1.1 -	1.06 -	8.51 -
RLS-C13-13	0.825 J	0.52 -	0.516 -	0.52 -	3.03 J
RLS-C13-14	1.1 J	0.718 -	0.724 -	0.718 -	3.93 J
RLS-C13-16	0.944 J	0.741 -	0.716 -	0.741 -	3.75 U
Limit	1.7	1.8	1.7	1.5	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%
Max. Result	1.33	1.06	1.1	1.06	8.63
Max. > Limit	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12
Nondetects	0	0	0	0	5
% Nondetects	0%	0%	0%	0%	42%
Est. Mean*	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C14

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
RLS-C14-2	1.24 -	1.35 -	1.39 J	1.35 -	6.99 J
RLS-C14-3	1 -	0.907 -	0.902 J	0.907 -	6.37 J
RLS-C14-4	1.23 -	1.01 -	1.06 J	1.01 -	5.17 J
RLS-C14-5	1.06 -	0.716 -	0.724 J	0.716 -	5.05 J
RLS-C14-6	1.26 -	1.04 -	1.06 J	1.04 -	6.3 J
RLS-C14-8	1.28 -	1.02 -	1.01 J	1.02 -	8.7 J
RLS-C14-10	1.29 -	0.968 -	0.982 J	0.968 -	4.45 J
RLS-C14-11	0.587 -	0.385 -	0.377 J	0.385 -	3.62 J
RLS-C14-11-D	0.631 -	0.421 -	0.435 J	0.421 -	4.57 J
RLS-C14-12	0.985 -	0.83 -	0.793 J	0.83 -	3.91 U
RLS-C14-13	1.29 -	1.01 -	1.05 J	1.01 -	5.89 J
RLS-C14-15	1 -	0.832 -	0.849 J	0.832 -	5.4 J
RLS-C14-16	1.17 -	0.891 -	0.907 J	0.891 -	6.85 J
Limit	1.7	1.8	1.7	1.5	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%
Max. Result	1.29	1.35	1.39	1.35	8.7
Max. > Limit	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12
Nondetects	0	0	0	0	1
% Nondetects	0%	0%	0%	0%	8%
Est. Mean*	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-C15

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
RLS-C15-1	1.53 J	1.16 J	1.17 -	1.16 J	6.34 -
RLS-C15-2	1.47 J	1.26 J	1.28 -	1.26 J	5.64 -
RLS-C15-4	1.05 J	0.712 J	0.712 -	0.712 J	4.61 -
RLS-C15-4-D	0.995 J	0.665 J	0.637 -	0.665 J	3.52 U
RLS-C15-5	1.87 J	1.53 J	1.72 -	1.53 J	8.71 -
RLS-C15-6	1.55 J	1.22 J	1.2 -	1.22 J	7.41 -
RLS-C15-7	1.29 J	1.07 J	1.08 -	1.07 J	6.87 -
RLS-C15-9	1.71 J	1.33 J	1.31 -	1.33 J	7.73 -
RLS-C15-10	1.28 J	1.13 J	1.12 -	1.13 J	5.93 -
RLS-C15-11	1.09 J	0.724 J	0.73 -	0.724 J	5.02 -
RLS-C15-13	1.23 J	1.19 J	1.22 -	1.19 J	8.4 -
RLS-C15-15	1.27 J	0.96 J	0.965 -	0.96 J	4.36 J
RLS-C15-16	0.868 J	0.6 J	0.605 -	0.6 J	5.83 -
Limit	1.7	1.8	1.7	1.5	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%
Max. Result	1.87	1.53	1.72	1.53	8.71
Max. > Limit	Yes	No	Yes	Yes	No
W-statistic Prob. #	95.7% (N)	- -	51.5% (N)	53.4% (N)	- -
Test Procedure	Normal	- -	Normal	Normal	- -
Sample Size	12	12	12	12	12
Nondetects	0	0	0	0	0
% Nondetects	0%	0%	0%	0%	0%
Est. Mean*	1.351	- -	1.093	1.074	- -
UCL	1.499	- -	1.252	1.217	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	pass	- -	pass	pass	- -

a posteriori Sample	6	- -	3	4	- -
Size calculation	Pass	- -	Pass	Pass	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-16

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
RLS-C16-1	1.22 -	1.02 -	1 -	1.02 -	5.99 -
RLS-C16-2	1.33 -	1.16 -	1.16 -	1.16 -	6.71 -
RLS-C16-3	1.66 -	1.23 -	1.27 -	1.23 -	5.78 -
RLS-C16-5	1.3 -	1.04 -	1.01 -	1.04 -	5.18 -
RLS-C16-6	1.28 -	1.1 -	1.08 -	1.1 -	4.25 -
RLS-C16-8	1.19 -	1.01 -	0.99 -	1.01 -	3.85 -
RLS-C16-9	1.28 -	1.07 -	1.09 -	1.07 -	5.45 -
RLS-C16-11	1.48 -	1.28 -	1.32 -	1.28 -	6.9 -
RLS-C16-12	1.17 J	1.03 J	1.1 -	1.03 J	6.84 -
RLS-C16-13	1.21 -	1.05 -	1.09 -	1.05 -	6.16 -
RLS-C16-14	1.3 -	1.19 -	1.19 -	1.19 -	6.25 -
RLS-C16-14-D	1.31 -	1.13 -	1.11 -	1.13 -	6.73 -
RLS-C16-15	1.25 -	1.03 -	1.03 -	1.03 -	6.72 -
Limit	1.7	1.8	1.7	1.5	82
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%
Max. Result	1.66	1.28	1.32	1.28	6.9
Max. > Limit	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12
Nondetects	0	0	0	0	0
% Nondetects	0%	0%	0%	0%	0%
Est. Mean*	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-STRATIFIED FILL CU

SAMPLE ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Thorium-230	Arsenic
RLS-C01-1-F	1.25 -	1.07 -	1.05 -	1.07 -	3.35 U	- -	- -	5.06 J
RLS-C02-1-F	0.929 -	0.913 -	0.908 -	0.913 -	6.71 -	- -	- -	9.2 J
RLS-C03-1-F	1.01 J	0.942 J	0.965 J	0.942 J	3.39 -	- -	- -	11 J
RLS-C02-2-F	0.935 -	0.984 -	0.93 -	0.984 -	3.68 -	- -	- -	9.1 J
RLS-C03-2-F	0.961 J	0.971 J	0.965 J	0.971 J	3.99 -	- -	- -	5.3 J
RLS-C03-3-F	1.09 J	0.961 J	0.97 J	0.961 J	5.06 J	- -	- -	8.6 J
RLS-C04-3-F	0.865 -	0.855 -	0.86 -	0.855 -	4.88 J	1.96 U	1.55 J	5.7 -
RLS-C04-4-F	0.946 -	1.03 -	1.01 -	1.03 -	4.12 J	1.98 U	1.82 -	7.6 -
RLS-C04-7-F	0.979 -	0.978 -	0.971 -	0.978 -	4.58 J	2.07 U	0.914 J	5.5 -
RLS-C04-8-F	0.965 -	1.06 J	1.07 J	1.06 J	3.56 J	1.54 U	1.42 -	7.3 J
RLS-C04-9-F	0.995 J	0.866 J	0.9 J	0.866 J	4.83 -	1.55 U	1.09 -	6.3 -
RLS-C04-9-D-F	1.23 J	1.05 J	1.07 J	1.05 J	4.03 -	1.61 U	1.01 -	6.4 -
RLS-C04-11-F	0.879 -	0.923 -	0.892 -	0.923 -	6.85 -	1.61 U	2.07 J	6.5 J
RLS-C04-12-F	0.909 J	0.923 J	0.955 J	0.923 J	4.9 -	1.43 U	1.29 -	5.6 -
RLS-C04-14-F	0.912 -	0.917 -	0.918 -	0.917 -	5.13 -	1.87 U	0.977 J	8.2 J
RLS-C04-15-F	1.13 -	0.977 J	0.979 J	0.977 J	7.12 -	1.63 U	1.31 -	6.4 -
RLS-C04-16-F	1.15 -	1.13 J	1.14 J	1.13 J	5.54 -	1.54 U	1.52 -	7.2 -
RLS-C05-11-F	0.936 -	0.915 -	0.895 -	0.915 -	2.91 J	2.08 U	1.02 J	8.7 -
RLS-C05-15-F	1.27 J	1.1 J	1.11 J	1.1 J	6.36 -	1.47 U	1.03 -	11.6 -
Limit	1.7	1.8	1.7	1.5	82	30	280	12
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.27	1.13	1.14	1.13	7.12	2.08 U	2.07	11.6
Max. > Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -	- -
Sample Size	18	18	18	18	18	12	12	18
Nondetects	0	0	0	0	1	12	0	0
% Nondetects	0%	0%	0%	0%	6%	100%	0%	0%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -	- -

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-STRATIFIED FILL CU

SAMPLE ID	Beryllium	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene
RLS-C01-1-F	0.521 -	--	--	--	--	--	--
RLS-C02-1-F	0.51 -	--	--	--	--	--	--
RLS-C03-1-F	0.8 -	--	--	--	--	--	--
RLS-C02-2-F	0.76 -	--	--	--	--	--	--
RLS-C03-2-F	0.54 -	--	--	--	--	--	--
RLS-C03-3-F	0.9 -	--	--	--	--	--	--
RLS-C04-3-F	0.61 J	37.5 U	37.5 U	37.5 U	37.5 U	37.5 U	37.5 U
RLS-C04-4-F	0.66 J	38.7 U	38.7 U	38.7 U	38.7 U	38.7 U	38.7 U
RLS-C04-7-F	0.52 J	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U
RLS-C04-8-F	0.67 -	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U
RLS-C04-9-F	0.5 J	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U
RLS-C04-9-D-F	0.52 J	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U
RLS-C04-11-F	0.71 -	38.8 U	38.8 U	38.8 U	38.8 U	38.8 U	38.8 U
RLS-C04-12-F	0.54 J	37.6 U	37.6 U	37.6 U	37.6 U	37.6 U	37.6 U
RLS-C04-14-F	0.82 -	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U
RLS-C04-15-F	0.83 -	38.7 U	38.7 U	38.7 U	38.7 U	38.7 U	38.7 U
RLS-C04-16-F	0.7 -	40.6 U	40.6 U	40.6 U	40.6 U	40.6 U	40.6 U
RLS-C05-11-F	0.81 J	38 U	38 U	38 U	38 U	38 U	38 U
RLS-C05-15-F	0.68 J	39.6 U	39.6 U	39.6 U	39.6 U	39.6 U	39.6 U
Limit	1.5	20000	2000	20000	*1000 (No FRL)*	200000	2000000
Units	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	0.9	40.6 U	40.6 U	40.6 U	40.6 U	40.6 U	40.6 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	
Test Procedure	--	--	--	--	--	--	--
Sample Size	18	12	12	12	12	12	12
Nondetects	0	12	12	12	12	12	12
% Nondetects	0%	100%	100%	100%	100%	100%	100%
Est. Mean*	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-STRATIFIED FILL CU

SAMPLE ID	Dibenzo(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Aroclor-1254	Aroclor-1260
RLS-C01-1-F	--	--	--	--	--	3.8 U	3.8 U
RLS-C02-1-F	--	--	--	--	--	3.9 U	3.9 U
RLS-C03-1-F	--	--	--	--	--	3.9 U	3.9 U
RLS-C02-2-F	--	--	--	--	--	3.9 U	3.9 U
RLS-C03-2-F	--	--	--	--	--	3.9 U	3.9 U
RLS-C03-3-F	--	--	--	--	--	3.9 U	3.9 U
RLS-C04-3-F	37.5 U	37.5 U	37.5 U	37.5 U	37.5 U	--	--
RLS-C04-4-F	38.7 U	38.7 U	38.7 U	38.7 U	38.7 U	--	--
RLS-C04-7-F	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U	--	--
RLS-C04-8-F	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U	--	--
RLS-C04-9-F	37.9 U	37.9 U	37.9 U	37.9 U	37.9 U	--	--
RLS-C04-9-D-F	39.1 U	39.1 U	39.1 U	39.1 U	39.1 U	--	--
RLS-C04-11-F	38.8 U	38.8 U	38.8 U	38.8 U	38.8 U	--	--
RLS-C04-12-F	37.6 U	37.6 U	37.6 U	37.6 U	37.6 U	--	--
RLS-C04-14-F	38.5 U	38.5 U	38.5 U	38.5 U	38.5 U	--	--
RLS-C04-15-F	38.7 U	38.7 U	38.7 U	38.7 U	38.7 U	--	--
RLS-C04-16-F	40.6 U	40.6 U	40.6 U	40.6 U	40.6 U	--	--
RLS-C05-11-F	38 U	38 U	38 U	38 U	38 U	--	--
RLS-C05-15-F	39.6 U	39.6 U	39.6 U	39.6 U	39.6 U	--	--
Limit	2000	*10000 (No FRL)*	20000	*5000 (No FRL)*	*10000 (No FRL)*	130	130
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	40.6 U	40.6 U	40.6 U	40.6 U	40.6 U	3.9 U	3.9 U
Max. > Limit	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	6	6
Nondetects	12	12	12	12	12	6	6
% Nondetects	100%	100%	100%	100%	100%	100%	100%
Est. Mean*	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-STRATIFIED FILL CU

SAMPLE ID	1,1-Dichloroethene	Bromodichloromethane	Tetrachloroethene
RLS-C01-1-F	--	--	--
RLS-C02-1-F	--	--	--
RLS-C03-1-F	--	--	--
RLS-C02-2-F	--	--	--
RLS-C03-2-F	--	--	--
RLS-C03-3-F	--	--	--
RLS-C04-3-F	1 U	1 U	1 U
RLS-C04-4-F	1 U	1 U	1 U
RLS-C04-7-F	0.9 U	0.9 U	0.9 U
RLS-C04-8-F	1 U	1 U	1 U
RLS-C04-9-F	0.9 U	0.9 U	0.9 U
RLS-C04-9-D-F	1 U	1 U	1 U
RLS-C04-11-F	1 U	1 U	1 U
RLS-C04-12-F	1.1 U	1.1 U	1.1 U
RLS-C04-14-F	1.1 U	1.1 U	1.1 U
RLS-C04-15-F	0.9 U	0.9 U	0.9 U
RLS-C04-16-F	0.9 U	0.9 U	0.9 U
RLS-C05-11-F	0.9 U	0.9 U	0.9 U
RLS-C05-15-F	1.1 U	1.1 U	1.1 U
Limit	410	4000	3600
Units	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%
Max. Result	1.1 U	1.1 U	1.1 U
Max. > Limit	No	No	No
W-statistic Prob. #	--	--	--
Test Procedure	--	--	--
Sample Size	12	12	12
Nondetects	12	12	12
% Nondetects	100%	100%	100%
Est. Mean*	--	--	--
UCL	--	--	--
Prob. > Limit	--	--	--
Pass / Fail	--	--	--

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-SOIL UNDER RAIL TRESTLE CU

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230	Antimony
A6-UT-1	1.02 -	0.725 -	0.697 -	0.725 -	2.68 U	0.0622 J	0.858 U	1.27 -	0.688 U
A6-UT-2	0.942 -	0.813 -	0.842 -	0.813 -	2.87 U	0.091 U	0.882 U	0.973 -	0.467 U
A6-UT-3	1.18 -	0.952 -	1.01 -	0.952 -	3.44 U	0.066 J	0.817 U	1.18 -	0.688 U
A6-UT-4	1.09 -	0.994 -	0.998 -	0.994 -	3.37 U	0.0615 U	0.797 U	1.18 -	0.462 U
A6-UT-5	1.04 -	0.855 -	0.883 -	0.855 -	3.73 U	0.0712 U	0.83 U	1.08 -	0.795 U
A6-UT-6	1.05 -	0.903 -	0.892 -	0.903 -	4.77 J	0.19 -	0.919 U	1.13 -	0.632 J
A6-UT-7	0.619 -	0.637 -	0.673 -	0.637 -	3.04 U	0.0564 U	0.81 U	0.878 -	0.422 U
A6-UT-8	0.874 -	0.55 -	0.54 -	0.55 -	2.61 U	0.242 -	0.77 U	1.5 -	0.482 U
A6-UT-9	0.775 -	0.478 -	0.492 -	0.478 -	2.42 U	0.184 -	8.16 -	1.23 -	0.406 U
A6-UT-10	0.676 -	0.515 -	0.513 -	0.515 -	3.67 J	0.0579 U	0.785 U	0.994 -	0.449 U
A6-UT-11	0.845 -	0.681 -	0.696 -	0.681 -	10.9 -	0.232 -	1.07 -	1.87 -	0.699 U
A6-UT-12	0.979 -	0.647 -	0.645 -	0.647 -	11 -	0.284 -	0.817 U	2.66 -	1.01 U
Limit	1.7	1.8	1.7	1.5	82	1.4	30	280	96
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	1.18	0.994	1.01	0.994	11	0.284	8.16	2.66	0.632
Max. > Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Nondetects	0	0	0	0	8	5	10	0	11
% Nondetects	0%	0%	0%	0%	67%	42%	83%	0%	92%
Est. Mean*	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--

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

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-SOIL UNDER RAIL TRESTLE CU

Sample ID	Arsenic	Beryllium	Cadmium	Silver	Fluoride	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
A6-UT-1	10.4 -	0.728 -	0.296 J	0.147 U	2.47 J	1160 J	1200 J	4430 J
A6-UT-2	5.16 -	0.749 -	0.357 J	0.148 U	1.2 J	2030 J	1740 J	6340 J
A6-UT-3	4.97 -	0.604 -	0.193 J	0.142 U	2.41 J	3420 J	2330 J	7330 -
A6-UT-4	5.95 -	0.798 -	0.287 J	0.147 U	2.19 J	672 J	790 J	2780 J
A6-UT-5	7.99 -	0.873 -	0.301 J	0.137 U	2.37 J	594 J	572 J	2050 J
A6-UT-6	6.59 -	0.747 -	0.318 J	0.139 U	1 J	1020 J	798 J	3510 J
A6-UT-7	4.37 -	0.448 -	0.19 J	0.134 U	0.85 J	3310 J	2280 J	8290 J
A6-UT-8	5.62 -	0.565 -	0.311 J	0.136 U	0.627 J	6540 J	4830 J	17300 J
A6-UT-9	5.04 -	0.347 -	0.295 J	0.129 U	0.449 J	3030 J	3140 J	12800 J
A6-UT-10	5.39 -	0.459 -	0.38 J	0.143 U	0.609 J	573 J	552 J	2620 J
A6-UT-11	11 -	0.603 -	0.345 J	0.125 U	0.903 J	4730 J	3420 J	21700 J
A6-UT-12	8.57 -	1.04 -	0.684 J	0.118 U	0.673 J	5810 J	4240 J	25900 J
Limit	12	1.5	82	29000	78000	20000	2000	20000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	0.9	0.9
Max. Result	11	1.04	0.684	0.148 U	2.47	6540	4830	25900
Max. > Limit	No	No	No	No	No	No	Yes	Yes
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	34.8% (LN)	53.0% (LN)
Test Procedure	- -	- -	- -	- -	- -	- -	Lognormal	Lognormal
Sample Size	12	12	12	12	12	12	12	12
Nondetects	0	0	0	12	0	0	0	0
% Nondetects	0%	0%	0%	100%	0%	0%	0%	0%
Est. Mean*	- -	- -	- -	- -	- -	- -	2271.135	9989.833
UCL	- -	- -	- -	- -	- -	- -	3490.448	16462.794
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	FAIL	pass

a posteriori Sample	- -	- -	- -	- -	- -	- -	88	4
Size calculation	- -	- -	- -	- -	- -	- -	Fail	Pass

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-SOIL UNDER RAIL TRESTLE CU

Sample ID	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene
A6-UT-1	955 -	37 U	3790 J	37 U	3350 J	1030 J	880 J
A6-UT-2	1280 -	38 U	5310 J	38 U	5890 J	1370 J	1130 J
A6-UT-3	1580 -	34.3 U	4980 J	34.3 U	6270 J	1660 J	1150 J
A6-UT-4	562 -	37.9 U	2200 J	37.9 U	2470 J	592 J	528 J
A6-UT-5	502 -	35 U	1990 J	35 U	2300 J	497 J	636 J
A6-UT-6	749 -	38.7 U	2690 J	38.7 U	3730 J	788 J	576 J
A6-UT-7	1580 -	34.2 U	7710 J	34.2 U	16400 J	1700 J	9410 J
A6-UT-8	3390 -	35.8 U	15000 J	35.8 U	22600 J	3610 -	5450 J
A6-UT-9	2480 -	34.8 U	9470 J	34.8 U	12600 J	2690 -	2910 J
A6-UT-10	508 -	35.7 U	2530 J	35.7 U	4070 J	561 J	1470 J
A6-UT-11	2810 -	34 U	23000 J	34 U	30600 J	3240 -	8410 J
A6-UT-12	3220 -	21500 J	26700 J	817 -	35700 J	3720 -	10000 J
Limit	*1000 (No FRL)*	200000	2000000	2000	*10000 (No FRL)*	20000	*5000(No FRL)*
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	0.9	90%	90%	90%	90%	90%	0.9
Max. Result	3390	21500	26700	817	35700	3720	10000
Max. > Limit	Yes	No	No	No	Yes	No	Yes
W-statistic Prob. #	27.4% (LN)	- -	- -	- -	29.7% (LN)	- -	8.3% (LN)
Test Procedure	Lognormal	- -	- -	- -	Lognormal	- -	Lognormal
Sample Size	12	12	12	12	12	12	12
Nondetects	0	11	0	11	0	0	0
% Nondetects	0%	92%	0%	92%	0.0%	0%	0%
Est. Mean*	1695.435	- -	- -	- -	12770.9	- -	3818.4
UCL	2488.199	- -	- -	- -	23560.7	- -	8255.1
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	FAIL	- -	- -	- -	FAIL	- -	FAIL

a posteriori Sample	34	- -	- -	- -	76	- -	8
Size calculation	Fail	- -	- -	- -	Fail	- -	Pass

APPENDIX A
STATISTICAL EVALUATION OF CERTIFICATION SAMPLING - SOIL
RLS-SOIL UNDER RAIL TRESTLE CU

Sample ID	Pyrene	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene	Bromodichloromethane	Tetrachloroethene
A6-UT-1	3680 J	18.5 U	18.5 U	29.6 U	1.2 U	1.2 U	1.2 UJ
A6-UT-2	7150 J	26.8 -	19 U	30.4 U	1 U	1 U	1 UJ
A6-UT-3	7780 J	17.2 U	17.2 U	27.5 U	1.1 U	1.1 U	1.1 UJ
A6-UT-4	2260 J	34.4 -	19 U	30.3 U	1.1 U	1.1 U	1.1 UJ
A6-UT-5	2030 J	17.5 U	17.5 U	28 U	1.3 U	1.3 U	1.3 UJ
A6-UT-6	4020 J	19.3 U	19.3 U	30.9 U	1.1 U	1.1 U	1.1 UJ
A6-UT-7	14200 J	21.9 J	28.6 J	27.3 U	1.3 U	1.3 U	1.3 UJ
A6-UT-8	23000 J	17.9 U	17.9 U	28.6 U	1.1 U	1.1 U	1.1 UJ
A6-UT-9	12100 J	17.4 U	17.4 U	27.9 U	1.1 U	1.1 U	1.1 UJ
A6-UT-10	4130 J	17.9 U	17.9 U	28.6 U	1.2 U	1.2 U	1.2 UJ
A6-UT-11	24900 J	20 -	17 U	27.2 U	1.5 U	1.5 U	1.5 UJ
A6-UT-12	32500 J	17.7 U	17.7 U	28.4 U	1.5 U	1.5 U	1.5 UJ
Limit	*10000 (No FRL)*	130	130	15	410	4000	3600
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	0.9	90%	90%	90%	90%	90%	90%
Max. Result	32500	34.4	28.6	30.9 U	1.5 U	1.5 U	1.5 UJ
Max. > Limit	Yes	No	No	No	No	No	No
W-statistic Prob. #	49.1% (LN)	- -	- -	- -	- -	- -	- -
Test Procedure	Lognormal	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12
Nondetects	0	8	11	12	12	12	12
% Nondetects	0%	67%	92%	100%	100%	100%	100%
Est. Mean*	12197.4	- -	- -	- -	- -	- -	- -
UCL	21657.9	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	FAIL	- -	- -	- -	- -	- -	- -

a posteriori Sample	66	- -	- -	- -	- -	- -	- -
Size calculation	Fail	- -	- -	- -	- -	- -	- -

APPENDIX B

BALLAST PRECERTIFICATION SAMPLES, ANALYTICAL RESULTS AND FINAL STATISTICS TABLES

APPENDIX B
STATISTICAL ABBREVIATIONS AND SYMBOLS

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

If the maximum result for each analyte is below the FRL, no statistical result needs to be reported. For all statistical evaluations, the maximum value of the two duplicates was used.

Note: Where no FRL was established for an analyte, the BTV was used. When this occurred, the Limit was italicized and a comment of (No FRL) was present.

Abbreviations:

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

W-Statistic Probability - Shapiro-Wilk probability of the "better" fit - either normal or lognormal (note: a value less than 0.05 indicates that neither normality nor lognormality could be accepted, but the highest p-value is still shown). The test is performed on the raw untransformed data (N) and the log-transformed data (LN) to test for lognormality.

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

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

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

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

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

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

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

Number of NDs - number of non-detects.

APPENDIX B
Ballast West of Paddys Run

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Technetium-99	Thorium-230	Neptunium-237	Arsenic
BLST-15	0.725 -	0.447 -	0.441 -	0.447 -	1.31 U	--	--	--	--	--
BLST-28	0.47 -	0.225 -	0.214 -	0.225 -	2.22 J	2.13 U	2.3 U	0.407 J	0.135 U	3.8 J
BLST-29	0.385 -	0.22 -	0.213 -	0.22 -	2.1 J	5.12 U	2.18 U	0.398 J	0.1 U	2.8 J
BLST-30	0.305 -	0.165 -	0.165 -	0.165 -	2.48 -	2.43 U	2.26 U	0.541 J	0.187 U	4.9 J
BLST-31	0.414 -	0.17 -	0.171 -	0.17 -	0.986 U	0.581 J	2.02 U	0.464 -	0.126 U	3.4 J
BLST-32	0.464 -	0.191 -	0.18 -	0.191 -	2.46 -	0.49 J	2.03 U	0.516 -	0.18 U	3.8 J
BLST-33	0.517 -	0.334 -	0.328 -	0.334 -	1.9 J	4.34 U	2.05 U	0.437 -	0.136 U	8 J
BLST-34	0.367 -	0.141 -	0.149 -	0.141 -	0.894 U	1.52 U	2.38 U	0.18 U	0.091 U	1.48 J
BLST-35	0.375 -	0.211 -	0.22 -	0.211 -	1.53 -	0.289 J	2.48 U	0.305 J	0.088 U	2.2 J
BLST-36	0.403 -	0.167 -	0.188 -	0.167 -	1.3 U	3.28 U	2.02 U	0.238 J	0.078 U	2.8 J
BLST-37	0.322 -	0.156 -	0.155 -	0.156 -	0.903 U	2.67 U	2.01 U	0.289 J	0.076 U	4.1 J
BLST-38	0.446 -	0.259 -	0.259 -	0.259 -	1.84 J	3.74 U	1.99 U	0.413 -	0.094 U	3.9 J
BLST-39	0.399 -	0.177 -	0.185 -	0.177 -	2.61 -	2.45 U	1.99 U	0.405 J	0.094 U	2.9 J
BLST-40	0.382 -	0.242 -	0.252 -	0.242 -	1.34 U	5.16 U	2.07 U	0.467 -	0.078 U	3 J
BLST-41	0.466 -	0.24 -	0.25 -	0.24 -	1.58 J	0.434 J	2.09 U	0.402 J	0.112 U	4.1 J
BLST-42	0.505 -	0.214 -	0.207 -	0.214 -	2.35 J	2.63 U	2.28 U	0.267 J	0.15 U	1.9 J
BLST-43	0.834 -	0.501 -	0.495 -	0.501 -	1.39 J	3 U	1.98 U	0.364 J	0.126 U	4.5 J
BLST-44	2.2 -	2.52 -	2.91 -	2.52 -	12.3 -	4.32 U	1.89 U	2.37 -	0.122 U	6.3 J
BLST-45	0.161 -	0.106 -	0.101 -	0.106 -	1.03 J	2.84 U	1.77 U	0.253 U	0.114 U	1.8 J
BLST-46	0.159 -	0.0697 -	0.0723 -	0.0697 -	0.702 U	1.64 U	1.85 U	0.425 U	0.102 U	4.1 J
BLST-47	0.201 -	0.131 -	0.13 -	0.131 -	0.845 J	2.48 U	1.85 U	0.436 J	0.125 U	1.46 UJ
Limit	1.7	1.8	1.7	1.5	82	38	30	280	3.2	12.0
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%
Max. Result	2.2	2.52	2.91	2.52	12.3	0.581	2.48 U	2.37	0.187 U	8
Max. >= Limit	Yes	Yes	Yes	Yes	No	No	No	No	No	No
W-statistic Prob. #	1.5% (LN)	< 0.01% (LN)	< 0.01% (LN)	< 0.01% (LN)	--	--	--	--	--	--
Test Procedure	Median (Sign)	Median (Sign)	Median (Sign)	Median (Sign)	--	--	--	--	--	--
Sample Size	21	21	21	21	21	20	20	20	20	20
Nondetects	0	0	0	0	7	16	20	3	20	1
% Nondetects	0.0%	0%	0%	0%	33%	80%	100%	15%	100%	5%
Est. Mean*	0.403	0.211	0.207	0.211	--	--	--	--	--	--
UCL	0.466	0.240	0.250	0.240	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--
Pass / Fail	Pass	Pass	Pass	Pass	--	--	--	--	--	--
a posteriori Sample	5	5	5	5	--	--	--	--	--	--
Size calculation	Pass	Pass	Pass	Pass	--	--	--	--	--	--

APPENDIX B
Ballast West of Paddys Run

Sample ID	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Benzo(a)anthracene
BLST-15	--	--	--	--	--	--	--	--	--
BLST-28	21.6 J	0.25 -	0.12 J	4.5 J	6.4 J	0.0077 J	0.508 U	0.0407 U	814 J
BLST-29	22.3 J	0.26 -	0.13 J	6.2 J	6.3 J	0.0054 J	0.507 U	0.0406 U	1840 J
BLST-30	23.9 J	0.31 -	0.19 -	6.2 J	8.9 J	0.0047 J	0.58 J	0.042 J	1250 J
BLST-31	27.6 J	0.23 -	0.16 J	6.6 J	9.7 J	0.01 J	2.45 U	0.196 U	394 J
BLST-32	18.2 J	0.14 J	0.104 U	9.2 J	7.9 J	0.0069 J	2.6 U	0.208 U	734 J
BLST-33	33 J	0.23 -	0.13 J	12.4 J	7.7 J	0.0066 J	2.69 U	0.215 U	2100 -
BLST-34	8.6 J	0.0989 U	0.0989 U	5 J	2.8 J	0.0046 J	2.47 U	0.198 U	322 J
BLST-35	20.7 J	0.0997 U	0.0997 U	3.6 J	4.5 J	0.0059 J	2.49 U	0.199 U	1160 J
BLST-36	8.4 J	0.1 U	0.1 U	3.4 J	8.6 J	0.0063 J	2.5 U	0.2 U	359 J
BLST-37	18.8 J	0.17 -	0.14 J	12.9 J	5.7 J	0.005 J	2.47 U	0.198 U	371 J
BLST-38	24.5 J	0.27 -	0.105 U	11.7 J	6.5 J	0.0071 J	2.62 U	0.21 U	1370 J
BLST-39	22 J	0.11 J	0.12 J	5.8 J	3.9 J	0.019 J	2.48 U	0.199 U	486 J
BLST-40	24.5 J	0.19 -	0.15 J	7.3 J	5.9 J	0.0054 J	2.61 U	0.208 U	545 J
BLST-41	17.7 J	0.12 J	0.13 J	5.1 J	4.7 J	0.0097 J	2.51 U	0.201 U	34.7 U
BLST-42	9.7 J	0.12 J	0.0981 U	6.2 J	2.7 J	0.0076 J	2.45 U	0.196 U	580 J
BLST-43	34.3 J	0.47 -	0.16 J	7.3 J	12.3 J	0.011 J	2.5 U	0.2 U	460 J
BLST-44	46 J	0.24 -	0.55 J	16.4 J	58.8 -	0.065 J	2.52 UJ	0.202 U	33.7 U
BLST-45	6 J	0.1 J	0.0992 U	3.3 J	3.6 J	0.0024 J	2.48 UJ	0.198 U	33.5 U
BLST-46	13.1 J	0.14 J	0.1 J	7.5 J	6.3 J	0.003 J	2.5 UJ	0.2 U	462 J
BLST-47	4.3 J	0.0975 U	0.0975 U	4 J	2.2 J	0.003 J	2.44 UJ	0.195 U	33.6 U
Limit	68000	1.5	82	300	400	7.5	5,400	29,000	20000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	46	0.47	0.55	16.4	58.8	0.065	0.58	0.042	2100
Max. >= Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	20	20	20	20	20	20	20	20	20
Nondetects	0	4	8	0	0	0	19	19	4
% Nondetects	0%	20%	40%	0%	0%	0%	95%	95%	20%
Est. Mean*	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--	--

APPENDIX B
Ballast West of Paddys Run

Sample ID	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene
BLST-15	--	--	--	--	--	--	--
BLST-28	980 -	2140 J	807 -	34.4 J	1270 J	34.4 J	1420 J
BLST-29	1790 -	5270 J	1050 -	68.3 J	3460 J	68.3 J	4840 J
BLST-30	1640 -	3270 J	1260 -	34.3 J	1920 J	34.3 J	2100 J
BLST-31	567 -	1650 J	526 -	34.3 U	917 J	208 -	1060 -
BLST-32	987 -	2110 -	812 -	695 J	1520 J	308 -	2010 -
BLST-33	3210 -	4700 -	1800 -	2160 J	2420 J	638 -	2570 -
BLST-34	494 -	1170 J	410 -	34.6 U	502 J	204 -	543 -
BLST-35	1410 -	3740 -	1100 -	34.8 U	1600 J	400 -	1440 -
BLST-36	430 -	1430 J	378 -	34.6 U	981 J	195 J	1240 -
BLST-37	420 -	1280 J	350 -	34.5 U	811 J	183 J	1400 -
BLST-38	1490 -	4460 -	1020 -	35.4 U	2570 J	350 -	2830 -
BLST-39	637 -	1650 J	538 -	34.8 U	819 J	226 -	861 -
BLST-40	612 -	2290 -	489 -	34.7 U	1540 J	212 -	3410 -
BLST-41	70.7 J	66.9 J	94.3 J	34.7 U	40.1 J	117 J	44.5 J
BLST-42	611 -	2130 -	494 -	34.2 U	1130 J	219 -	1660 -
BLST-43	692 -	1860 J	546 -	34.9 U	843 J	240 -	745 -
BLST-44	200 -	415 J	259 -	33.7 U	163 J	33.7 U	133 -
BLST-45	89.3 J	277 J	150 -	33.5 U	262 J	33.5 U	477 -
BLST-46	421 -	1410 J	350 -	33.7 U	1080 J	33.7 U	1980 -
BLST-47	80.5 J	184 J	139 -	33.6 U	147 J	33.6 U	221 -
Limit	2000	20000	*1000 (No FRL)*	200000	2000000	2000	*10000 (No FRL)*
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	3210	5270	1800	2160	3460	638	4840
Max. >= Limit	Yes	No	Yes	No	No	No	No
W-statistic Prob. #	20.2% (LN)	--	57.2% (LN)	--	--	--	--
Test Procedure	Lognormal	--	Lognormal	--	--	--	--
Sample Size	20	20	20	20	20	20	20
Nondetects	0	0	0	15	0	4	0
% Nondetects	0%	0%	0%	75%	0%	20%	0%
Est. Mean*	953.7	--	659.8	--	--	--	--
UCL	1522.3	--	891.1	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--
Pass / Fail	pass	--	pass	--	--	--	--
a posteriori Sample	4	--	7	--	--	--	--
Size calculation	Pass	--	Pass	--	--	--	--

APPENDIX B
Ballast West of Paddys Run

Sample ID	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
BLST-15	--	--	--
BLST-28	688 J	148 J	1430 J
BLST-29	938 J	1130 J	4580 J
BLST-30	1170 J	311 J	2060 J
BLST-31	466 J	161 J	845 -
BLST-32	748 J	448 J	1480 -
BLST-33	1720 J	172 J	2320 -
BLST-34	365 J	80.3 J	596 -
BLST-35	966 J	199 J	1850 -
BLST-36	362 J	255 J	1010 -
BLST-37	331 J	351 J	1170 -
BLST-38	942 J	328 J	2660 -
BLST-39	469 J	122 J	879 -
BLST-40	469 J	1100 -	2400 -
BLST-41	111 J	34.7 U	38.9 J
BLST-42	473 J	289 J	1400 -
BLST-43	480 J	126 J	706 -
BLST-44	241 J	33.7 U	127 -
BLST-45	156 J	140 J	336 -
BLST-46	350 J	508 -	1640 -
BLST-47	146 J	73.1 J	148 -
Limit	20000	*5000 (No FRL)*	*10000 (No FRL)*
Units	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%
Max. Result	1720	1130	4580
Max. >= Limit	No	No	No
W-statistic Prob. #	- -	- -	- -
Test Procedure	- -	- -	- -
Sample Size	20	20	20
Nondetects	0	2	0
% Nondetects	0%	10%	0%
Est. Mean*	- -	- -	- -
UCL	- -	- -	- -
Prob. > Limit	- -	- -	- -
Pass / Fail	- -	- -	- -

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

APPENDIX B
Ballast East of Paddys Run

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Lead-210	Technetium-99
BLST-2	0.764 -	0.565 -	0.64 - .	0.565 -	4.67 -	--	0.817 J	2.08 U
BLST-3	1.04 -	0.76 -	0.759 -	0.76 -	5.58 -	--	0.557 U	2.27 U
BLST-4	1.77 -	0.992 -	1 -	0.992 -	10 -	--	0.716 U	2.14 U
BLST-5	1.63 -	0.891 -	0.929 -	0.891 -	8.93 -	--	0.747 U	0.899 U
BLST-6	1.43 -	1.05 -	1.12 -	1.05 -	7.86 -	--	0.585 U	2.11 U
BLST-7	0.451 -	0.331 -	0.33 -	0.331 -	1.22 U	--	0.463 U	1.09 U
BLST-8	0.499 -	0.302 -	0.297 -	0.302 -	1.95 J	--	--	1.82 J
BLST-9	0.502 -	0.304 -	0.307 -	0.304 -	1.29 U	--	--	0.813 U
BLST-10	0.504 -	0.323 -	0.336 -	0.323 -	2 J	--	--	0.876 U
BLST-11	0.553 -	0.302 -	0.303 -	0.302 -	3.4 -	--	--	1.26 U
BLST-12	0.574 -	0.215 -	0.221 -	0.215 -	4.82 -	0.0954 -	--	0.849 U
BLST-13	0.476 -	0.223 -	0.222 -	0.223 -	3.62 U	0.0968 -	--	2 U
BLST-14	0.274 -	0.163 -	0.148 -	0.163 -	1.68 U	0.0377 U	--	1.91 U
BLST-48	0.261 -	0.146 -	0.147 -	0.146 -	1.07 U	--	4.13 U	1.76 U
BLST-49	0.222 -	0.221 -	0.224 -	0.221 -	1.02 J	--	1.95 J	1.81 U
BLST-50	0.246 -	0.175 -	0.173 -	0.175 -	1.15 J	--	3.05 U	1.85 U
BLST-51	0.259 -	0.0859 -	0.0906 -	0.0859 -	0.622 J	--	1.79 U	1.92 U
Limit	1.7	1.8	1.7	1.5	82	1.4	38	29
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	1.77	1.05	1.12	1.05	10	0.0968	1.95	1.82
Max. >= Limit	Yes	No	No	No	No	No	No	No
W-statistic Prob. #	13.5% (LN)	- -	- -	- -	- -	- -	- -	- -
Test Procedure	Lognormal	- -	- -	- -	- -	- -	- -	- -
Sample Size	17	17	17	17	17	3	10	17
Nondetects	0	0	0	0	5	1	8	16
% Nondetects	0%	0%	0%	0%	29%	33%	80%	94%
Est. Mean*	0.675	- -	- -	- -	- -	- -	- -	- -
UCL	0.978	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	pass	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	4	- -	- -	- -	- -	- -	- -	- -
Size calculation	Pass	- -	- -	- -	- -	- -	- -	- -

APPENDIX B
Ballast East of Paddys Run

Sample ID	Thorium-230	Neptunium-237	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium
BLST-2	2.09 -	--	0.808 U	--	--	--	0.411 J	--
BLST-3	1.74 J	--	0.802 U	--	--	--	1.63 -	--
BLST-4	1.94 J	--	0.897 U	--	--	--	1.3 -	--
BLST-5	2.36 J	--	0.855 U	--	--	--	1.02 -	--
BLST-6	2.47 J	--	0.933 U	--	--	--	1.4 -	--
BLST-7	1.19 J	--	0.786 U	--	--	--	0.118 J	--
BLST-8	--	--	0.826 U	15.1 J	--	0.128 J	0.0949 J	--
BLST-9	--	--	0.879 U	15.2 J	--	0.146 J	0.0953 J	--
BLST-10	--	--	0.791 U	12.5 J	--	0.176 J	0.115 J	--
BLST-11	--	--	0.877 U	14.7 -	--	0.129 J	0.236 J	--
BLST-12	1.97 -	--	0.84 U	2.58 -	--	0.156 J	--	--
BLST-13	0.491 NV	--	4.1 U	1.8 -	--	0.12 J	--	--
BLST-14	0.196 NV	--	3.6 U	4.5 -	--	0.14 J	--	--
BLST-48	0.464 J	0.168 U	--	9.8 J	6.5 J	0.0989 U	0.17 J	9.9 J
BLST-49	0.429 U	0.249 U	--	2.8 J	7.2 J	0.0959 U	0.12 J	5.8 J
BLST-50	0.454 J	0.102 U	--	3.7 J	11.2 J	0.101 J	0.14 J	1.7 J
BLST-51	2.54 -	0.13 U	--	11.9 J	10.6 J	0.18 -	0.11 J	6.3 J
Limit	280	3.2	10	12	68000	1.5	82	300
Units	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	2.54	0.249 U	4.1 U	15.2	11.2	0.18	1.63	9.9
Max. >= Limit	No	No	No	Yes	No	No	No	No
W-statistic Prob. #	- -	- -	- -	5.9% (LN)	- -	- -	- -	- -
Test Procedure	- -	- -	- -	Lognormal	- -	- -	- -	- -
Sample Size	13	4	13	11	4	11	14	4
Nondetects	1	4	13	0	0	2	0	0
% Nondetects	8%	100%	100%	0%	0%	18%	0%	0%
Est. Mean*	- -	- -	- -	**9.260**	- -	- -	- -	- -
UCL	- -	- -	- -	**15.151**	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	**FAIL**	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	**10**	- -	- -	- -	- -
Size calculation	- -	- -	- -	**Pass**	- -	- -	- -	- -

APPENDIX B
Ballast East of Paddys Run

Sample ID	Lead	Mercury	Selenium	Silver	Fluoride	Benzo(a)anthracene	Benzo(a)pyrene
BLST-2	--	--	--	--	--	--	--
BLST-3	--	--	--	--	--	--	--
BLST-4	--	--	--	--	--	--	--
BLST-5	--	--	--	--	--	--	--
BLST-6	--	--	--	--	--	--	--
BLST-7	--	--	--	--	--	--	--
BLST-8	--	--	--	0.131 U	0.813 J	35.1 U	35.1 U
BLST-9	--	--	--	0.14 U	0.3 U	34.8 U	34.8 U
BLST-10	--	--	--	0.126 U	0.296 U	77.4 J	74.8 J
BLST-11	--	--	--	0.279 U	1.06 J	71.5 J	38.2 J
BLST-12	--	--	--	0.267 U	1.4 J	--	617 -
BLST-13	--	--	--	0.0405 U	0.804 J	--	2640 -
BLST-14	--	--	--	0.0404 U	0.289 U	--	1210 -
BLST-48	2.9 J	0.0023 U	2.47 UJ	0.198 U	--	33.4 U	33.4 U
BLST-49	2 J	0.0025 U	2.4 UJ	0.192 U	--	33.5 U	64.6 J
BLST-50	2.3 J	0.0023 U	2.52 UJ	0.202 U	--	33.6 U	33.6 U
BLST-51	8.8 J	0.0053 J	2.43 UJ	0.194 U	--	33.5 U	86.8 J
Limit	400	7.5	5400	29000	78000	20000	2000
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	8.8	0.0053	2.52 UJ	0.279 U	1.4	77.4	2640
Max. >= Limit	No	No	No	No	No	No	Yes
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	4.3% (LN)
Test Procedure	- -	- -	- -	- -	- -	- -	Median (Sign)
Sample Size	4	4	4	11	7	8	11
Nondetects	0	3	4	11	3	6	4
% Nondetects	0%	75%	100%	100%	43%	75%	36%
Est. Mean*	- -	- -	- -	- -	- -	- -	64.6
UCL	- -	- -	- -	- -	- -	- -	617
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	Pass
a posteriori Sample	- -	- -	- -	- -	- -	- -	5
Size calculation	- -	- -	- -	- -	- -	- -	Pass

APPENDIX B
Ballast East of Paddys Run

Sample ID	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene
BLST-2	--	--	--	--	--	--
BLST-3	--	--	--	--	--	--
BLST-4	--	--	--	--	--	--
BLST-5	--	--	--	--	--	--
BLST-6	--	--	--	--	--	--
BLST-7	--	--	--	--	--	--
BLST-8	49.7 J	--	--	--	35.1 U	--
BLST-9	104 -	--	--	--	34.8 U	--
BLST-10	275 -	--	--	--	35 U	--
BLST-11	143 -	--	--	--	35.5 U	--
BLST-12	1950 -	--	--	--	35.3 U	--
BLST-13	6140 -	--	--	--	502 -	--
BLST-14	2030 -	--	--	--	237 -	--
BLST-48	76.6 J	33.4 U	33.4 U	33.4 U	33.4 U	61.3 J
BLST-49	91.2 J	33.5 U	33.5 U	33.5 U	33.5 U	65.1 J
BLST-50	78.2 J	33.6 U	33.6 U	33.6 U	33.6 U	47.1 J
BLST-51	322 J	142 -	33.5 U	360 J	33.5 U	560 -
Limit	20000	*1000 (No FRL)*	200000	2000000	2000	*10000 (No FRL)*
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	6140	142	33.6 U	360	502	560
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	11	4	4	4	11	4
Nondetects	0	3	4	3	9	0
% Nondetects	0%	75%	100%	75%	82%	0%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--

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

APPENDIX B
Ballast East of Paddys Run

Sample ID	Indeno(1,2,3-cd)pyrene	Carbazole	Phenanthrene	Pyrene	Aroclor-1254	Aroclor-1260	Dieldrin
BLST-2	--	--	--	--	--	--	--
BLST-3	--	--	--	--	--	--	--
BLST-4	--	--	--	--	--	--	--
BLST-5	--	--	--	--	--	--	--
BLST-6	--	--	--	--	--	--	--
BLST-7	--	--	--	--	--	--	--
BLST-8	43.4 J	351 U	--	--	3.5 U	3.5 U	--
BLST-9	48.5 J	348 U	--	--	3.5 U	3.5 U	--
BLST-10	114 -	350 U	--	--	3.5 U	3.5 U	--
BLST-11	35.5 U	355 U	--	--	3.6 U	3.6 U	--
BLST-12	587 -	--	--	--	10.5 J	5.2 J	1.4 U
BLST-13	1340 -	--	--	--	3.5 U	3.5 U	1.4 U
BLST-14	683 -	--	--	--	3.4 U	3.4 U	1.4 U
BLST-48	33.4 U	--	33.4 U	33.4 U	--	--	--
BLST-49	33.5 U	--	33.5 U	33.5 U	--	--	--
BLST-50	33.6 U	--	33.6 U	33.6 U	--	--	--
BLST-51	150 J	--	209 J	356 -	--	--	--
Limit	20000	12000	*5000 (No FRL)*	*10000 (No FRL)*	130	130	15
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%
Max. Result	1340	355 U	209	356	10.5	5.2	1.4 U
Max. >= Limit	No	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -	- -
Sample Size	11	4	4	4	7	7	3
Nondetects	4	4	3	3	6	6	3
% Nondetects	36%	100%	75%	75%	86%	86%	100%
Est. Mean*	- -	- -	- -	- -	- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -	- -

APPENDIX B
Ballast in Railyard

Sample ID	Arsenic	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene
BLST-16	10.8 -	33.3 U	33.3 U	37.4 J	33.3 U	33.3 U
BLST-17	9.48 -	33.3 U	33.3 U	35.3 J	33.3 U	33.3 U
BLST-18	7.85 -	33.3 U	33.3 U	38 J	33.3 U	33.3 U
BLST-19	7.38 -	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U
BLST-20	10.5 -	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-21	9.94 -	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-22	16 -	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-23	8.61 -	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U
BLST-24	14.8 -	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-25	6.61 -	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U
BLST-26	5.09 -	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-27	10.9 -	72.2 J	53.6 J	33.3 U	33.3 U	109 J
Limit	12	20000	2000	20000	*1000 (No FRL)*	200000
Units	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	16	72.2	53.6	38	33.4 U	109
Max. >= Limit	Yes	No	No	No	No	No
W-statistic Prob. #	92.5% (LN)	- -	- -	- -	- -	- -
Test Procedure	Lognormal	- -	- -		- -	- -
Sample Size	12	12	12	12	12	12
Nondetects	0	11	11	9	12	11
% Nondetects	0%	91.7%	91.7%	75%	100%	92%
Est. Mean*	9.9	- -	- -	- -	- -	- -
UCL	11.4	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -
Pass / Fail	pass	- -	- -	- -	- -	- -

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

APPENDIX B
Ballast in Railyard

Sample ID	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
BLST-16	33.3 U	33.3 U	39.6 J	33.3 U	33.3 U	33.3 U
BLST-17	33.3 U	33.3 U	36.5 J	33.3 U	33.3 U	33.3 U
BLST-18	33.3 U	33.3 U	44.4 J	33.3 U	33.3 U	33.3 U
BLST-19	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U
BLST-20	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-21	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-22	33.4 U	33.4 U	61.3 J	33.4 U	42.1 J	33.4 U
BLST-23	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U
BLST-24	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-25	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U	33.3 U
BLST-26	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U	33.4 U
BLST-27	153 J	33.3 U	751 -	107 J	511 -	348 -
Limit	2000000	2000	*10000 (No FRL)*	20000	*5000 (No FRL)*	*10000 (No FRL)*
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	153	33.4 U	751	107	511	348
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12
Nondetects	11	12	7	11	10	11
% Nondetects	92%	100%	58%	92%	83%	92%
Est. Mean*	- -	- -		- -	- -	- -
UCL	- -	- -	- -	- -	- -	- -
Prob. > Limit	- -	- -	- -	- -	- -	- -
Pass / Fail	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	- -	- -	- -	- -
Size calculation	- -	- -	- -	- -	- -	- -

20

APPENDIX C
CORRECTION OF 7-DAY RADIUM-226 RESULTS

APPENDIX C
CORRECTION OF 7-DAY RADIUM-226 RESULTS

On July 10, 2006, OEPA approved DOE's July 6, 2006 request to reduce the in-growth period for radon, with the stipulation that additional soil samples would be collected from non-certified areas to verify initial assumptions and finalize the documentation of the process. This attachment to the certification report presents the analytical results for 7- and 21-day in-growth periods for samples collected from non-certified areas, as described in variance 20810-PSP-0004-36.

Figure 1 summarizes the results for 48 samples collected from non-certified areas. A regression of the data ($R^2 = 0.9969$) yields the following equation for the estimate of the 21-day value:

21-day value = 1.053*7-day value – 0.0156

This correction will be applied to 7-day analytical results to yield an estimate of the 21-day result. If statistical calculations are performed in the certification report, the estimate for 21-day results will be used to determine the pass/fail criteria for the certification units.

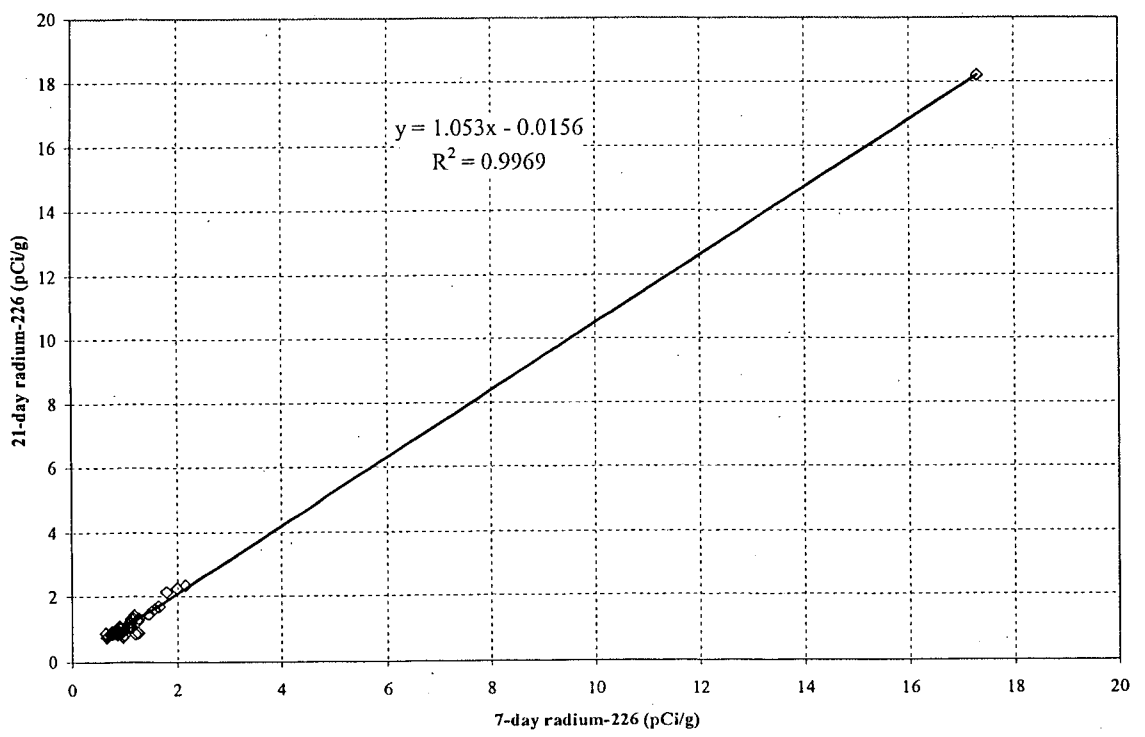

FIGURE 1. Regression analysis of radium-226 data based on 7- and 21-day ingrowth period for radon-222

APPENDIX D
VARIANCES ASSOCIATED WITH THE SITE-WIDE RAIL LINE SYSTEM CERTIFICATION EFFORT

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the collection of physical soil samples for precertification of the Sitewide Rail Line System Area, which is shown on Figure 1.

The selection of precertification sampling locations was conducted according to Section 3.4.2 of the Sitewide Excavation Plan. The defined area was gridded in the same manner defined for group 1 CUs. During this gridding process, 16 areas were defined (see Figure 2 and 3). Each of these defined areas was then sub-divided into 16 approximately equal sub-areas. Sample locations were then generated by randomly selecting an easting and northing coordinate within the boundaries of each sub-area, then testing those locations against the minimum distance criteria for each defined area to ensure that all 16 random locations have sufficient spacing. If the minimum distance criteria were not met, an alternative random location was selected for that sub-area, and all the locations were re-tested. This process continued until all random locations met the minimum distance criteria as defined by the SEP.

All Sitewide Rail Line System sub-areas and planned precertification sampling locations are shown on Figures 4 through 12. As stated in the Excavation Plan for Area 6 Waste Pits and General Area (DOE 2005), samples collected from the western half of the railyard will include sampling of both native and fill soil. These locations are identified in Attachment 3. The top 0 to 6 inches from each type of soil shall be collected for analysis. Based on topography evaluations completed during predesign, the sampling depth for the native soil has been defined for each sample location, and is provided in Attachment 3. For the remaining areas, samples will be collected for analysis from the top 0 to 6 inches of native soil. Four of the 16 sample locations are designated with a "V", indicating that these are archive sample locations. Archive samples will not be collected unless they are needed for additional analysis. One sample location in each of the defined areas has been designated with a "D", indicating a field duplicate sample collection location.

Each sample location will be surveyed (by the surveying group) prior to sampling. Because the majority of the samples will be collected from the top 0 to 6 inches of native soil that is underlying ballast material used to build up the ground that holds the railroad tracks, it will be necessary for the sampling team to complete a field walk down to identify locations requiring a penetration permit. Sample locations may only be moved (greater than 3 feet) with the concurrence of characterization personnel. See, Attachment 1 for the Sampling and Analytical Requirements, Attachment 2 for the Target Analyte Lists, and Attachment 3 for the Sample Identifiers and Locations.

Soil samples will be collected in accordance with procedure SMPL-01, "Solids Sampling". All activities associated with this sampling event will comply with Data Quality Objective SL-052, Revision 3.

If "push tubes" are used for sample collection, two container blanks will be collected – one before sample collection begins and one at the conclusion of sample collection. The container blank samples will be analyzed for the radiological and the metal COCs as identified in Attachments 2 and 3. If an alternate sample collection method is used, one rinsate will be collected at a minimum frequency of one per 20 pieces of equipment reused in the field. Rinsates and/or container blanks will be analyzed for the same rad and metal TALs from the precertification area sampled. A trip blank is required if VOC samples are being collected. The frequency for a trip blank is one per day, or one per batch of 20 samples collected, or one per cooler to be shipped, whichever is more frequent.

All field data will be validated. Sample 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. Specifically, samples collected from areas RLS-C04, RLS-C05, RLS-C07, RLS-C10, and RLS-C11 will be validated to VSL D.

As shown on Attachment 1, each sample will be assigned a unique sample ID number as *Remediation Area-C##-Location^F or N-x-Analysis-QC*, where:

RLS	= Sample Collected from the Rail Line System
C##	= Precertification Area from which sample is collected (01 through 16)
Location	= Sample location number within Precertification Area (1 through 16)
^	= Separates location number and analysis type
F	= For use with samples as identified in Attachment 3; identifies soils as "fill" soil.
N-*x*	= For use with samples as identified in Attachment 3; identifies soil as "native" soil and *x* defines the depth interval indicator equal to two times the bottom depth for the respective interval and is measured in feet, i.e., "2" = 2 x 1.
Analysis	= "R" = radiological; "M" = metals; "P" = pesticides and/or PCBs; "S" = semi-volatiles or PAHs; "L" = VOCs
QC	= "V" = archive sample; "D" = duplicate sample; "Y1" = first container blank; "X1" = first rinsate; "TB1" = first trip blank

Surveying Required: Yes - by surveying group.
Field QC Samples Required: Yes
Field Data Validation: Yes
Analytical Data Validation: Yes - VSL B/D (90/10).
Off-site Data Package Requirements (as applicable): ASL D. A 10-day TAT is required for the final data package and EDD reporting of all non-gamma analyses. For gamma analysis, a preliminary EDD is due on a 10-day TAT; a final data package and EDD is to be reported on a 30-day TAT (see Attachment 1).

Historical Data for shipping: 23.5 mg/kg total uranium from boring location A6-SA3-8.

Justification:
As required by the SEP, all soil demonstrated to contain contamination above the associated FRLs and other applicable action levels was evaluated for remedial action. Historical and Predesign data for the Sitewide Rail Line System Area was collected during the RI/FS and various predesign investigations. Based on the results of sampling activities discussed in the below-listed documents, it has been determined that no further remedial activities are needed.

- Post-Excavation As-Built Report for Area 7, Phase 1 (DOE 2004)
- Excavation Plan for Area 6 Waste Pits and General Area (DOE 2005)
- Excavation Plan for Area 7 Silos and General Area (DOE 2005)
- Excavation Plan for Area 7 Support and Silos Process Area (DOE 2005)

The sampling activities outlined in this V/FCN are an effort to illustrate that moving forward with the precertification/certification process in this area is an acceptable course of action.

REQUESTED BY: Denise Arico Date: 12/14/05

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Fiske	1-5-06	X	PROJECT MANAGER: J.D. Chiou	12/27/05
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	12/21/05
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. Mehrman	1/10/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage for T.E.B.	1/3/06

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

DISTRIBUTION

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

ATTACHMENT 1
SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method[a]	Matrix	Preserve	Hold Time	TAT[e]	Container[b]	Minimum Mass/Volume
Any combination of Rads/Metals/PCBs/ SVOCs and/or Fluoride (TALs MVT,MDSVA1, MDWTU, MDOTU, MDSXT, MDNWQP, MDNZQP)	Gamma Spec, Alpha Spec, and LSC	Solid	Cool, 4° C	12 months	10 day prelim[e] 30 day final[e]	Glass with Teflon-lined lid	700 g (1500 g)[c]
	ICP/AES or ICP/MS			6 months	10 day[e]		
	GC			14 days	10 day[e]		
	GC			14 days	10 day[e]		
	IC			28 days	10 day[e]		
Rads/Metals (TALs MDY)	Gamma Spec	Solids	Cool, 4° C	12 months	10 day prelim[e] 30 day final[e]	Plastic core liner or glass or polyethylene sample container	300 g (900g)[c]
	ICP/AES or ICP/MS			6 months	10 day[e]		
Rads (TAL M)	Gamma Spec	Solids	None	12 months	10 day prelim[e] 30 day final[e]	Plastic or Stainless Steel core liner or glass or polyethylene sample container	300 g (900 g)[c]
VOCs (TAL I)	GC/MS	Solid	Cool, 4° C	48 hours	10 day[e]	3 x 1-Encore Sampler[c] plus 1 x 2-oz jar for % moisture	Each full Encore Sampler[c] will hold approx. 5 g
Rads (TALs M, MD, MDS, MDN)[d]	Gamma Spec, Alpha Spec, and LSC	Liquid (rinsate[d])	HNO_3 pH<2	6 months	10 day prelim[e] 30 day final[e]	Polyethylene	4 liters
Metals and/or Fluoride (TALs O, V, W, Y, X or Z)[d]	ICP/AES, ICP/MS, or ISE	Liquid (rinsate[d])	HNO_3 pH<2	6 months	10 day[e]	Glass with Teflon lined lid	500 ml
VOCs (TAL I)	GC/MS	Liquid (trip blank only)	H_2SO_4 pH<2 Cool, 4° C	14 days	10 day[e]	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] t the direction of the Field Sampling Lead, triple the specified volume must be collected for all samples at one location in the CU in order for the contract laboratory to perform the required quality control analysis. The samples shall be identified on the Chain of Custody/Request for Analysis forms as "designated for laboratory QC".

[d] If "push tubes" are used for sampling, the off-site laboratories will be sent container blanks. If an alternative sample method is used, the Field Technicians will collect a rinsate(s). Rinsate and container blank samples will only be analyzed for rads and metals.

[e] 10-day TAT is required for the final data package and EDD reporting of all non-gamma analyses. For gamma analysis, a preliminary EDD is due on a 10-day TAT; a final data package and EDD is to be reported on a 30-day TAT.

ATTACHMENT 2
TARGET ANALYTE LISTS

20600-PSP-0016-D
(Radiological - ASL D/E*)

Analyte	On-Property FRL[a]	MDL
Technetium-99	29.1 pCi/g	2.91 pCi/g

20600-PSP-0016-I
(VOCs - ASL D/E*)

Analyte	On-Property FRL	MDL
1,1-Dichloroethene	0.41 mg/kg	0.041 mg/kg
Bromodichloromethane	4.0 mg/kg	0.4 mg/kg
Tetrachloroethene	3.6 mg/kg	0.36 mg/kg

20600-PSP-0016-M
(Radiological - ASL D/E*)

Analyte	On-Property FRL	MDL
Total Uranium	82 mg/kg	8.2 mg/kg
Radium-226	1.7 pCi/g	0.17 pCi/g
Radium-228	1.8 pCi/g	0.18 pCi/g
Thorium-228	1.7 pCi/g	0.17 pCi/g
Thorium-232	1.5 pCi/g	0.15 pCi/g

20600-PSP-0016-N
(Radiological – ASL D/E*)

Analyte	On-Property FRL	MDL
Cesium-137	1.4 pCi/g	0.14 pCi/g
Thorium-230	280 pCi/g	28 pCi/g

20600-PSP-0016-O
(Metals – ASL D/E*)

Analyte	On-Property FRL	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Cadmium	*5.0 mg/kg*	*0.5 mg/kg*
Silver	*10.0 mg/kg*	*1.0 mg/kg*
Fluoride	78000 mg/kg	7800 mg/kg

20600-PSP-0016-P[c]
(PAHs - ASL D/E*)

Analyte	On-Property FRL/*BTV*[b]	MDL
Benzo(a)pyrene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(b)fluoranthene	*1.0 mg/kg*	*0.1 mg/kg*
Dibenzo(a,h)anthracene	*0.088 mg/kg*	*0.0088 mg/kg*
Indeno(1,2,3-cd)pyrene	*1.0 mg/kg*	*0.10 mg/kg*

ATTACHMENT 2
TARGET ANALYTE LISTS
(continued)

20600-PSP-0016-Q
(Pesticides - ASL D/E*)

Analyte	On-Property FRL	MDL
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

20600-PSP-0016-S
(Radiological – ASL D/E*)

Analyte	On-Property FRL	MDL
Thorium-230	280 pCi/g	28 pCi/g

20600-PSP-0016-T
(PCBs - ASL D/E*)

Analyte	On-Property FRL	MDL
Aroclor-1254	0.13 mg/kg	0.013 mg/kg
Aroclor-1260	0.13 mg/kg	0.013 mg/kg

20600-PSP-0016-U[c]
(PAHs - ASL D/E*)

Analyte	On-Property FRL/*BTV*[b]	MDL
Benzo(a)anthracene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(a)pyrene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(b)fluoranthene	*1.0 mg/kg*	*0.1 mg/kg*
Dibenzo(a,h)anthracene	*0.088 mg/kg*	*0.0088 mg/kg*
Indeno(1,2,3-cd)pyrene	*1.0 mg/kg*	*0.10 mg/kg*
Carbazole	12 mg/kg	1.2 mg/kg

20600-PSP-0016-V
(Metals - ASL D/E*)

Analyte	On-Property FRL/*BTV*[b]	MDL
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg

20600-PSP-0016-W
(Metals - ASL D/E*)

Analyte	On-Property FRL/*BTV*[b]	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Silver	*10.0 mg/kg*	*1.0 mg/kg*
Fluoride	78000 mg/kg	7800 mg/kg

ATTACHMENT 2
TARGET ANALYTE LISTS
(continued)

20600-PSP-0016-X
(Metals - ASL D/E*)

Analyte	On-Property FRL/*BTV*[b]	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Cadmium	*5.0 mg/kg*	*0.5 mg/kg*

20600-PSP-0016-Y
(Metals - ASL D/E*)

Analyte	On-Property FRL/*BTV*[b]	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Beryllium	1.5 mg/kg	0.15 mg/kg

20600-PSP-0016-Z
(Metals - ASL D/E*)

Analyte	On-Property FRL/*BTV*[b]	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Fluoride	78000 mg/kg	7800 mg/kg

20600-PSP-0016-A1[c]
(PAHs - ASL D/E*)

Analyte	On-Property FRL/*BTV*[b]	MDL
Benzo(a)anthracene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(a)pyrene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(b)fluoranthene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(g,h,i)perylene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(k)fluoranthene	*1.0 mg/kg*	*0.1 mg/kg*
Chrysene	*1.0 mg/kg*	*0.1 mg/kg*
Dibenzo(a,h)anthracene	*0.088 mg/kg*	*0.0088 mg/kg*
Fluoranthene	*10.0 mg/kg*	*1.0 mg/kg*
Indeno(1,2,3-cd)pyrene	*1.0 mg/kg*	*0.10 mg/kg*
Phenanthrene	*5.0 mg/kg*	*0.5 mg/kg*
Pyrene	*10.0 mg/kg*	*1.0 mg/kg*

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

[b]BTV applies to Ecological COCs.

[c]The MDLs for TALs P, U, and A1 are 10 percent of the BTV, which is lower than the FRLs.

*Analytical requirements will meet ASL D but the MDL may cause some analyses to be considered ASL E.

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
1	C01-1	0-0.5	RLS-C01-1^F-RMP	MVT	482420.56	1349602.08
		1-1.5	RLS-C01-1^N-3-RMP	MVT		
	C01-2	0-0.5	RLS-C01-2^RMP	MVT	482420.28	1349654.87
	C01-3	0-0.5	RLS-C01-3^RMP	MVT	482447.9	1349721.36
	C01-4V	0-0.5	RLS-C01-4V	Archive	482416.08	1349782.79
	C01-5	0-0.5	RLS-C01-5^RMP	MVT	482441.61	1349871.89
	C01-6V	0-0.5	RLS-C01-6V	Archive	482410.78	1349911.14
	C01-7	0-0.5	RLS-C01-7^RMP	MVT	482423.19	1349958.5
	C01-8D	0-0.5	RLS-C01-8^RMP	MVT	482421.73	1350023.47
			RLS-C01-8^RMP-D	MVT		
	C01-9V	0-0.5	RLS-C01-9V	Archive	482405.24	1350079.1
	C01-10	0-0.5	RLS-C01-10^RMP	MVT	482430.82	1350176.3
	C01-11	0-0.5	RLS-C01-11^RMP	MVT	482414.73	1350234.01
	C01-12	0-0.5	RLS-C01-12^RMP	MVT	482397.28	1350291.08
	C01-13	0-0.5	RLS-C01-13^RMP	MVT	482430.64	1350390.04
	C01-14V	0-0.5	RLS-C01-14V	Archive	482407.28	1350434.52
	C01-15	0-0.5	RLS-C01-15^RMP	MVT	482390.68	1350518.28
	C01-16	0-0.5	RLS-C01-16^RMP	MVT	482396.82	1350581.93

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
2	C02-1	0-0.5	RLS-C02-1^F-RMP	MVT	482379.62	1349598.78
		1.5-2.0	RLS-C02-1^N-4-RMP	MVT		
	C02-2	0-0.5	RLS-C02-2^F-RMP	MVT	482364.24	1349630.44
		1.5-2.0	RLS-C02-2^N-4-RMP	MVT		
	C02-3V	0-0.5	RLS-C02-3V (fill)	Archive	482389.63	1349715.7
		0.5-1.0	RLS-C02-3V (native)	Archive		
	C02-4	0-0.5	RLS-C02-4^RMP	MVT	482388.54	1349762.51
	C02-5D	0-0.5	RLS-C02-5^RMP	MVT	482357.43	1349830
			RLS-C02-5^RMP-D	MVT		
	C02-6	0-0.5	RLS-C02-6^RMP	MVT	482355.89	1349898.44
	C02-7V	0-0.5	RLS-C02-7V	Archive	482352.66	1349969.73
	C02-8	0-0.5	RLS-C02-8^RMP	MVT	482365.05	1350029.54
	C02-9	0-0.5	RLS-C02-9^RMP	MVT	482377.22	1350083.14
	C02-10	0-0.5	RLS-C02-10^RMP	MVT	482346.75	1350143.86
	C02-11V	0-0.5	RLS-C02-11V	Archive	482357.02	1350250.91
	C02-12	0-0.5	RLS-C02-12^RMP	MVT	482383.04	1350295.29
	C02-13	0-0.5	RLS-C02-13^RMP	MVT	482338.52	1350379.07
	C02-14	0-0.5	RLS-C02-14^RMP	MVT	482337.02	1350431.75
	C02-15	0-0.5	RLS-C02-15^RMP	MVT	482363.81	1350478.39
	C02-16V	0-0.5	RLS-C02-16V	Archive	482347.1	1350551.98

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
3	C03-1	0-0.5	RLS-C03-1^F-RMP	MVT	482310.92	1349593.05
		0.5-1.0	RLS-C03-1^N-2-RMP	MVT		
	C03-2	0-0.5	RLS-C03-2^F-RMP	MVT	482296.75	1349628.47
		0.5-1.0	RLS-C03-2^N-2-RMP	MVT		
	C03-3	0-0.5	RLS-C03-3^F-RMP	MVT	482333.25	1349731.17
		0.5-1.0	RLS-C03-3^N-2-RMP	MVT		
	C03-4V	0-0.5	RLS-C03-4V	Archive	482303.5	1349760.37
	C03-5	0-0.5	RLS-C03-5^RMP	MVT	482315.89	1349847.53
	C03-6D	0-0.5	RLS-C03-6^RMP	MVT	482326.85	1349921.83
			RLS-C03-6^RMP-D	MVT		
	C03-7	0-0.5	RLS-C03-7^RMP	MVT	482297.45	1349966.01
	C03-8V	0-0.5	RLS-C03-8V	Archive	482322.04	1350052.29
	C03-9	0-0.5	RLS-C03-9^RMP	MVT	482320.52	1350107.93
	C03-10	0-0.5	RLS-C03-10^RMP	MVT	482303.47	1350176.59
	C03-11	0-0.5	RLS-C03-11^RMP	MVT	482287.63	1350229.43
	C03-12V	0-0.5	RLS-C03-12V	Archive	482299.1	1350304.19
	C03-13	0-0.5	RLS-C03-13^RMP	MVT	482269.47	1350389.95
	C03-14	0-0.5	RLS-C03-14^RMP	MVT	482281.08	1350434.9
	C03-15V	0-0.5	RLS-C03-15V	Archive	482305.95	1350508.64
	C03-16	0-0.5	RLS-C03-16^RMP	MVT	482290.65	1350563.39

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
4	C04-1	0-0.5	RLS-C04-1^RMS	MDSVA1	482449.04	1349306.03
			RLS-C04-1^L	I		
	C04-2V	0-0.5	RLS-C04-2V	Archive	482432.12	1349367.47
	C04-3	0-0.5	RLS-C04-3^F-RMS	MDSVA1	482407.44	1349266.93
			RLS-C04-3^F-L	I		
		2.5-3.0	RLS-C04-3^N-6-RMS	MDSVA1		
			RLS-C04-3^N-6-L	I		
	C04-4	0-0.5	RLS-C04-4^F-RMS	MDSVA1	482410.48	1349338.23
			RLS-C04-4^F-L	I		
		2.5-3.0	RLS-C04-4^N-6-RMS	MDSVA1		
			RLS-C04-4^N-6-L	I		
	C04-5	0-0.5	RLS-C04-5^RMS	MDSVA1	482443.55	1349423.29
			RLS-C04-5^L	I		
	C04-6V	0-0.5	RLS-C04-6V (fill)	Archive	482426.72	1349504.97
		1.0-1.5	RLS-C04-6V (native)			
	C04-7	0-0.5	RLS-C04-7^F-RMS	MDSVA1	482418.77	1349430.22
			RLS-C04-7^F-L	I		
		1.0-1.5	RLS-C04-7^N-3-RMS	MDSVA1		
			RLS-C04-7^N-3-L	I		
	C04-8	0-0.5	RLS-C04-8^F-RMS	MDSVA1	482397.37	1349503.97
			RLS-C04-8^F-L	I		
		1.5-2.0	RLS-C04-8^N-4-RMS	MDSVA1		
			RLS-C04-8^N-4-L	I		
	C04-9D	0-0.5	RLS-C04-9^F-RMS	MDSVA1	482376.63	1349288.74
		0-0.5	RLS-C04-9^F-L	I		
		0-0.5	RLS-C04-9^F-RMS-D	MDSVA1		
		0-0.5	RLS-C04-9^F-L-D	I		
		2.5-3.0	RLS-C04-9^N-6-RMS	MDSVA1		
		2.5-3.0	RLS-C04-9^N-6-L	I		
		2.5-3.0	RLS-C04-9^N-6-RMS-D	MDSVA1		
		2.5-3.0	RLS-C04-9^N-6-L-D	I		
	C04-10	0-0.5	RLS-C04-10^F-RMS	MDSVA1	482360.38	1349343.11
		0-0.5	RLS-C04-10^F-L	I		
		2.5-3.0	RLS-C04-10^N-6-RMS	MDSVA1		
		2.5-3.0	RLS-C04-10^N-6-L	I		
	C04-11	0-0.5	RLS-C04-11^F-RMS	MDSVA1	482341.97	1349306.07
			RLS-C04-11^F-L	I		
		2.0-2.5	RLS-C04-12^N-5-RMS	MDSVA1		
			RLS-C04-12^N-5-L	I		
	C04-12	0-0.5	RLS-C04-12^F-RMS	MDSVA1	482371.8	1349428.42
			RLS-C04-12^F-L	I		
		1.5-2.0	RLS-C04-12^N-3-RMS	MDSVA1		
			RLS-C04-12^N-3-L	I		
	C04-13V	0-0.5	RLS-C04-13V (fill)	Archive	482367.66	1349528.35
		1.5-2.0	RLS-C04-13V (native)			
	C04-14	0-0.5	RLS-C04-14^F-RMS	MDSVA1	482323.98	1349427.24
			RLS-C04-14^F-L	I		
		2-2.5	RLS-C04-14^N-5-RMS	MDSVA1		
			RLS-C04-14^N-5-L	I		
	C04-15	0-0.5	RLS-C04-15^F-RMS	MDSVA1	482342.9	1349469.19
			RLS-C04-15^F-L	I		
		2-2.5	RLS-C04-15^N-5-RMS	MDSVA1		
			RLS-C04-15^N-5-L	I		
	C04-16	0-0.5	RLS-C04-16^F-RMS	MDSVA1	482327.16	1349504.04
			RLS-C04-16^F-L	I		
		1-1.5	RLS-C04-16^N-3-RMS	MDSVA1		
			RLS-C04-16^N-3-L	I		

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
5	C05-1	0-0.5	RLS-C05-1^RMS	MDSVA1	482519.46	1349177.55
			RLS-C05-1^L	I		
	C05-2	0-0.5	RLS-C05-2^RMS	MDSVA1	482479.79	1349077.67
			RLS-C05-2^L	I		
	C05-3V	0-0.5	RLS-C05-3V	Archive	482472.66	1349135.09
	C05-4	0-0.5	RLS-C05-4^RMS	MDSVA1	482477.5	1349194.43
			RLS-C05-4^L	I		
	C05-5	0-0.5	RLS-C05-5^RMS	MDSVA1	482451.48	1348985.25
			RLS-C05-5^L	I		
	C05-6V	0-0.5	RLS-C05-6V	Archive	482429.66	1349021.84
	C05-7	0-0.5	RLS-C05-7^RMS	MDSVA1	482373.66	1348941.36
			RLS-C05-7^L	I		
	C05-8	0-0.5	RLS-C05-8^RMS	MDSVA1	482387.88	1349001.94
			RLS-C05-8^L	I		
	C05-9	0-0.5	RLS-C05-9^RMS	MDSVA1	482430.28	1349064.82
			RLS-C05-9^L	I		
	C05-10	0-0.5	RLS-C05-10^RMS	MDSVA1	482419.49	1349127.49
			RLS-C05-10^L	I		
	C05-11	0-0.5	RLS-C05-11^F-RMS	MDSVA1	482385.07	1349053.52
			RLS-C05-11^F-L	I		
		3.0-3.5	RLS-C05-11^N-7-RMS	MDSVA1		
			RLS-C05-11^N-7-L	I		
	C05-12V	0-0.5	RLS-C05-12V (fill)	Archive	482362.6	1349143.66
		3.0-3.5	RLS-C05-12V (native)			
	C05-13	0-0.5	RLS-C05-13^RMS	MDSVA1	482434.54	1349183.84
			RLS-C05-13^L	I		
	C05-14D	0-0.5	RLS-C05-14^RMS	MDSVA1	482433.64	1349235.07
			RLS-C05-14^L	I		
			RLS-C05-14^RMS-D	MDSVA1		
			RLS-C05-14^L-D	I		
	C05-15	0-0.5	RLS-C05-15^F-RMS	MDSVA1	482379.32	1349195.95
			RLS-C05-15^F-L	I		
		3.0-3.5	RLS-C05-15^N-7-RMS	MDSVA1		
			RLS-C05-15^N-7-L	I		
	C05-16V	0-0.5	RLS-C05-16V (fill)	Archive	482374.06	1349233.46
		2.5-3.0	RLS-C05-16V (native)			

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
6	C06-1D	0-0.5	RLS-C06-1^RMPS	MDWTU	482396.08	1348303.17
			RLS-C06-1^RMPS-D	MDWTU		
	C06-2	0-0.5	RLS-C06-2^RMPS	MDWTU	482412.3	1348449.08
	C06-3	0-0.5	RLS-C06-3^RMPS	MDWTU	482397.2	1348508.16
	C06-4V	0-0.5	RLS-C06-4V	Archive	482389.69	1348621.13
	C06-5	0-0.5	RLS-C06-5^RMPS	MDWTU	482390.11	1348741.58
	C06-6V	0-0.5	RLS-C06-6V	Archive	482390.18	1348825.05
	C06-7	0-0.5	RLS-C06-7^RMPS	MDWTU	482374.44	1348865.62
	C06-8	0-0.5	RLS-C06-8^RMPS	MDWTU	482334.97	1348689.15
	C06-9	0-0.5	RLS-C06-9^RMPS	MDWTU	482307.51	1348630.28
	C06-10V	0-0.5	RLS-C06-10V	Archive	482258.94	1348564.81
	C06-11	0-0.5	RLS-C06-11^RMPS	MDWTU	482161.25	1348468.77
	C06-12	0-0.5	RLS-C06-12^RMPS	MDWTU	482088	1348355.08
	C06-13	0-0.5	RLS-C06-13^RMPS	MDWTU	482042.72	1348288.8
	C06-14V	0-0.5	RLS-C06-14V	Archive	481987.3	1348218.51
	C06-15	0-0.5	RLS-C06-15^RMPS	MDWTU	481901.83	1348163.04
	C06-16	0-0.5	RLS-C06-16^RMPS	MDWTU	481818.42	1348113.64

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
7	C07-1V	0-0.5	RLS-C07-1V	Archive	481716.31	1348054.31
	C07-2	0-0.5	RLS-C07-2^RMPS	MDOTU	481775.39	1348062.64
	C07-3	0-0.5	RLS-C07-3^RMPS	MDOTU	481853.54	1348043.74
	C07-4	0-0.5	RLS-C07-4^RMPS	MDOTU	481932.56	1348000.7
	C07-5V	0-0.5	RLS-C07-5V	Archive	482037.36	1347955.8
	C07-6	0-0.5	RLS-C07-6^RMPS	MDOTU	482062.51	1347903.74
	C07-7	0-0.5	RLS-C07-7^RMPS	MDOTU	482124.2	1347826.32
	C07-8	0-0.5	RLS-C07-8^RMPS	MDOTU	482169.43	1347693.62
	C07-9	0-0.5	RLS-C07-9^RMPS	MDOTU	482194.06	1347613.13
	C07-10V	0-0.5	RLS-C07-10V	Archive	482194.35	1347712.21
	C07-11D	0-0.5	RLS-C07-11^RMPS	MDOTU	482231.69	1347825.4
			RLS-C07-11^RMPS-D	MDOTU		
	C07-12	0-0.5	RLS-C07-12^RMPS	MDOTU	482244.98	1347896.24
	C07-13V	0-0.5	RLS-C07-13V	Archive	482279.87	1347944.71
	C07-14	0-0.5	RLS-C07-14^RMPS	MDOTU	482353.79	1348052.38
	C07-15	0-0.5	RLS-C07-15^RMPS	MDOTU	482377.17	1348113.77
	C07-16	0-0.5	RLS-C07-16^RMPS	MDOTU	482402.4	1348242.74

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
8	C08-1	0-0.5	RLS-C08-1^RMP	MDSXT	481635.14	1348054.05
	C08-2	0-0.5	RLS-C08-2^RMP	MDSXT	481531.44	1348054.4
	C08-3V	0-0.5	RLS-C08-3V	Archive	481405.85	1348049.42
	C08-4	0-0.5	RLS-C08-4^RMP	MDSXT	481352.45	1348044.21
	C08-5D	0-0.5	RLS-C08-5^RMP	MDSXT	481289.74	1348021.51
			RLS-C08-5^RMP-D	MDSXT		
	C08-6	0-0.5	RLS-C08-6^RMP	MDSXT	481244.28	1348083.32
	C08-7	0-0.5	RLS-C08-7^RMP	MDSXT	481202.11	1348031
	C08-8V	0-0.5	RLS-C08-8V	Archive	481167.4	1348054.67
	C08-9	0-0.5	RLS-C08-9^RMP	MDSXT	481122.11	1348051.84
	C08-10	0-0.5	RLS-C08-10^RMP	MDSXT	481085.61	1348066.88
	C08-11V	0-0.5	RLS-C08-11V	Archive	481051.96	1348024.58
	C08-12	0-0.5	RLS-C08-12^RMP	MDSXT	481010.2	1348050.77
	C08-13V	0-0.5	RLS-C08-13V	Archive	480958.4	1348059.84
	C08-14	0-0.5	RLS-C08-14^RMP	MDSXT	480920.89	1348012.47
	C08-15	0-0.5	RLS-C08-15^RMP	MDSXT	480861.27	1348039.21
	C08-16	0-0.5	RLS-C08-16^RMP	MDSXT	480804.58	1348025.87

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
9	C09-1	0-0.5	RLS-C09-1^RM	MDY	480748.5	1348041.95
	C09-2	0-0.5	RLS-C09-2^RM	MDY	480661.83	1348018.35
	C09-3	0-0.5	RLS-C09-3^RM	MDY	480589.14	1348029.04
	C09-4V	0-0.5	RLS-C09-4V	Archive	480522.11	1347984.92
	C09-5	0-0.5	RLS-C09-5^RM	MDY	480486.61	1348019.74
	C09-6	0-0.5	RLS-C09-6^RM	MDY	480438.4	1348003.77
	C09-7V	0-0.5	RLS-C09-7V	Archive	480398.59	1347968.75
	C09-8	0-0.5	RLS-C09-8^RM	MDY	480365.44	1347939.82
	C09-9	0-0.5	RLS-C09-9^RM	MDY	480380.83	1347907.5
	C09-10V	0-0.5	RLS-C09-10^V	Archive	480315.17	1347866.66
	C09-11	0-0.5	RLS-C09-11^RM	MDY	480314.97	1347823.08
	C09-12	0-0.5	RLS-C09-12^RM	MDY	480344.78	1347771.98
	C09-13D	0-0.5	RLS-C09-13^RM	MDY	480309.97	1347744.26
			RLS-C09-13^RM-D	MDY		
	C09-14	0-0.5	RLS-C09-14^RM	MDY	480309.63	1347667.92
	C09-15V	0-0.5	RLS-C09-15V	Archive	480345.58	1347585.65
	C09-16	0-0.5	RLS-C09-16^RM	MDY	480338.91	1347627.29

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
10	C10-1	0-0.5	RLS-C10-1^RMPS	MDNWQP	482484.67	1346523.84
			RLS-C10-1^L	I		
	C10-2	0-0.5	RLS-C10-2^RMPS	MDNWQP	482483.14	1346580.7
			RLS-C10-2^L	I		
	C10-3	0-0.5	RLS-C10-3^RMPS	MDNWQP	482449.38	1346641.85
			RLS-C10-3^L	I		
	C10-4V	0-0.5	RLS-C10-4V	Archive	482455.65	1346695.97
	C10-5	0-0.5	RLS-C10-5^RMPS	MDNWQP	482412.99	1346785.54
			RLS-C10-5^L	I		
	C10-6V	0-0.5	RLS-C10-6V	Archive	482387.85	1346837.9
	C10-7	0-0.5	RLS-C10-7^RMPS	MDNWQP	482397.8	1346922.85
			RLS-C10-7^L	I		
	C10-8	0-0.5	RLS-C10-8^RMPS	MDNWQP	482351.77	1347001.07
			RLS-C10-8^L	I		
	C10-9	0-0.5	RLS-C10-9^RMPS	MDNWQP	482332.29	1347045.51
			RLS-C10-9^L	I		
	C10-10V	0-0.5	RLS-C10-10V	Archive	482348.2	1347092.43
	C10-11	0-0.5	RLS-C10-11^RMPS	MDNWQP	482338.37	1347162.01
			RLS-C10-11^L	I		
	C10-12D	0-0.5	RLS-C10-12^RMPS	MDNWQP	482306.33	1347215.46
			RLS-C10-12^L	I		
			RLS-C10-12^RMPS-D	MDNWQP		
			RLS-C10-12^L-D	I		
	C10-13	0-0.5	RLS-C10-13^RMPS	MDNWQP	482286.27	1347317.04
			RLS-C10-13^L	I		
	C10-14	0-0.5	RLS-C10-14^RMPS	MDNWQP	482248.63	1347384.31
			RLS-C10-14^L	I		
	C10-15V	0-0.5	RLS-C10-15V	Archive	482236.73	1347460.3
	C10-16	0-0.5	RLS-C10-16^RMPS	MDNWQP	482206.26	1347537.81
			RLS-C10-16^L	I		

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
11	C11-1D	0-0.5	RLS-C11-1^RMPS	MDNZQP	482661.1	1345898.04
			RLS-C11-1^L	I		
			RLS-C11-1^RMPS-D	MDNZQP		
			RLS-C11-1^L-D	I		
	C11-2V	0-0.5	RLS-C11-2V	Archive	482636.18	1345948.89
	C11-3	0-0.5	RLS-C11-3^RMPS	MDNZQP	482639.07	1345991.47
			RLS-C11-3^L	I		
	C11-4	0-0.5	RLS-C11-4^RMPS	MDNZQP	482620.27	1346026.66
			RLS-C11-4^L	I		
	C11-5V	0-0.5	RLS-C11-5V	Archive	482597.54	1346072.74
	C11-6	0-0.5	RLS-C11-6^RMPS	MDNZQP	482604.86	1346104.12
			RLS-C11-6^L	I		
	C11-7	0-0.5	RLS-C11-7^RMPS	MDNZQP	482586.57	1346141.37
			RLS-C11-7^L	I		
	C11-8	0-0.5	RLS-C11-8^RMPS	MDNZQP	482568.62	1346175.56
			RLS-C11-8^L	I		
	C11-9	0-0.5	RLS-C11-9^RMPS	MDNZQP	482578.83	1346219.44
			RLS-C11-9^L	I		
	C11-10V	0-0.5	RLS-C11-10V	Archive	482561.51	1346259.01
	C11-11	0-0.5	RLS-C11-11^RMPS	MDNZQP	482535.81	1346307.06
			RLS-C11-11^L	I		
	C11-12	0-0.5	RLS-C11-12^RMPS	MDNZQP	482530.18	1346333.58
			RLS-C11-12^L	I		
	C11-13	0-0.5	RLS-C11-13^RMPS	MDNZQP	482539.89	1346376.3
			RLS-C11-13^L	I		
	C11-14	0-0.5	RLS-C11-14^RMPS	MDNZQP	482514.29	1346391.84
			RLS-C11-14^L	I		
	C11-15V	0-0.5	RLS-C11-15V	Archive	482529.37	1346434.72
	C11-16	0-0.5	RLS-C11-16^RMPS	MDNZQP	482505.37	1346446.86
			RLS-C11-16^L	I		

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
12	C12-1	0-0.5	RLS-C12-1^R	M	482776.64	1345570.49
	C12-2V	0-0.5	RLS-C12-2V	Archive	482762.51	1345648.14
	C12-3	0-0.5	RLS-C12-3^R	M	482745.87	1345569.34
	C12-4	0-0.5	RLS-C12-4^R	M	482713.27	1345621.68
	C12-5	0-0.5	RLS-C12-5^R	M	482749.13	1345681.62
	C12-6	0-0.5	RLS-C12-6^R	M	482726.55	1345737.34
	C12-7V	0-0.5	RLS-C12-7V	Archive	482708.44	1345675.12
	C12-8D	0-0.5	RLS-C12-8^R-D	M	482693.14	1345755.3
			RLS-C12-8^R-D	M		
	C12-9	0-0.5	RLS-C12-9^R	M	482762.06	1345757.84
	C12-10V	0-0.5	RLS-C12-10V	Archive	482709.16	1345787.56
	C12-11	0-0.5	RLS-C12-11^R	M	482749.9	1345847.89
	C12-12	0-0.5	RLS-C12-12^R	M	482701.64	1345830.77
	C12-13	0-0.5	RLS-C12-13^R	M	482740.76	1345897.89
	C12-14	0-0.5	RLS-C12-14^R	M	482686.45	1345864.23
	C12-15V	0-0.5	RLS-C12-15V	Archive	482673.87	1345773.78
	C12-16	0-0.5	RLS-C12-16^R	M	482652.05	1345848.08

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
13	C13-1V	0-0.5	RLS-C13-1V	Archive	482906.25	1345136.47
	C13-2	0-0.5	RLS-C13-2^R	M	482881.77	1345204.08
	C13-3	0-0.5	RLS-C13-3^R	M	482870.13	1345143.05
	C13-4D	0-0.5	RLS-C13-4^R	M	482838.73	1345161.07
			RLS-C13-4^R-D	M		
	C13-5	0-0.5	RLS-C13-5^R	M	482859.54	1345264.1
	C13-6	0-0.5	RLS-C13-6^R	M	482857.43	1345320.95
	C13-7	0-0.5	RLS-C13-7^R	M	482828.88	1345202.8
	C13-8V	0-0.5	RLS-C13-8V	Archive	482828.42	1345273.81
	C13-9V	0-0.5	RLS-C13-9V	Archive	482833.21	1345349.37
	C13-10	0-0.5	RLS-C13-10^R	M	482792.26	1345351.5
	C13-11	0-0.5	RLS-C13-11^R	M	482825.25	1345433.6
	C13-12	0-0.5	RLS-C13-12^R	M	482756.81	1345429.25
	C13-13	0-0.5	RLS-C13-13^R	M	482796.94	1345486.44
	C13-14	0-0.5	RLS-C13-14^R	M	482800.99	1345533.15
	C13-15V	0-0.5	RLS-C13-15V	Archive	482763.47	1345467.87
	C13-16	0-0.5	RLS-C13-16^R	M	482743.65	1345511.93

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
14	C14-1V	0-0.5	RLS-C14-1V	Archive	483045.33	1344680.88
	C14-2	0-0.5	RLS-C14-2^R	M	483042.66	1344724.73
	C14-3	0-0.5	RLS-C14-3^R	M	482996.22	1344658.87
	C14-4	0-0.5	RLS-C14-4^R	M	482984.62	1344760.62
	C14-5	0-0.5	RLS-C14-5 ^R	M	483023.56	1344791.1
	C14-6	0-0.5	RLS-C14-6^R	M	483003.42	1344836.84
	C14-7V	0-0.5	RLS-C14-7V	Archive	482942.6	1344795.68
	C14-8	0-0.5	RLS-C14-8^R	M	482967.77	1344861.88
	C14-9V	0-0.5	RLS-C14-9V	Archive	482970.76	1344910.96
	C14-10	0-0.5	RLS-C14-10^R	M	482977.95	1344965.74
	C14-11D	0-0.5	RLS-C14-11^R	M	482918.26	1344896.08
			RLS-C14-11^R-D	M		
	C14-12	0-0.5	RLS-C14-12^R	M	482935.63	1344985.66
	C14-13	0-0.5	RLS-C14-13^R	M	482960.17	1345040.82
	C14-14V	0-0.5	RLS-C14-14V	Archive	482935.36	1345088.98
	C14-15	0-0.5	RLS-C14-15^R	M	482891.45	1345038.99
	C14-16	0-0.5	RLS-C14-16^R	M	482899.16	1345080.45

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
15	C15-1	0-0.5	RLS-C15-1^R	M	483233.93	1344271.2
	C15-2	0-0.5	RLS-C15-2^R	M	483216.47	1344319.39
	C15-3V	0-0.5	RLS-C15-3V	Archive	483187.9	1344264.09
	C15-4D	0-0.5	RLS-C15-4^R-D	M	483126.57	1344320.08
			RLS-C15-4^R-D	M		
	C15-5	0-0.5	RLS-C15-5^R	M	483194.38	1344357.1
	C15-6	0-0.5	RLS-C15-6^R	M	483143.12	1344400.27
	C15-7	0-0.5	RLS-C15-7^R	M	483118.85	1344363.48
	C15-8V	0-0.5	RLS-C15-8V	Archive	483088.46	1344419.67
	C15-9	0-0.5	RLS-C15-9^R	M	483127.71	1344442.73
	C15-10	0-0.5	RLS-C15-10^R	M	483095.66	1344506.84
	C15-11	0-0.5	RLS-C15-11^R	M	483056.92	1344489.21
	C15-12V	0-0.5	RLS-C15-12V	Archive	483044.68	1344526.86
	C15-13	0-0.5	RLS-C15-13^R	M	483100.34	1344572.52
	C15-14V	0-0.5	RLS-C15-14V	Archive	483081.43	1344641.46
	C15-15	0-0.5	RLS-C15-15^R	M	483036.49	1344582.9
	C15-16	0-0.5	RLS-C15-16^R	M	483001.61	1344636.94

ATTACHMENT 3
SITEWIDE RAIL LINE SYSTEM SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth (feet)	Sample ID	TAL (Analysis)	Northing	Easting
16	C16-1	0-0.5	RLS-C16-1^R	M	483721.31	1343871.21
	C16-2	0-0.5	RLS-C16-2^R	M	483624.32	1343918.12
	C16-3	0-0.5	RLS-C16-3^R	M	483555.76	1343981.23
	C16-4V	0-0.5	RLS-C16-4V	Archive	483511.25	1343968
	C16-5	0-0.5	RLS-C16-5^R	M	483484.4	1344032.46
	C16-6	0-0.5	RLS-C16-6^R	M	483452.75	1344018.13
	C16-7V	0-0.5	RLS-C16-7V	Archive	483395.42	1344039.42
	C16-8	0-0.5	RLS-C16-8^R	M	483416.18	1344100.86
	C16-9	0-0.5	RLS-C16-9^R	M	483371.28	1344069.52
	C16-10V	0-0.5	RLS-C16-10V	Archive	483343.23	1344106.43
	C16-11	0-0.5	RLS-C16-11^R	M	483343.83	1344169.86
	C16-12	0-0.5	RLS-C16-12^R	M	483306.66	1344085.39
	C16-13	0-0.5	RLS-C16-13^R	M	483275.27	1344149.35
	C16-14D	0-0.5	RLS-C16-14^R	M	483295.42	1344215.48
			RLS-C16-14^R-D	M		
	C16-15	0-0.5	RLS-C16-15^R	M	483249.03	1344198.61
	C16-16V	0-0.5	RLS-C16-16V	Archive	483205.47	1344206.85

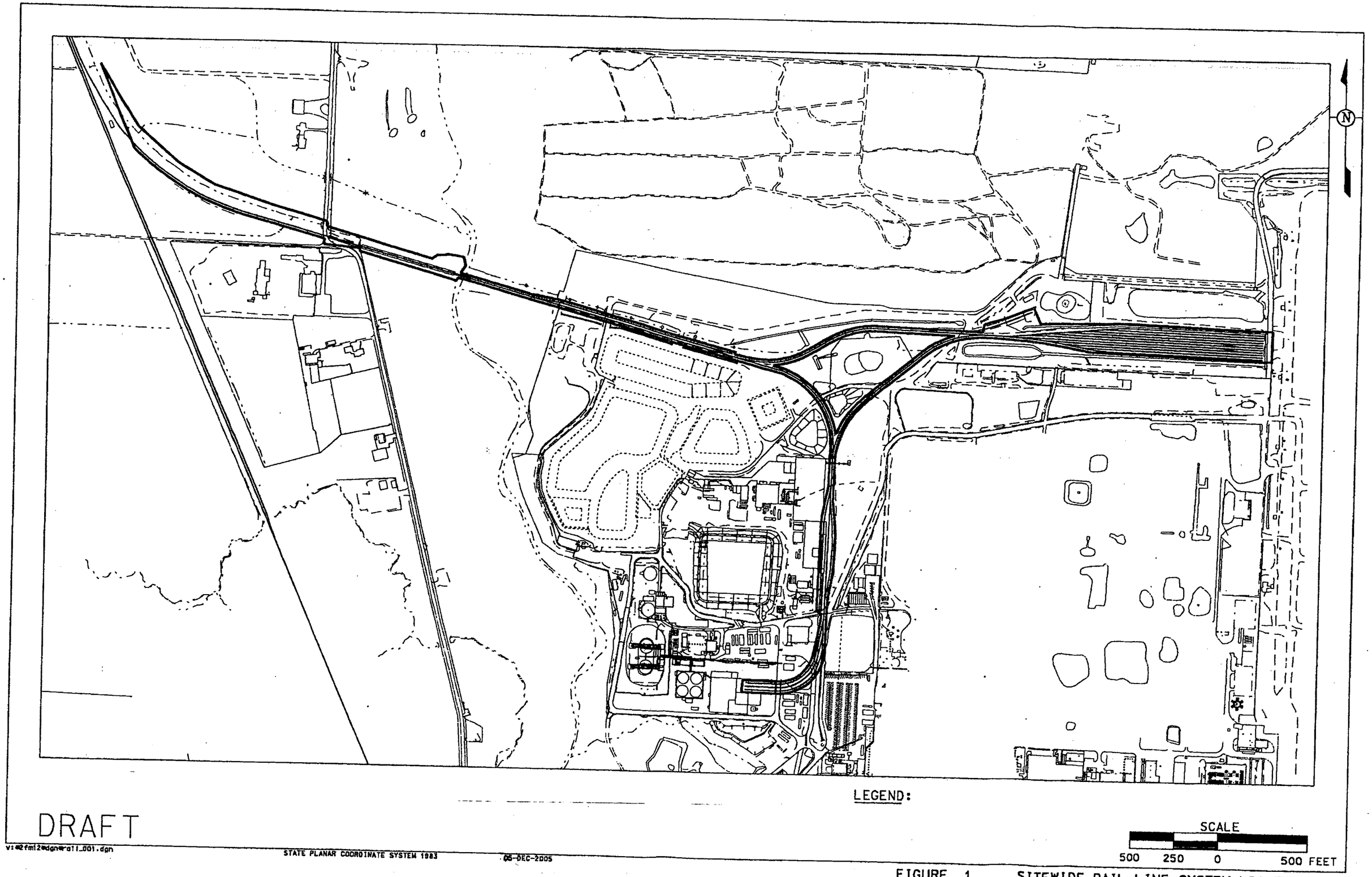

FIGURE 1 SITEWIDE RAIL LINE SYSTEM LOCATION MAP

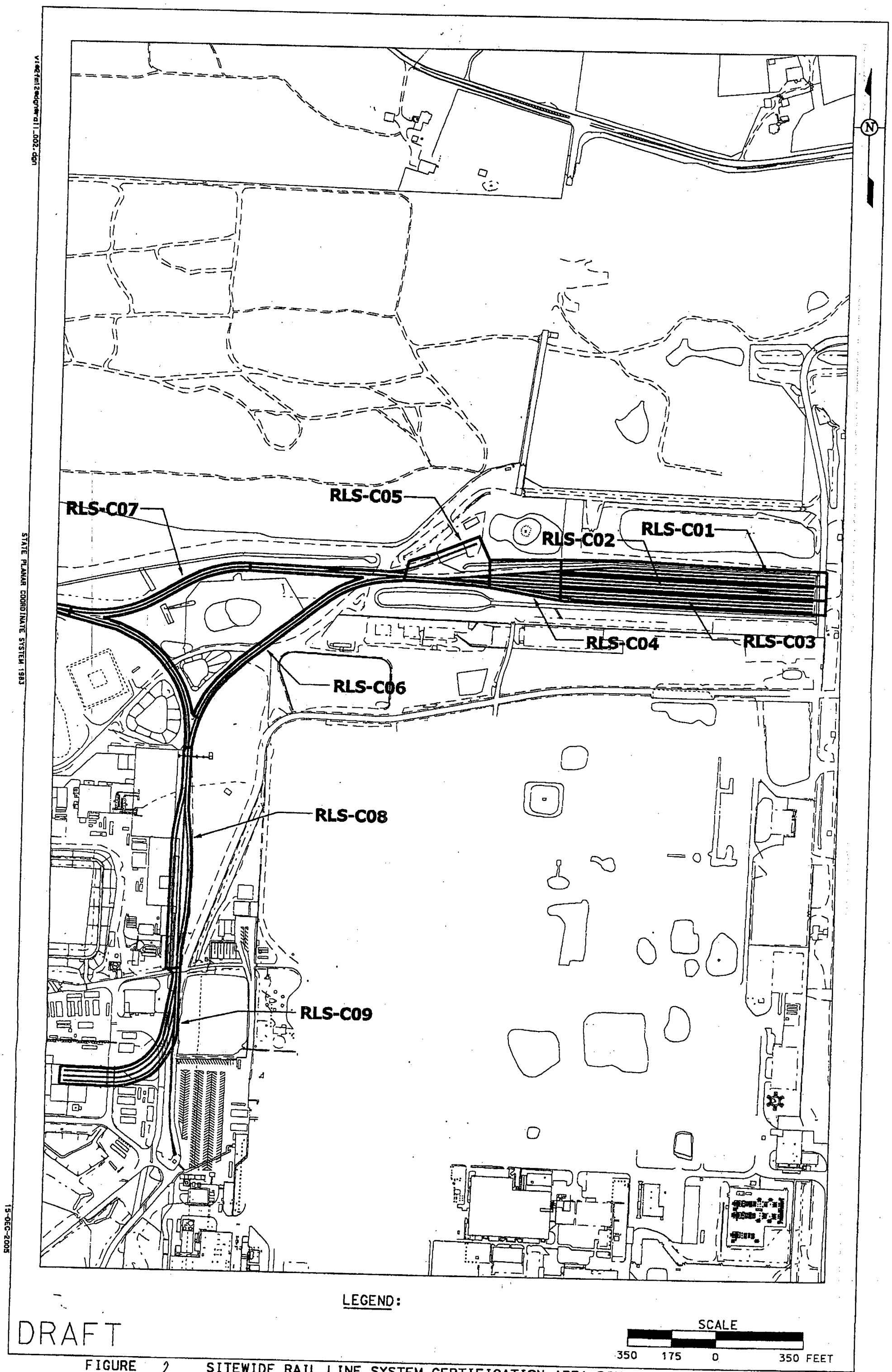

FIGURE 2 SITEWIDE RAIL LINE SYSTEM CERTIFICATION AREA BOUNDARIES (CUs 1-9)

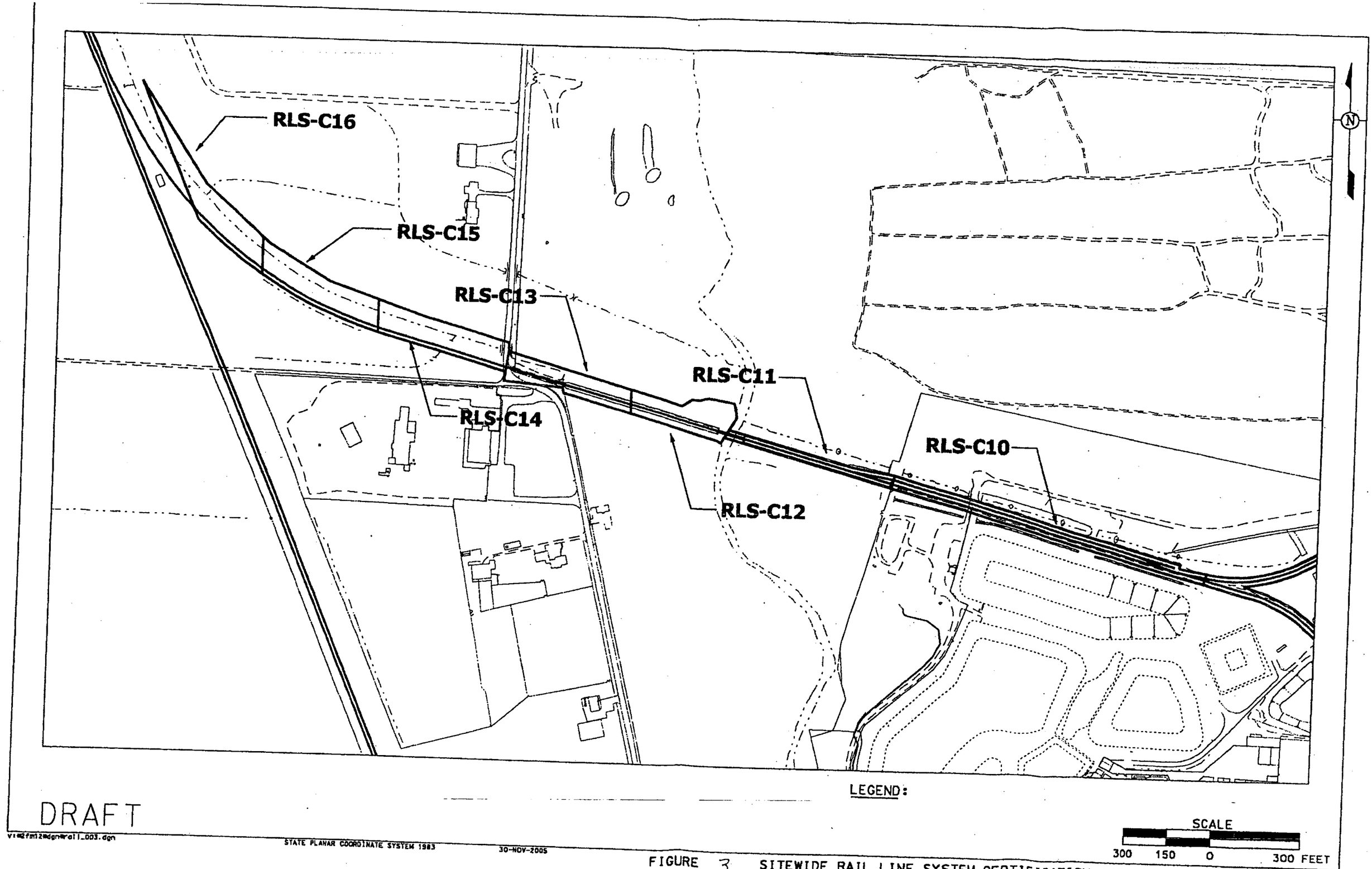

FIGURE 3 SITEWIDE RAIL LINE SYSTEM CERTIFICATION AREA BOUNDARIES (CUs 10-16)

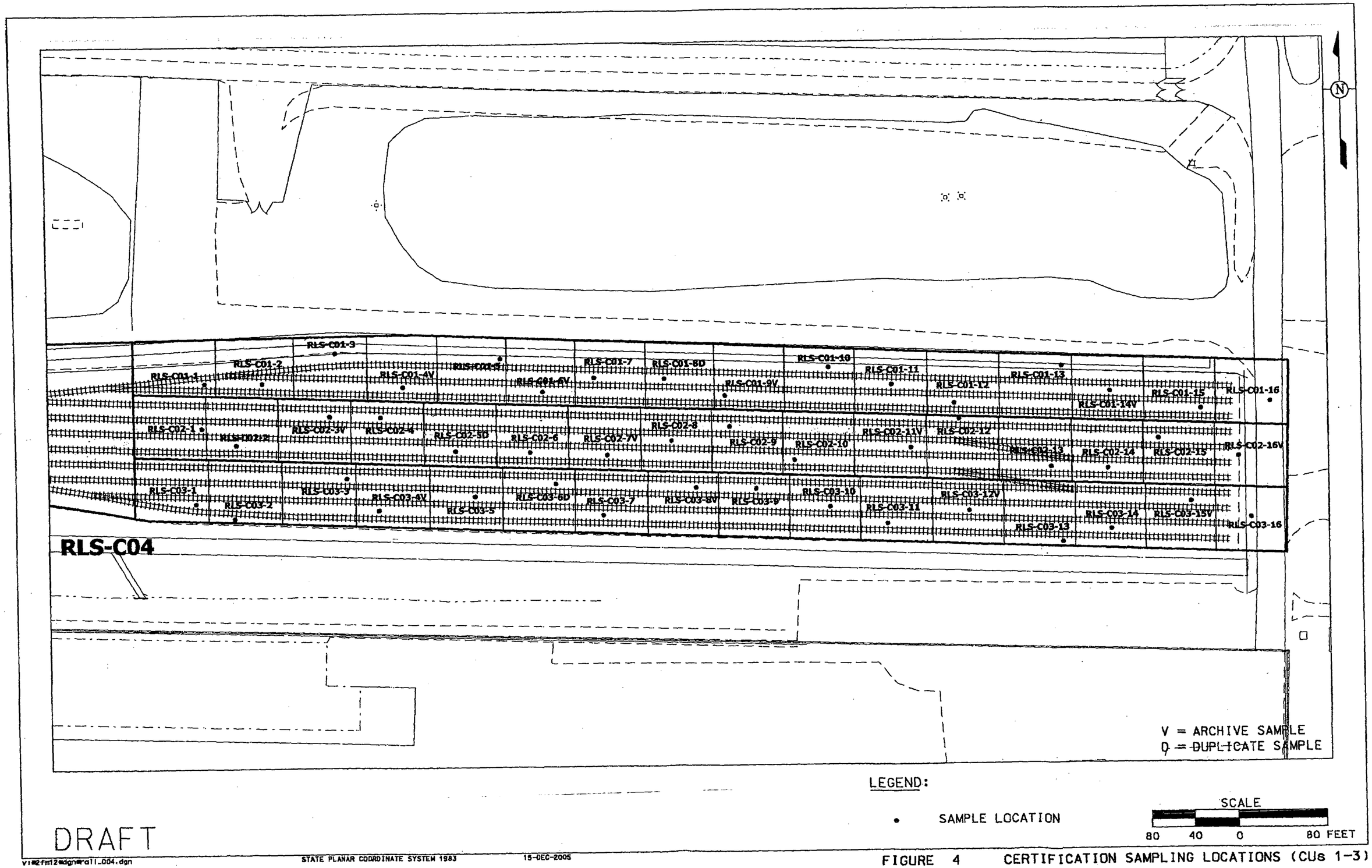

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FIGURE 4 CERTIFICATION SAMPLING LOCATIONS (CUs 1-3)

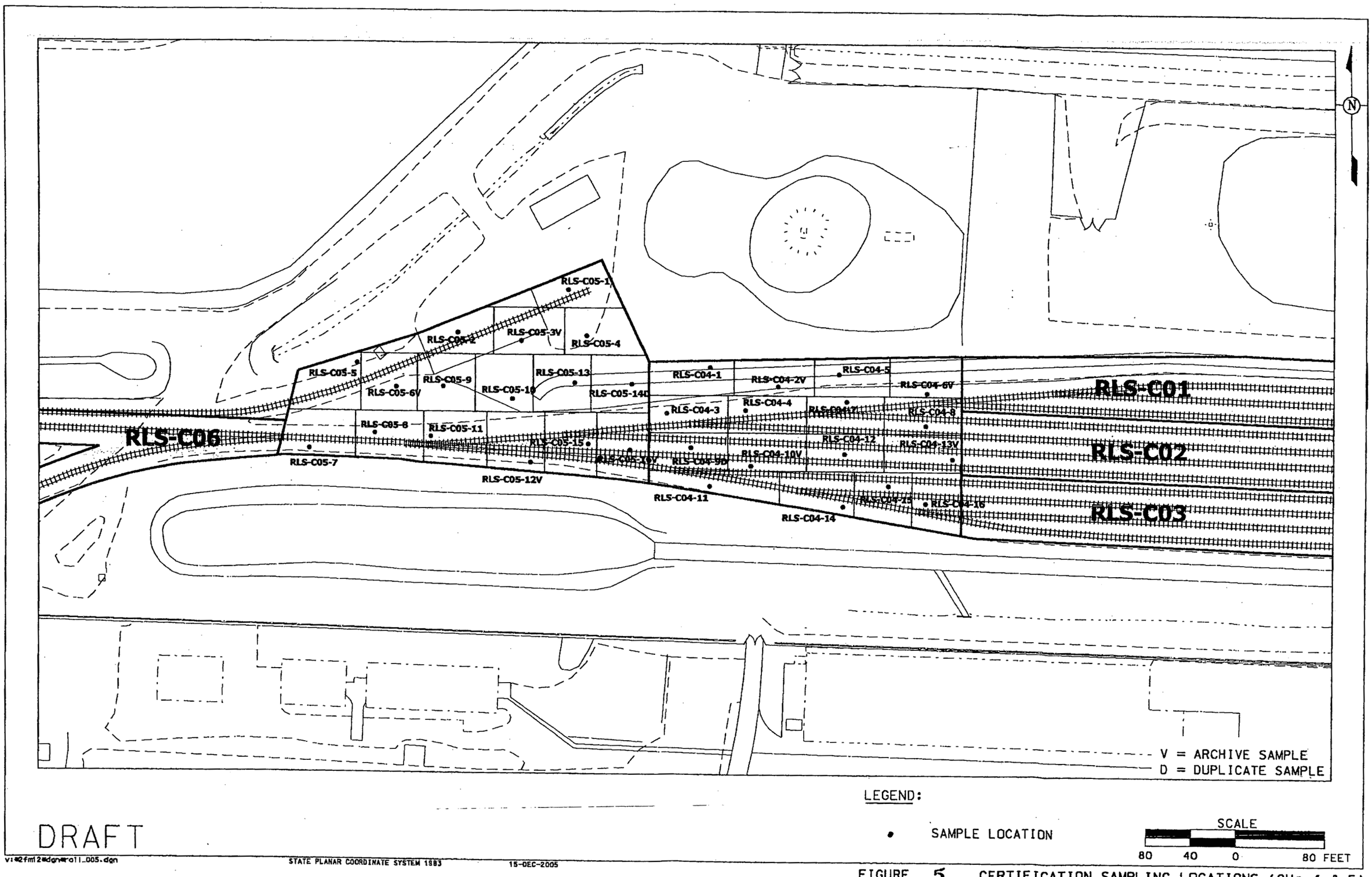

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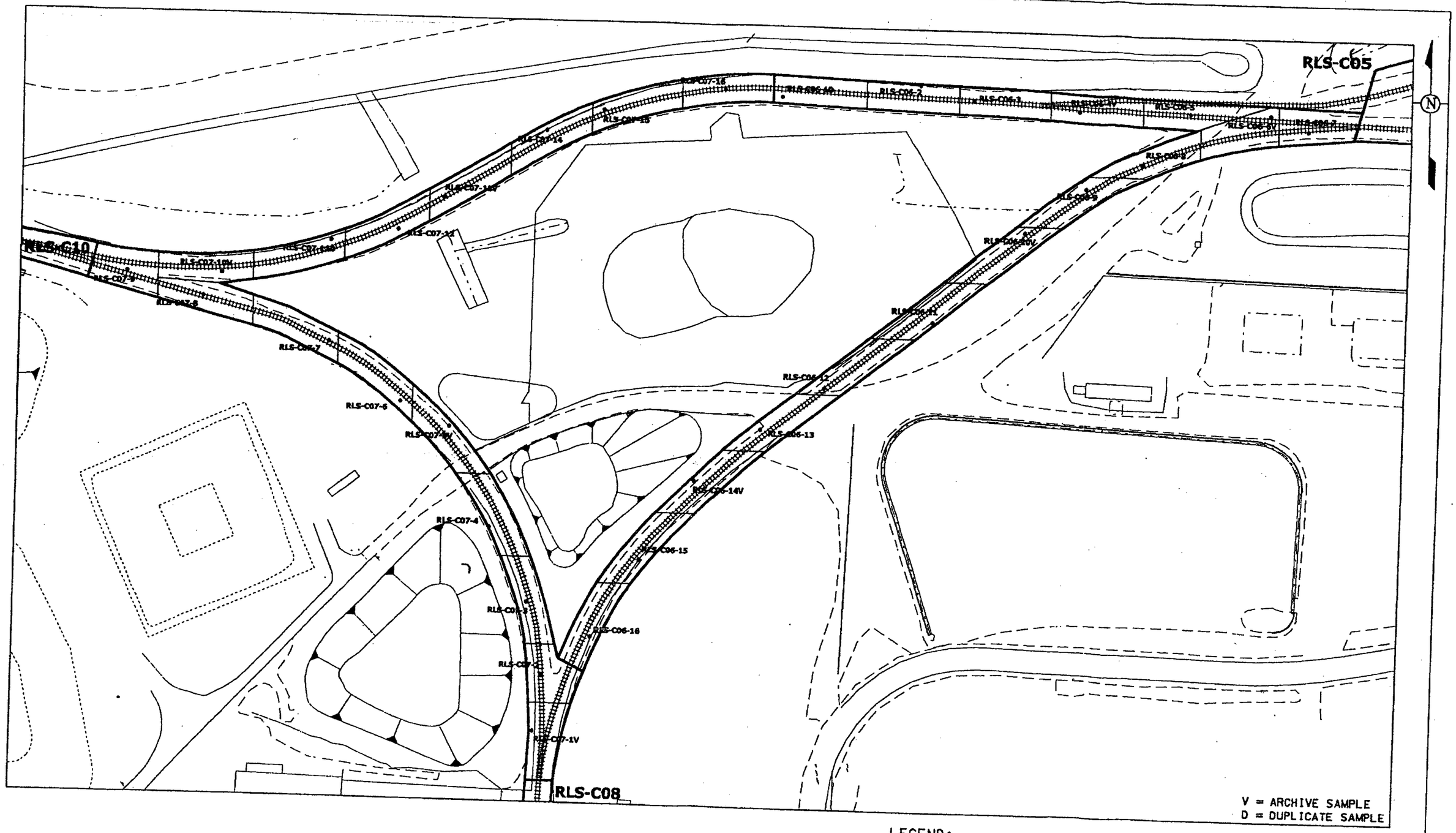
FIGURE 5 CERTIFICATION SAMPLING LOCATIONS (CUs 4 & 5)



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LEGEND:

• SAMPLE LOCATION

SCALE

100 50 0 100 FEET

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STATE PLANAR COORDINATE SYSTEM 1983

07-DEC-2005

FIGURE 6 CERTIFICATION SAMPLING LOCATIONS (CUs 6 & 7)

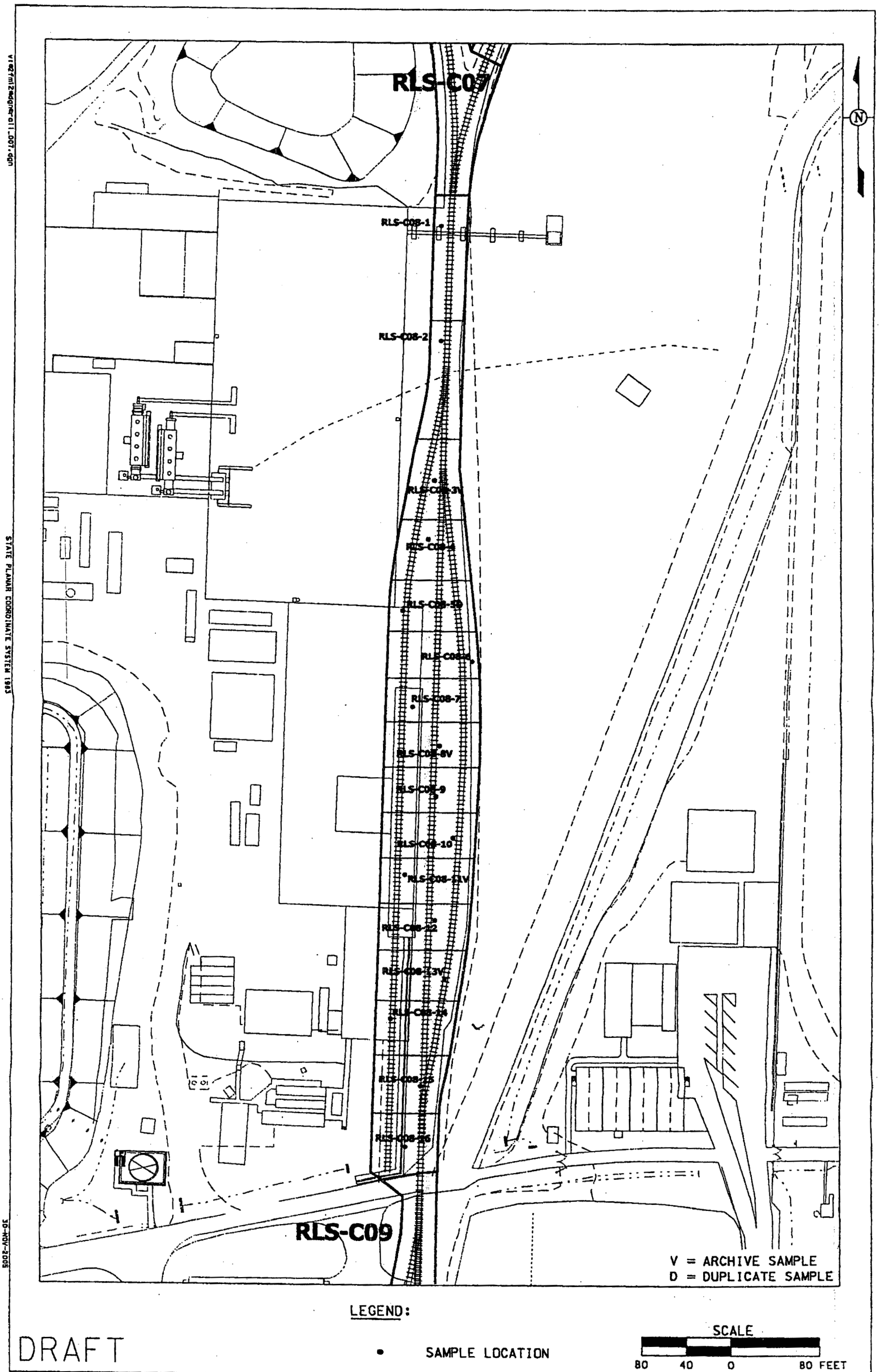


FIGURE 7 CERTIFICATION SAMPLING LOCATIONS (CU 8)

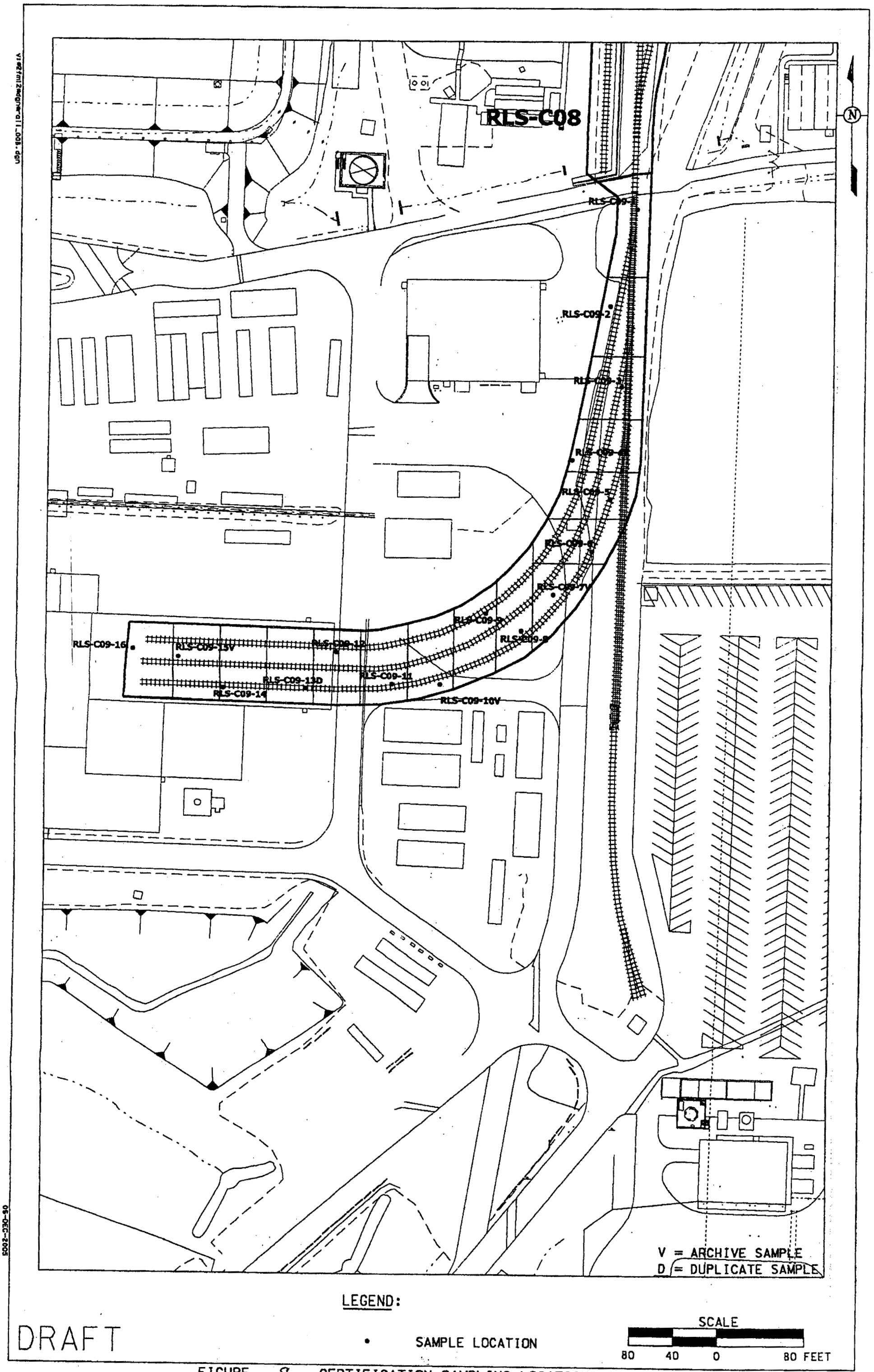
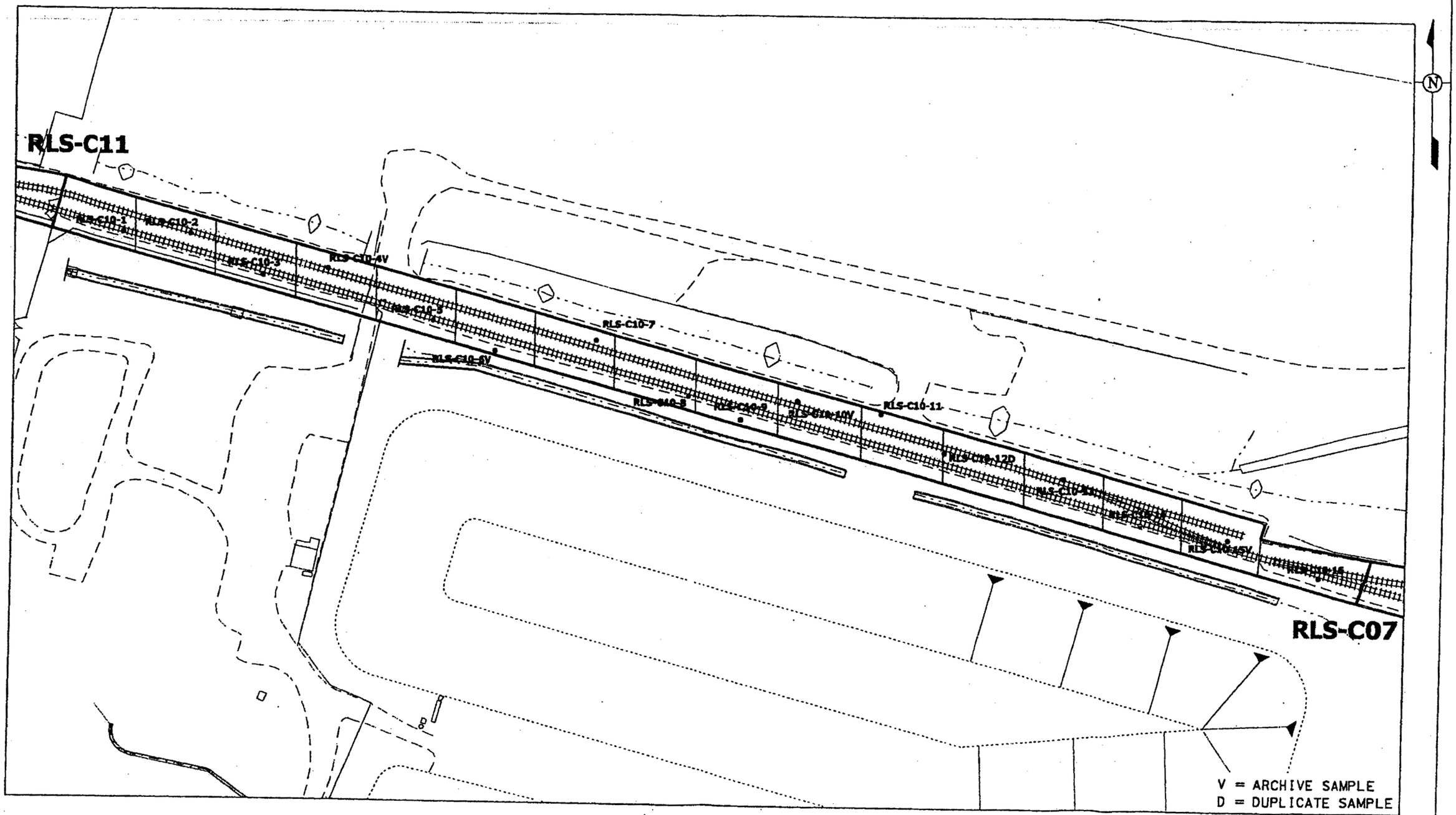


FIGURE 8 CERTIFICATION SAMPLING LOCATIONS (CU 9)



LEGEND:

• SAMPLE LOCATION

SCALE

80 40 0 80 FEET

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FIGURE 9 CERTIFICATION SAMPLING LOCATIONS (CU-10)

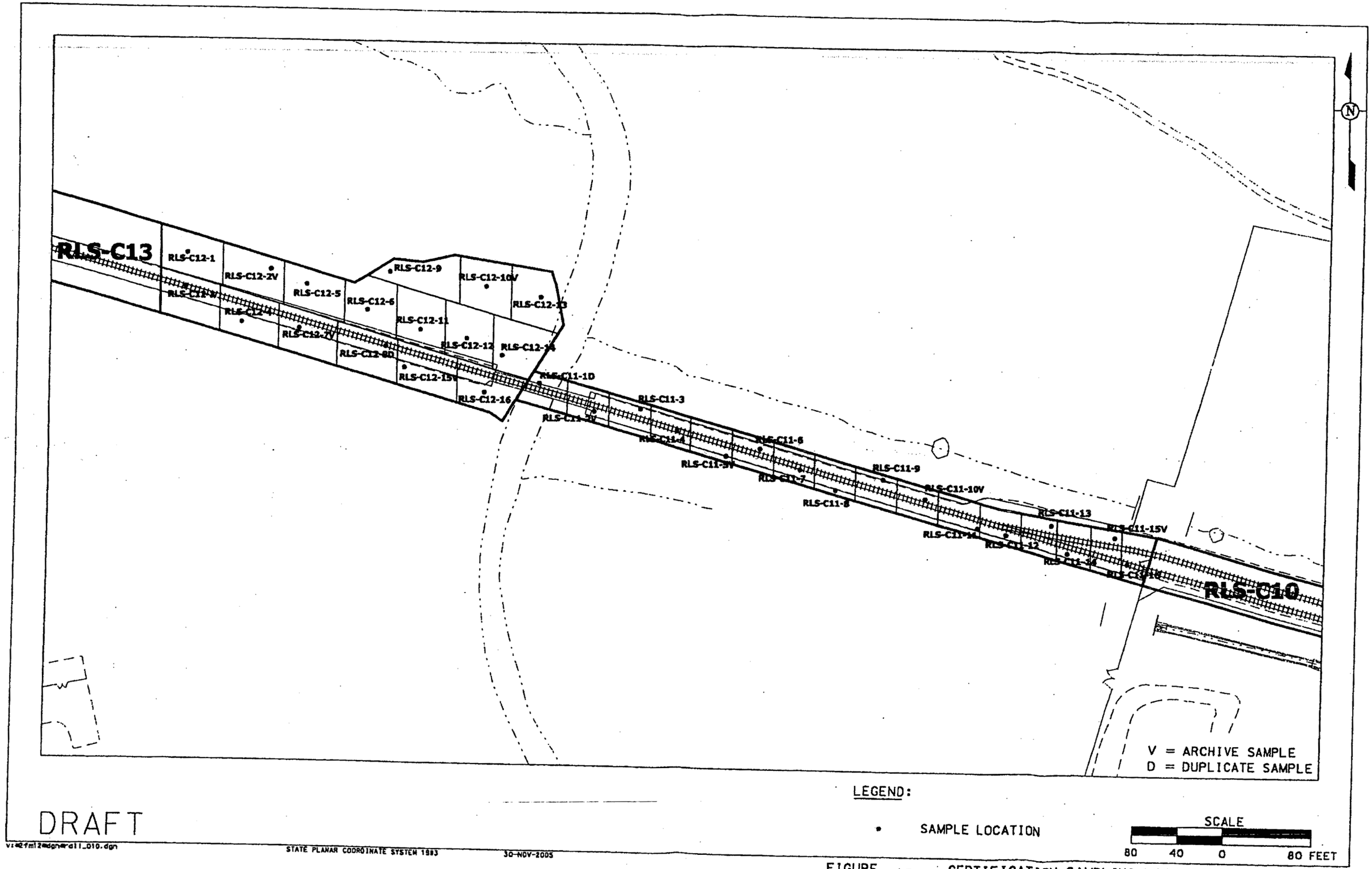
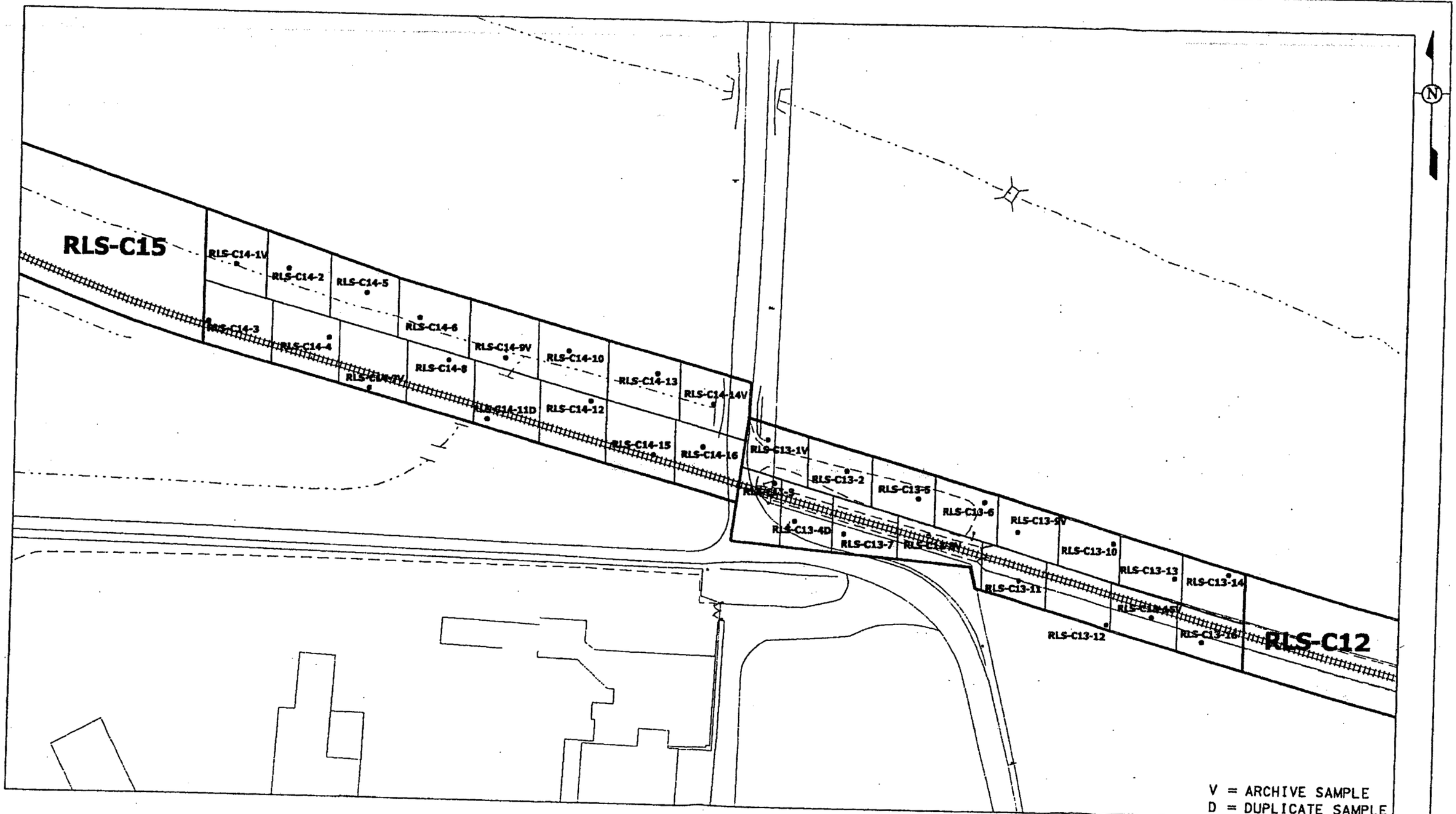


FIGURE 10 CERTIFICATION SAMPLING LOCATIONS (CUs 11 & 12)



LEGEND:

• SAMPLE LOCATION

SCALE

80 40 0 80 FEET

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STATE PLANAR COORDINATE SYSTEM 1983

30-NOV-2005

FIGURE 11 CERTIFICATION SAMPLING LOCATIONS (CUs 13 & 14)

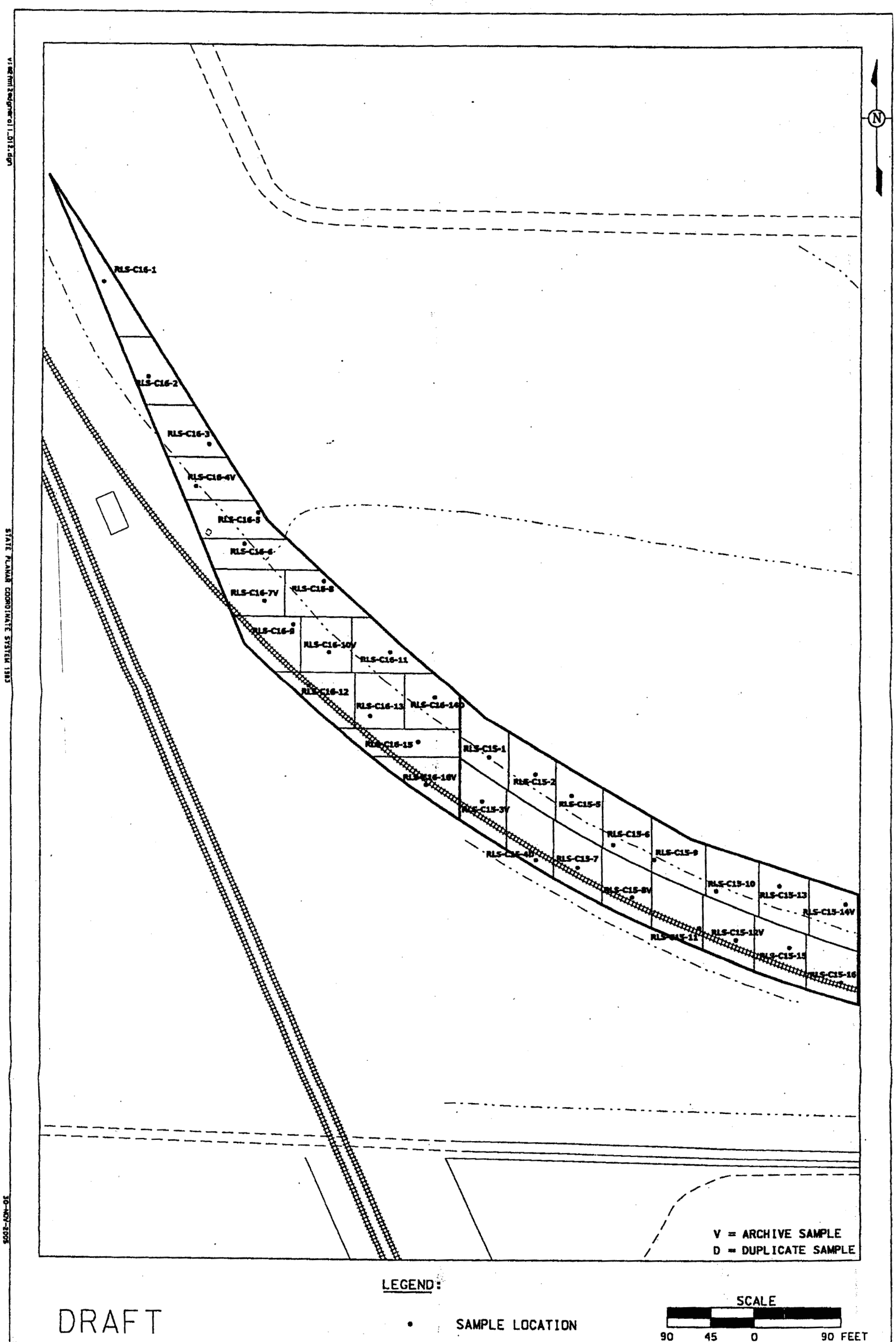


FIGURE 12 CERTIFICATION SAMPLING LOCATIONS (CUs 15 & 16)

VARIANCE / FIELD CHANGE NOTICE	Supplement / Q Log No. N/A	V/F: 20600-PSP-0016-101
WBS NO.: PROJECT/DOCUMENT/ECDC # 20600-PSP-0016 Rev.0		Page: 1 of 10
PROJECT TITLE: Project Specific Plan For Excavation Control And Precertification of the Area 6 Waste Pits and General Area		Date: 6/26/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the collection of ballast material for characterization. The areas to be sampled are shown on Figure 1.

The planned sample locations are shown on Figures 2 and 3. The Geoprobe® shall be used to core through the entire depth of the ballast. The core of ballast material shall then be scanned with a beta/gamma frisker. If an interval scans greater than 450 ccpm, a biased sample will be collected from the 12-inch interval with the highest ccpm. If there is visible staining of the ballast material, a biased sample shall also be collected from the 12-inch interval around the visibly stained ballast. If the entire core of ballast material scans less than 450 ccpm and there is no evidence of staining, a sample should be collected from the 12-inch interval that represents the middle of the core. The planned sample locations will be surveyed by the surveyors prior to sampling.

See, Attachment 1 for the Sampling and Analytical Requirements, Attachment 2 for the Target Analyte Lists (TALs), and Attachment 3 for the Sample Identifiers and Locations.

In addition to the planned sample locations, any areas along the rail line where the ballast material has visible staining are to be sampled. Sampling should be conducted as described above. Surveyors shall be contacted to survey in sample locations that are identified by the samplers. Figure 4 identifies the TALs to be sampled for the various areas along the rail. Additional samples collected shall be consecutively numbered beginning with the next number after the planned sample number.

Surveying Required: Yes - by surveying group.
Field Data Validation: Yes

Justification:
The ballast material underneath a portion of the rail line is being characterized to further assess disposition options.

REQUESTED BY: Denise Arico Date: 06/26/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	7-13-06	X	PROJECT MANAGER: J.D. Chiou	6/27/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Abitz	27 Jun 06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McLurgan	7/5/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrage	6/28/06

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

DISTRIBUTION

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

ATTACHMENT 1
SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method[a]	Matrix	ASL	Preserve	TAT	Container[b]	Minimum Mass
Any combination of Rads/Metals/PCBs/ SVOCs and/or Fluoride (TALs, MDOTU, MDNWQP, MDNZQP)	Gamma Spec, Alpha Spec, and LSC	Solid	B	Cool, 4° C	Prelim gamma 10 days Final gamma 30 days Final alpha (Th-230) 10 days Final Tc99 10 days	Polyethylene sample container	500 g
	ICP/AES or ICP/MS				10 day		
	GC				10 day		
	GC				10 day		
	IC				10 day		
Rads (TAL M)	Gamma Spec	Solid	B	None	Prelim gamma 10 days Final gamma 30 days	Plastic or Stainless Steel core liner or polyethylene sample container	300 g
Rads/Metals (TAL MDSXB7)	Gamma Spec, Alpha Spec, and LSC	Solid	B	Cool, 4° C	Prelim gamma 10 days Final gamma 30 days da 6/27/06 Final alpha (Th-230) 10 days Final Tc99 10 days	Polyethylene sample container	300 g
	ICP/AES or ICP/MS				10 days		

Special Instructions (samplers):
[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.

Special Instructions (SPL/Lab):
For radium-226, a seven-day in-growth is requested.
Analytical Data Validation is not required.
ASL: B
Data Package Requirements – COAs
Historical Data for Shipping: 23.5 mg/kg total uranium from boring location A6-SA3-8

ATTACHMENT 2
TARGET ANALYTE LISTS

20600-PSP-0016-B7
(up to 25 samples estimated in V/FCN)

Analyte	FRL/*BTV*[b]	MDL
Lead-210	38 pCi/g	3.8 pCi/g

20600-PSP-0016-D
(up to 25 samples estimated in V/FCN)

Analyte	FRL[a]	MDL
Technetium-99	29.1 pCi/g	2.91 pCi/g

20600-PSP-0016-M
(up to 25 samples estimated in V/FCN)

Analyte	FRL	MDL
Total Uranium	82 mg/kg	8.2 mg/kg
Radium-226	1.7 pCi/g	0.17 pCi/g
Radium-228	1.8 pCi/g	0.18 pCi/g
Thorium-228	1.7 pCi/g	0.17 pCi/g
Thorium-232	1.5 pCi/g	0.15 pCi/g

20600-PSP-0016-N
(up to 25 samples estimated in V/FCN)

Analyte	FRL	MDL
Cesium-137	1.4 pCi/g	0.14 pCi/g
Thorium-230	280 pCi/g	28 pCi/g

20600-PSP-0016-O
(up to 25 samples estimated in V/FCN)

Analyte	FRL	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Cadmium	*5.0 mg/kg*	*0.5 mg/kg*
Silver	*10.0 mg/kg*	*1.0 mg/kg*
Fluoride	78000 mg/kg	7800 mg/kg

20600-PSP-0016-P[c]
(up to 25 samples estimated in V/FCN)

Analyte	FRL/*BTV*[b]	MDL
Benzo(a)pyrene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(b)fluoranthene	*1.0 mg/kg*	*0.1 mg/kg*
Dibenzo(a,h)anthracene[d]	*0.088 mg/kg*[d]	*0.01 mg/kg*[d]
Indeno(1,2,3-cd)pyrene	*1.0 mg/kg*	*0.10 mg/kg*

ATTACHMENT 2
TARGET ANALYTE LISTS
(continued)

20600-PSP-0016-Q
(up to 25 samples estimated in V/FCN)

Analyte	FRL	MDL
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

20600-PSP-0016-S
(up to 25 samples estimated in V/FCN)

Analyte	FRL	MDL
Thorium-230	280 pCi/g	28 pCi/g

20600-PSP-0016-T
(up to 25 samples estimated in V/FCN)

Analyte	FRL	MDL
Aroclor-1254	0.13 mg/kg	0.013 mg/kg
Aroclor-1260	0.13 mg/kg	0.013 mg/kg

20600-PSP-0016-U[c]
(up to 25 samples estimated in V/FCN)

Analyte	FRL/*BTV*[b]	MDL
Benzo(a)anthracene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(a)pyrene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(b)fluoranthene	*1.0 mg/kg*	*0.1 mg/kg*
Dibenzo(a,h)anthracene[d]	*0.088 mg/kg*[d]	*0.01 mg/kg*[d]
Indeno(1,2,3-cd)pyrene	*1.0 mg/kg*	*0.10 mg/kg*
Carbazole	12 mg/kg	1.2 mg/kg

20600-PSP-0016-W
(up to 25 samples estimated in V/FCN)

Analyte	FRL/*BTV*[b]	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Silver	*10.0 mg/kg*	*1.0 mg/kg*
Fluoride	78000 mg/kg	7800 mg/kg

ATTACHMENT 2
TARGET ANALYTE LISTS
(continued)

20600-PSP-0016-X
(up to 25 samples estimated in V/FCN)

Analyte	FRL/*BTV*[b]	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Cadmium	*5.0 mg/kg*	*0.5 mg/kg*

20600-PSP-0016-Z
(up to 25 samples estimated in V/FCN)

Analyte	FRL/*BTV*[b]	MDL
Antimony	*10.0 mg/kg*	*1.0 mg/kg*
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Fluoride	78000 mg/kg	7800 mg/kg

[a]The MDL for technetium-99 is ten percent of the WAC limit, which is lower than the FRL.

[b]BTV applies to Ecological COCs.

[c]The MDLs for TALs P and U are ten percent of the BTV, which is lower than the FRLs.

[d]Ten percent of the BTV is not achievable for Dibenzo(a,h)anthracene.

Location	Sample ID	TAL	Northing	Easting
BLST-1	BLST-1^*a*-RMPS	MDSXB7	480900.709	1348015.456
BLST-2	BLST-2^*a*-RMPS	MDSXB7	480997.717	1348017.411
BLST-3	BLST-3^*a*-RMPS	MDSXB7	481087.951	1348051.4
BLST-4	BLST-4^*a*-RMPS	MDSXB7	481214.768	1348069.959
BLST-5	BLST-5^*a*-RMPS	MDSXB7	481277.608	1348049.46
BLST-6	BLST-6^*a*-RMPS	MDSXB7	481349.14	1348051.017
BLST-7	BLST-7^*a*-RMPS	MDSXB7	481564.33	1348059.839
BLST-8	BLST-8^*a*-RMPS	MDOTU	481745.491	1348068.842
BLST-9	BLST-9^*a*-RMPS	MDOTU	481837.449	1348052.636
BLST-10	BLST-10^*a*-RMPS	MDOTU	481949.692	1348008.281
BLST-11	BLST-11^*a*-RMPS	MDOTU	482143.728	1347776.111
BLST-12	BLST-12^*a*-RMPS	MDNWQP	482284.961	1347258.707
BLST-13	BLST-13^*a*-RMPS	MDNWQP	482425.54	1346745.702
BLST-14	BLST-14^*a*-RMPS	MDNZQP	482580.359	1346185.403
BLST-15	BLST-15^*a*-R	M	482658.56	1345882.82

Where:

BLST = Sample collected from the ballast

1, 2, etc = Consecutive sample numbers (locations)

a = To be replaced with the number that is two times the bottom depth of the sample interval collected

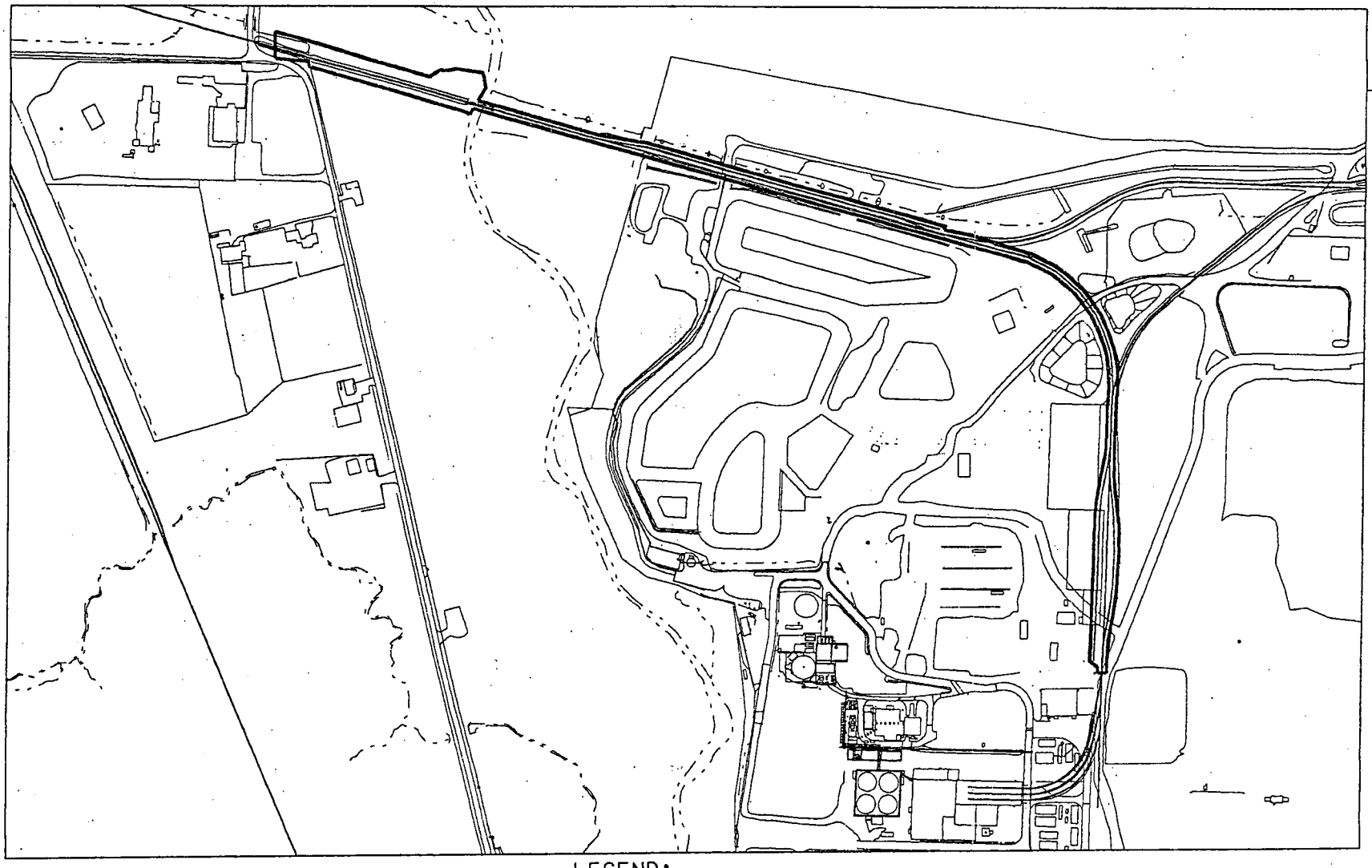
R = radiological

M = metals

P = pesticides and/or PCBs

S = semi-volatiles or PAHs

Note: If a bias sample is collected, "-B" is to be placed at the end of the sample ID.



LEGEND:

BALLAST SAMPLING AREA

SCALE

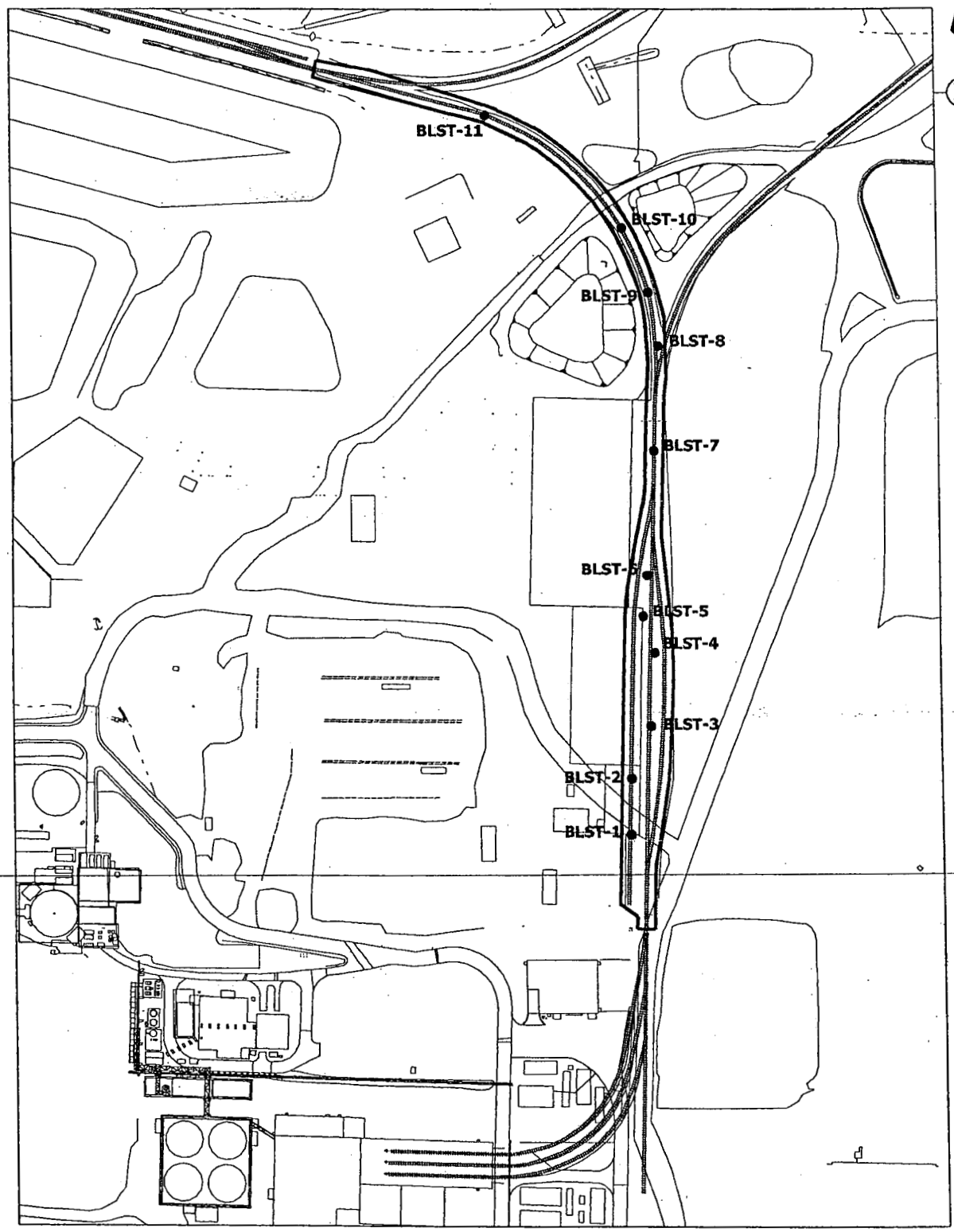
500 250 0 500 FEET

DRAFT

v:\2fm12\dgn\rr_ballast.dgn
STATE PLANAR COORDINATE SYSTEM 1983

26-JUN-2006

FIGURE 1.



LEGEND:

• BALLAST SAMPLE LOCATION

SCALE

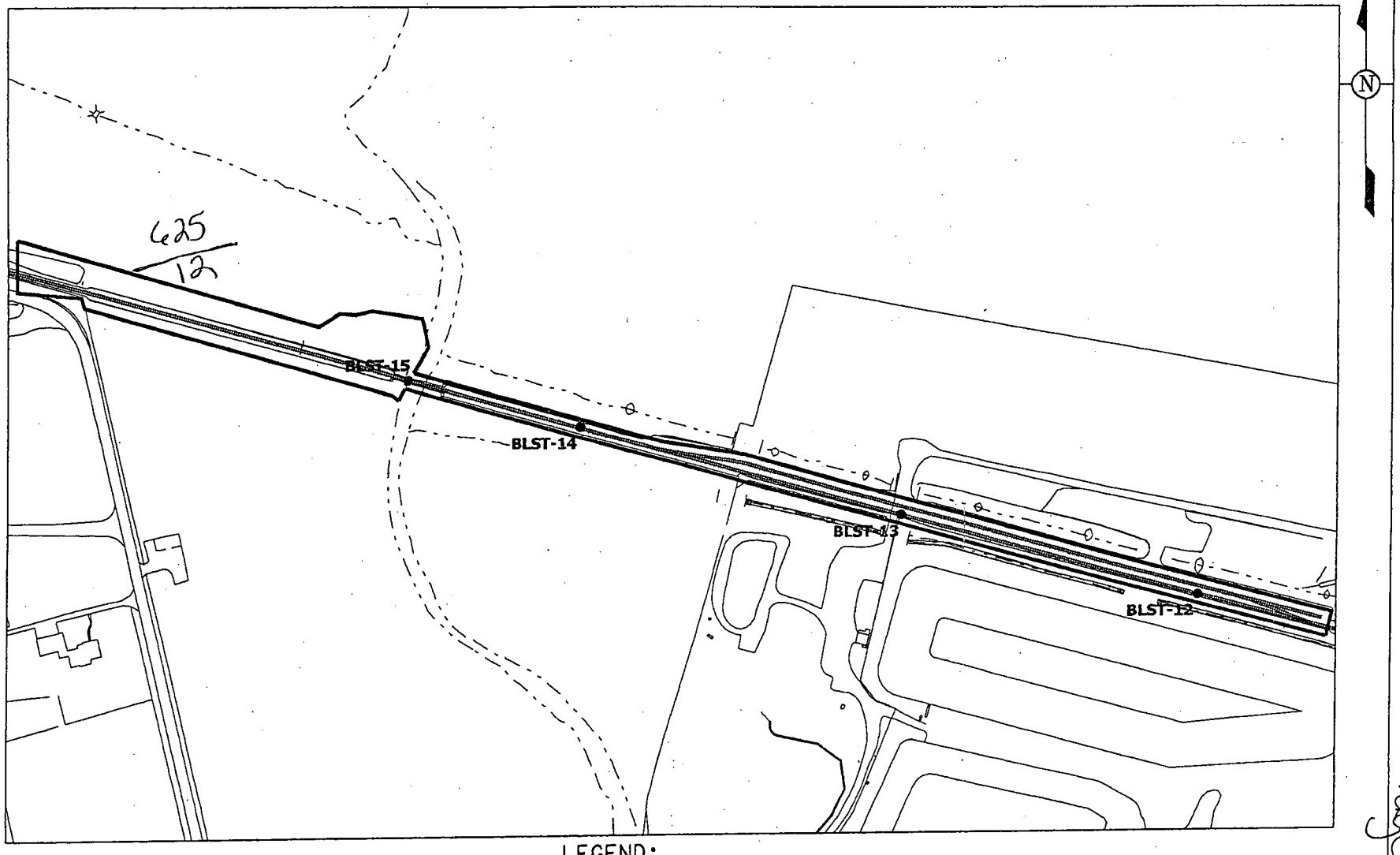
250 125 0 250 FEET

DRAFT

STATE PLANAR COORDINATE SYSTEM 1983

26-JUN-2006

FIGURE 2.



LEGEND:

• BALLAST SAMPLE LOCATION

SCALE

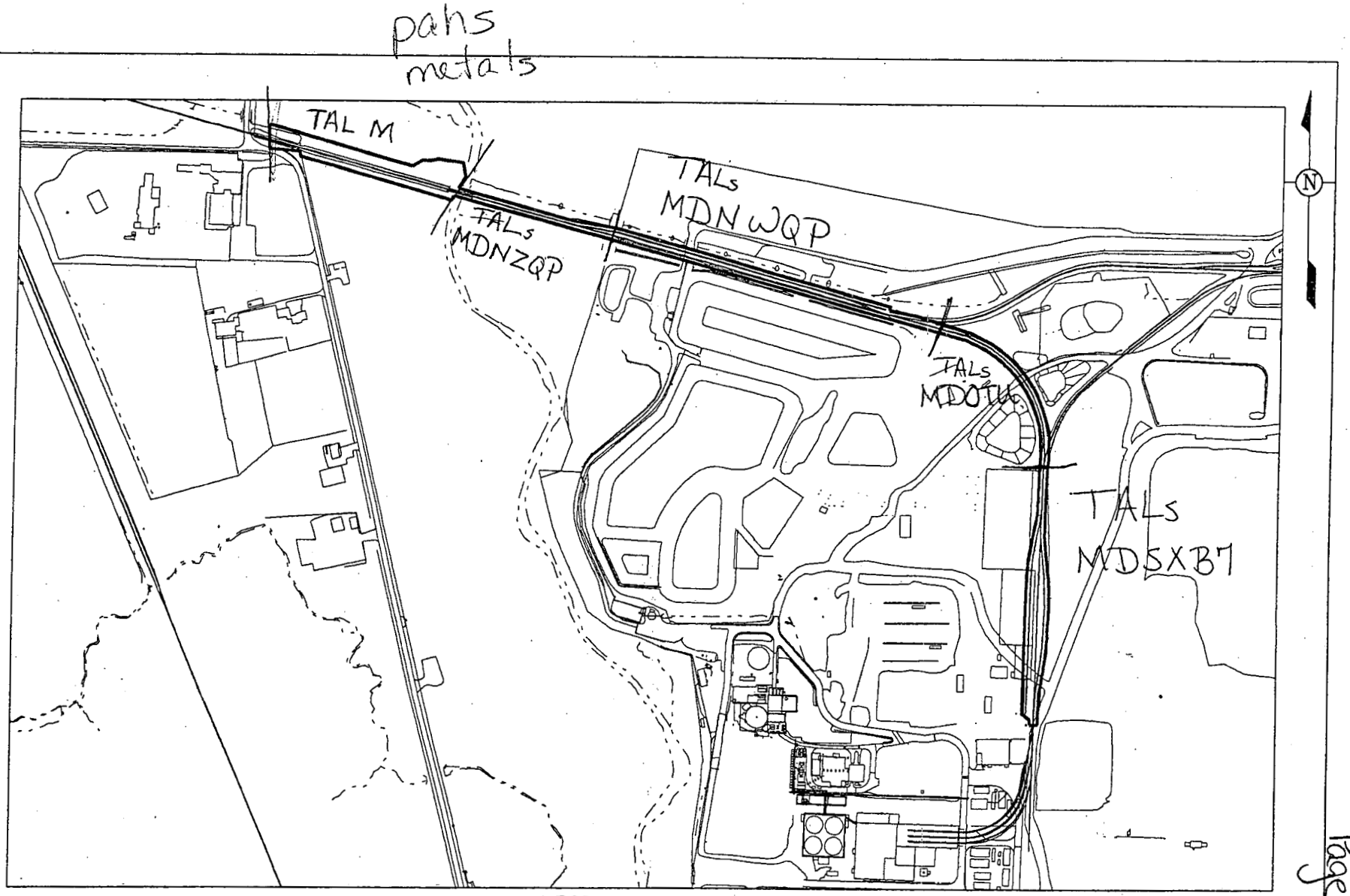
250 125 0 250 FEET

DRAFT

v:\2fm12\dgn\rr_ballast3.dgn
STATE PLANAR COORDINATE SYSTEM 1983

26-JUN-2006

FIGURE 3.



LEGEND:

BALLAST SAMPLING AREA

SCALE

500 250 0 500 FEET

DRAFT

v:*2fm12*dgn\rr_ballast.dgn
STATE PLANAR COORDINATE SYSTEM 1983

26-JUN-2006

FIGURE 4.

Page 10 of 10

VARIANCE / FIELD CHANGE NOTICE

[redacted]

V/F: 20600-PSP-0016-106

WBS NO.: PROJECT/DOCUMENT/ECDC # 20600-PSP-0016 Rev.0

Page: 1 of 2

PROJECT TITLE: Project Specific Plan For Excavation Control And Precertification of the Area 6 Waste Pits and General Area

Date: 8/17/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the collection of ballast material from the railyard area for characterization.

The sample locations are to be field located in accessible areas of the railyard. Twelve surface samples are to be collected and submitted for arsenic (TAL A4) and PAH (TAL A1) analysis. Surveyors shall be contacted to survey in sample locations that are identified by the samplers.

The first sample collected shall by identified as BLST-16^MS, and each additional sample collected shall be consecutively numbered, where:

BLST = Sample collected from the ballast
16, 17, etc = Consecutive sample numbers (locations)
M = metals analysis
S = semi-volatile analysis (PAHs)

Surveying Required: Yes - by surveying group.
Field Data Validation: Yes

Justification:
The ballast material in the railyard is being characterized to further assess disposition options.

REQUESTED BY: Denise Arico Date: 08/16/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	8-29-06	X	PROJECT MANAGER: J.D. Chiou	8/30/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Abitz Denise M Arico for RA	8/16/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McMorgan	8/17/06		RTMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage	8/21/06

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

DISTRIBUTION

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

ATTACHMENT 1
SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Matrix	ASL	Preserve	TAT	Container[b]	Minimum Mass
Metals/SVOCs (TAL A1 and A4)	ICP/AES or ICP/MS	Solid	B	Cool, 4° C	10 day	Polyethylene sample container	250 g
	GC				10 day		

Special Instructions (samplers):
[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.

Special Instructions (SPL/Lab):
Analytical Data Validation is not required.
ASL: B
Data Package Requirements – COAs
Historical Data for Shipping: 23.5 mg/kg total uranium from boring location A6-SA3-8

20600-PSP-0016-A1
(12 samples estimated in V/FCN)

Analyte	FRL/*BTV*[a]	MDL[a]
Benzo(a)anthracene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Benzo(a)pyrene	2.0 mg/kg / *1.0 mg/kg*	0.2 mg/kg
Benzo(b)fluoranthene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Benzo(g,h,i)perylene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(k)fluoranthene	200 mg/kg / *1.0 mg/kg*	20 mg/kg
Chrysene	2,000 mg/kg / *1.0 mg/kg*	200 mg/kg
Dibenzo(a,h)anthracene	2.0 mg/kg / *0.088 mg/kg*	*0.2 mg/kg*
Fluoranthene	*10 mg/kg*	*0.1 mg/kg*
Indeno(1,2,3-cd)pyrene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Phenanthrene	*5 mg/kg*	0.5 mg/kg
Pyrene	*10 mg/kg*	*0.1 mg/kg*

20600-PSP-0016-A4
(12 samples estimated in V/FCN)

Analyte	FRL	MDL
Arsenic	12 mg/kg	1.2 mg/kg

[a] BTV applies to Ecological COCs. MDL is 10% of the BTV for COCs that do not have an FRL

VARIANCE / FIELD CHANGE NOTICE

Significant Design Change? NO

V/F: 20600-PSP-0016-107

WBS NO.: PROJECT/DOCUMENT/ECDC # 20600-PSP-0016 Rev.0

PROJECT TITLE: Project Specific Plan For Excavation Control And Precertification of the Area 6 Waste Pits and General Area

Date: 8/22/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the collection of ballast material located between the Paddys Run trestle and the FCP gate. See Figure 1 for the approximate location to be sampled.

Sixteen locations of representative spacing are to be field located along the area identified in Figure 1. The Geoprobe® shall be used to core through the entire depth of the ballast. The core of ballast material shall then be scanned with a beta/gamma frisker. If an interval scans greater than 450 ccpm, a biased sample will be collected from the 12-inch interval with the highest ccpm. If there is visible staining of the ballast material, a biased sample shall also be collected from the 12-inch interval around the visibly stained ballast. If the entire core of ballast material scans less than 450 ccpm and there is no evidence of staining, a sample should be collected from the 12-inch interval that represents the middle of the core. Contact the surveyors to survey in the sample locations.

The Sampling and Analytical Requirements and Target Analyte Lists (TALs) are provided on Attachment 1.

Each sample collected will be submitted for analysis of the TALs provided on Attachment 1.

The first sample collected shall by identified as BLST-28^*x*-RMS, and each additional sample collected shall be consecutively numbered, where:

BLST = Sample collected from the ballast
28, 29, etc = Consecutive sample numbers (locations)
x = to be replaced with the number that is two times the bottom depth of the sample interval collected.
R = radiological analysis
M = metals analysis
S = semi-volatile analysis (PAHs)

Surveying Required: Yes - by surveying group.
Field Data Validation: Yes

Justification:
The ballast material located between the Paddys Run Trestle and the FCP Gate is being characterized to further assess disposition options.

REQUESTED BY: Denise Arico Date: 08/22/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	8-23-06	X	PROJECT MANAGER: J.D. Chiou	8/30/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: S. Abitz	
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McMorgan	8/28/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Burlage	8/21/06

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

DISTRIBUTION

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

ATTACHMENT 1
SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Matrix	ASL	Preserve	TAT	Container[b]	Minimum Mass
Rads/Metals/SVOCs (TAL A1/B5/B7/B8/B9)	Gamma or Alpha Spec or LSC or GPC	Solid	D	Cool, 4° C	EDD gamma 10 days[a] Final gamma 14 days Final Tc99 10 days Final Th230 10days	Polyethylene sample container	250 g[c]
	ICP/AES or ICP/MS				10 day		
	GC				10 day		

Special Instructions (samplers):

[c]At the direction of the field sampling lead, triple the specified sample mass shall be collected from one sample location in order for the contract laboratory to perform the required quality control analysis. The sample shall be identified on the Chain of Custody/Request for Analysis form as "designated for laboratory QC."

[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.

Special Instructions (SPL/Lab):

[a]Samples will go through a 7-day in-growth, and shall have "7DAY" noted in the suffix field of the EDD.
Analytical Data Validation is required.
ASL: D
Data Package Requirements – Full Data Package
Historical Data for Shipping: 23.5 mg/kg total uranium from boring location A6-SA3-8

TARGET ANALYTE LIST

20600-PSP-0016-B5
(estimated 16 samples estimated in V/FCN)

Analyte	FRL	MDL
Thorium-230	280 pCi/g	28 pCi/g
Total Uranium	82 mg/kg	8.2 mg/kg
Radium-226	1.7 pCi/g	0.17 pCi/g
Radium-228	1.8 pCi/g	0.18 pCi/g
Thorium-228	1.7 pCi/g	0.17 pCi/g
Thorium-232	1.5 pCi/g	0.15 pCi/g
Technetium-99	30.0 pCi/g	2.9 pCi/g

20600-PSP-0016-B7
(estimated 16 samples estimated in V/FCN)

Analyte	FRL	MDL
Lead-210	38 pCi/g	3.8 pCi/g

20600-PSP-0016-B8
(estimated 16 samples estimated in V/FCN)

Analyte	FRL	MDL
Neptunium-237	3.2 pCi/g	0.32 pCi/g

ATTACHMENT 1
(cont'd)

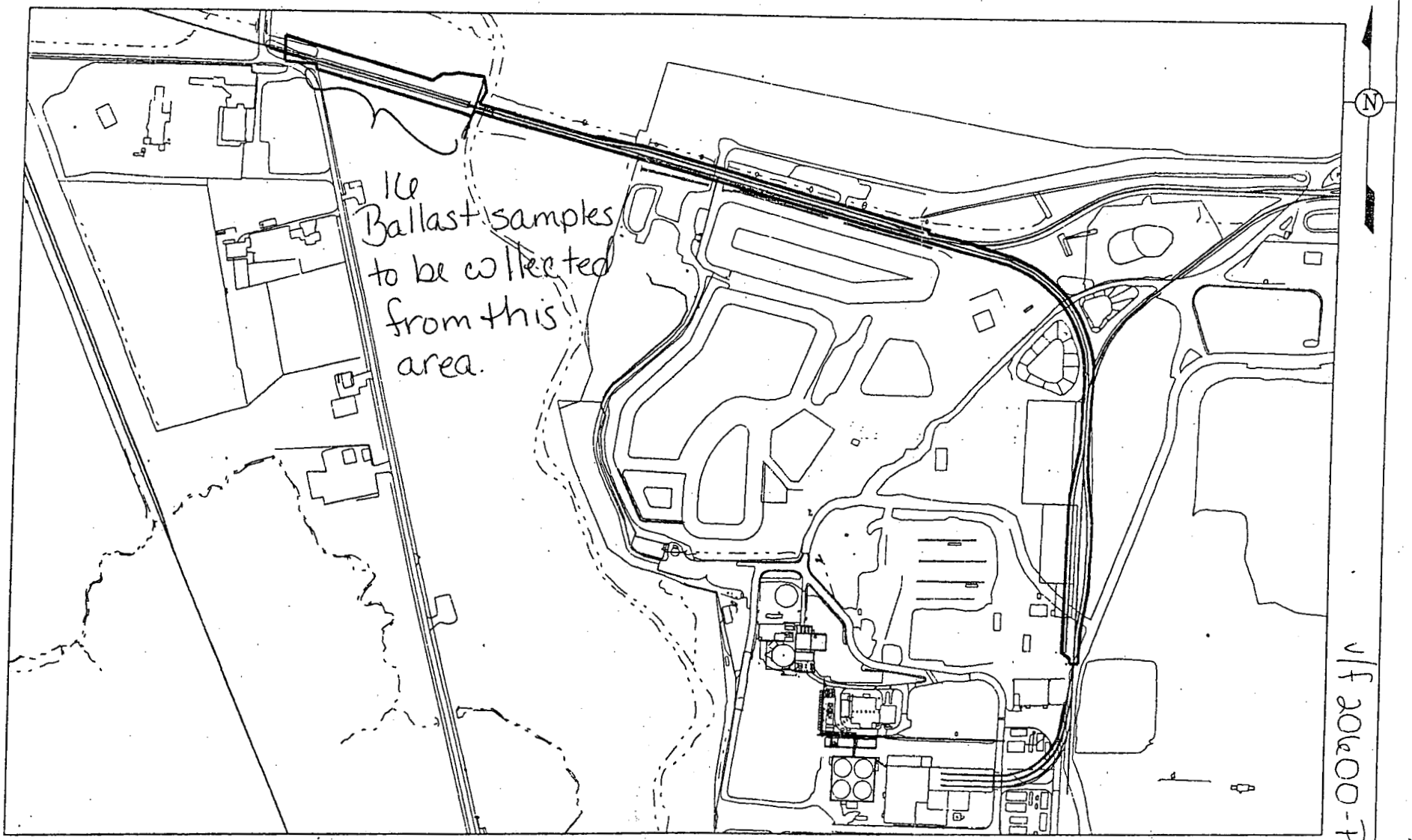
20600-PSP-0016-B9
(estimated 16 samples estimated in V/FCN)

Analyte	FRL	MDL
Arsenic	12 mg/kg	1.2 mg/kg
Barium	68000 mg/kg	200 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Cadmium	82 mg/kg	8.2 mg/kg
Chromium	300 mg/kg	30 mg/kg
Lead	400 mg/kg	40 mg/kg
Mercury	7.5 mg/kg	0.75 mg/kg
Selenium	5400 mb/kg	10 mg/kg
Silver	29000 mg/kg	40 mg/kg

20600-PSP-0016-A1
(estimated 16 samples estimated in V/FCN)

Analyte	FRL/*BTV*[a]	MDL[a]
Benzo(a)anthracene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Benzo(a)pyrene	2.0 mg/kg / *1.0 mg/kg*	0.2 mg/kg
Benzo(b)fluoranthene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Benzo(g,h,i)perylene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(k)fluoranthene	200 mg/kg / *1.0 mg/kg*	20 mg/kg
Chrysene	2,000 mg/kg / *1.0 mg/kg*	200 mg/kg
Dibenzo(a,h)anthracene	2.0 mg/kg / *0.088 mg/kg*	0.2 mg/kg
Fluoranthene	*10 mg/kg*	*0.1 mg/kg*
Indeno(1,2,3-cd)pyrene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Phenanthrene	*5 mg/kg*	*0.5 mg/kg*
Pyrene	*10 mg/kg*	*0.1 mg/kg*

[a]BTV applies to Ecological COCs. MDL is 10% of the BTV for COCs that do not have an FRL



LEGEND:

SCALE

500 250 0 500 FEET

DRAFT

v:\02fm12\dgn\rr_ballast.dgn
STATE PLANAR COORDINATE SYSTEM 1983

26-JUN-2006

FIGURE 1.

Page 4 of 4

v/f 20600-PSP-0016-107

VARIANCE / FIELD CHANGE NOTICE

CLASSIFICATION (YES or NO) NO

V/F: 20600-PSP-0016-109

Page: 1 of 4

Date: 8/30/06

WBS NO.: PROJECT/DOCUMENT/ECDC # 20600-PSP-0016 Rev.0

PROJECT TITLE: Project Specific Plan For Excavation Control And Precertification of the Area 6 Waste Pits and General Area

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the collection of ballast material from the section of track located north of the SWL as well as the section of track west of the FCP gate. See Figure 1 for the areas to be sampled.

Four locations of representative spacing are to be field located in each area to be sampled, for a total of eight locations being sampled. Samples are to be collected from just beneath the top surface of the ballast. Contact the surveyors to survey in the sample locations.

The Sampling and Analytical Requirements and Target Analyte Lists (TALs) are provided on Attachment 1.

Each sample collected will be submitted for analysis of the TALs provided on Attachment 1.

The first sample collected shall by identified as BLST-44^RMS, and each additional sample collected shall be consecutively numbered, where:

BLST = Sample collected from the ballast
44, 45, etc = Consecutive sample numbers (locations)
R = radiological analysis
M = metals analysis
S = semi-volatile analysis (PAHs)

Surveying Required: Yes - by surveying group.
Field Data Validation: Yes

Justification:
The ballast material is being characterized to further assess disposition options.

REQUESTED BY: Denise Arico Date: 08/30/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	9/8/06	X	PROJECT MANAGER: J.D. Chiou	8/30/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Miller	30 Aug 06
X	ANALYTICAL CUSTOMER SUPPORT: Paul S. McGurgan	8/30/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Bubnage	9/14/06

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

DISTRIBUTION

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

ATTACHMENT 1
SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Matrix	ASL	Preserve	TAT	Container[b]	Minimum Mass
Rads/Metals/SVOCs (TAL A1/B5/B7/B8/B9)	Gamma or Alpha Spec or LSC or GPC	Solid	D/E	Cool, 4° C	EDD gamma 10 days[a] Final gamma 14 days Final Tc99 10 days Final Th230 10days	Polyethylene sample container	250 g[c]
	ICP/AES or ICP/MS				10 day		
	GC				10 day		

Special Instructions (samplers):
[c]At the direction of the field sampling lead, triple the specified sample mass shall be collected from one sample location in order for the contract laboratory to perform the required quality control analysis. The sample shall be identified on the Chain of Custody/Request for Analysis form as "designated for laboratory QC."

[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.

Special Instructions (SPL/Lab):
[a]Samples will go through a 7-day in-growth, and shall have "7DAY" noted in the suffix field of the EDD.
Analytical Data Validation is required.
ASL: D/E
Data Package Requirements – Full Data Package
Historical Data for Shipping: 23.5 mg/kg total uranium from boring location A6-SA3-8

TARGET ANALYTE LIST

20600-PSP-0016-B5
(8 samples estimated in V/FCN)

Analyte	FRL	MDL
Thorium-230	280 pCi/g	28 pCi/g
Total Uranium	82 mg/kg	8.2 mg/kg
Radium-226	1.7 pCi/g	0.17 pCi/g
Radium-228	1.8 pCi/g	0.18 pCi/g
Thorium-228	1.7 pCi/g	0.17 pCi/g
Thorium-232	1.5 pCi/g	0.15 pCi/g
Technetium-99	30.0 pCi/g	2.9 pCi/g

0.3

20600-PSP-0016-B7
(8 samples estimated in V/FCN)

Analyte	FRL	10 MDL
Lead-210	38 pCi/g	~~3.8~~ pCi/g

20600-PSP-0016-B8
(8 samples estimated in V/FCN)

Analyte	FRL	MDL
Neptunium-237	3.2 pCi/g	0.32 pCi/g

ATTACHMENT 1
(cont'd)

20600-PSP-0016-B9
(8 samples estimated in V/FCN)

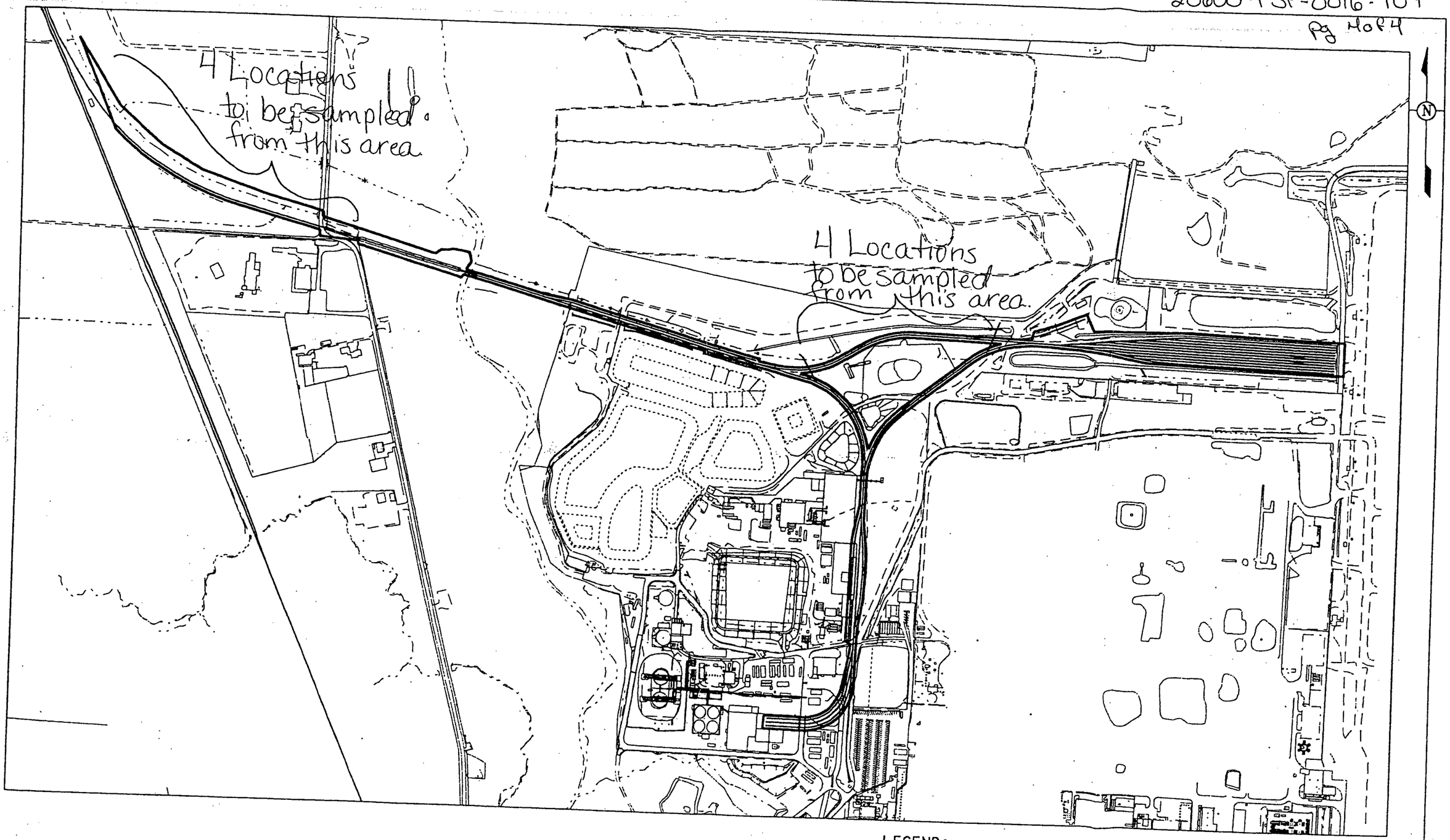
Analyte	FRL	MDL
Arsenic	12 mg/kg	1.2 mg/kg
Barium	68000 mg/kg	200 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Cadmium	82 mg/kg	8.2 mg/kg
Chromium	300 mg/kg	30 mg/kg
Lead	400 mg/kg	40 mg/kg
Mercury	7.5 mg/kg	0.75 mg/kg
Selenium	5400 mb/kg	10 mg/kg
Silver	29000 mg/kg	40 mg/kg

mg/kg

20600-PSP-0016-A1
(8 samples estimated in V/FCN)

Analyte	FRL/*BTV*[a]	MDL[a]
Benzo(a)anthracene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Benzo(a)pyrene	2.0 mg/kg / *1.0 mg/kg*	0.2 mg/kg
Benzo(b)fluoranthene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Benzo(g,h,i)perylene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(k)fluoranthene	200 mg/kg / *1.0 mg/kg*	20 mg/kg
Chrysene	2,000 mg/kg / *1.0 mg/kg*	200 mg/kg
Dibenzo(a,h)anthracene	2.0 mg/kg / *0.088 mg/kg*	0.2 mg/kg
Fluoranthene	*10 mg/kg*	*0.1 mg/kg*
Indeno(1,2,3-cd)pyrene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Phenanthrene	*5 mg/kg*	*0.5 mg/kg*
Pyrene	*10 mg/kg*	*0.1 mg/kg*

[a]BTV applies to Ecological COCs. MDL is 10% of the BTV for COCs that do not have an FRL



LEGEND:

DRAFT

SCALE
500 250 0 500 FEET

v:\e2fml2\dgn\rail_001.dgn
STATE PLANAR COORDINATE SYSTEM 1983
05-DEC-2005

FIGURE 1

VARIANCE / FIELD CHANGE NOTICE

SIGNIFICANT CONDITION (Check One) NO

V/F: 20600-PSP-0016-110

Date: 9/7/06

WBS NO.: PROJECT/DOCUMENT/ECDC # 20600-PSP-0016 Rev.0

PROJECT TITLE: Project Specific Plan For Excavation Control And Precertification of the Area 6 Waste Pits and General Area

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the collection of soil samples from the banks of Paddys Run Creek directly under the train trestle.

Six locations are to be marked for sampling up each bank of Paddys Run Creek directly underneath the train trestle, for a total of 12 sample locations. The locations will be field located by the lead field tech (but coordinate with Bob Minges or Denise Arico). The top six inches of the soil surface will be collected at each location, and each sample will be submitted for the analytes listed in the TALs provided on attachment 1.

The Sampling and Analytical Requirements and Target Analyte Lists (TALs) are provided on Attachment 1.

Samples collected from the first location shall by identified as A6-UT-1^RMPS and A6-UT-1^L, and each additional sample collected shall be consecutively numbered, where:

A6 = Sample collected in Area 6
UT = Underneath the trestle
1, 2, etc = Consecutive sample numbers (locations)
R = radiological analysis
M = metals analysis
P = pest/PCB analysis
S = semi-volatile analysis (PAHs)
L = volatiles analysis

A trip blank shall be collected and identified as A6-UT-TB1-L.

Surveying Required: Yes - by surveying group.
Field Data Validation: Yes

Justification:
The soil under the trestle is being sampled to ensure that rail operations did not impact the area.

REQUESTED BY: Denise Arico Date: 09/7/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske		X	PROJECT MANAGER: J.D. Chiou	9/26/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: K. Arbitz	7/8/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McLaughlin	9/25/06		RTIMS Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage	9/14/06

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

DISTRIBUTION

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

ATTACHMENT 1
SAMPLING AND ANALYTICAL REQUIREMENTS

TAL(s)	Method	Matrix	ASL	Preserve	TAT	Container[b]	Minimum Mass
Rads/Metals/ SVOCs/ Pest/PCBs (TAL B5/E/O/A1/Q)	Gamma or Alpha Spec or LSC or GPC	Solid	D	Cool, 4° C	EDD gamma 10 days[a] Final gamma 14 days Final Tc99 10 days Final Th230 10days	Glass sample container	500 g[c]
	ICP/AES or ICP/MS				10 day		
	GC				10 day		
Volatiles (TAL I)	GC/MS	Solid	D	Cool, 4° C	10 days	3 x 1-Encore Sampler plus 1 x 2-oz jar for percent moisture	Each Encore will hold approx 5 g
Volatiles (TAL I)	GC/MS	Trip Blank	D	H_2SO_4 pH<2 Cool, 4° C	10 days	2 x 40-ml glass with Teflon-lined septa	120 ml (no headspace)

Special Instructions (samplers):

[c]At the direction of the field sampling lead, triple the specified sample mass shall be collected from one sample location in order for the contract laboratory to perform the required quality control analysis. The sample shall be identified on the Chain of Custody/Request for Analysis form as "designated for laboratory QC."

[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.

Special Instructions (SPL/Lab):

[a]One sample will be selected for analysis utilizing a 21-day in-growth with a 25-day TAT for Ra-226. Samples with a 7-day in-growth will be denoted by a "7DAY" suffix in the EDD while the sample chosen as a 21-day in-growth will be denoted by a "21DAY" suffix in the EDD.

Analytical Data Validation is required.

ASL: D

Data Package Requirements – Full Data Package

Historical Data for Shipping: 23.5 mg/kg total uranium from boring location A6-SA3-8

TARGET ANALYTE LIST

20600-PSP-0016-B5
(8 samples estimated in V/FCN)

Analyte	FRL	MDL
Thorium-230	280 pCi/g	28 pCi/g
Total Uranium	82 mg/kg	8.2 mg/kg
Radium-226	1.7 pCi/g	0.3 pCi/g
Radium-228	1.8 pCi/g	0.3 pCi/g
Thorium-228	1.7 pCi/g	0.3 pCi/g
Thorium-232	1.5 pCi/g	0.3 pCi/g
Technetium-99	30.0 pCi/g	2.9 pCi/g

20600-PSP-0016-E
(8 samples estimated in V/FCN)

Analyte	FRL	MDL
Cesium-137	1.4 pCi/g	0.14 pCi/g

ATTACHMENT 1
(cont'd)

20600-PSP-0016-O
(8 samples estimated in V/FCN)

Analyte	FRL	MDL
Antimony	10 mg/kg	1.0 mg/kg
Arsenic	12 mg/kg	1.2 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg
Cadmium	82 mg/kg	8.2 mg/kg
Silver	29000 mg/kg	40 mg/kg
Fluoride	78000 mg/kg	7800 mg/kg

20600-PSP-0016-A1
(8 samples estimated in V/FCN)

Analyte	FRL/*BTV*[a]	MDL[a]
Benzo(a)anthracene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Benzo(a)pyrene	2.0 mg/kg / *1.0 mg/kg*	0.2 mg/kg
Benzo(b)fluoranthene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Benzo(g,h,i)perylene	*1.0 mg/kg*	*0.1 mg/kg*
Benzo(k)fluoranthene	200 mg/kg / *1.0 mg/kg*	20 mg/kg
Chrysene	2,000 mg/kg / *1.0 mg/kg*	200 mg/kg
Dibenzo(a,h)anthracene	2.0 mg/kg / *0.088 mg/kg*	0.2 mg/kg
Fluoranthene	*10 mg/kg*	*0.1 mg/kg*
Indeno(1,2,3-cd)pyrene	20 mg/kg / *1.0 mg/kg*	2.0 mg/kg
Phenanthrene	*5 mg/kg*	*0.5 mg/kg*
Pyrene	*10 mg/kg*	*0.1 mg/kg*

20600-PSP-0016-I
(8 samples estimated in V/FCN)

Analyte	FRL/*BTV*[a]	MDL[a]
Bromodichloromehtane	4.0 mg/kg	0.4 mg/kg
1,1-Dichloroethene	0.41 mg/kg	0.041 mg/kg
Tetrachloroethene	3.6 mg/kg	0.36 mg/kg

20600-PSP-0016-Q
(8 samples estimated in V/FCN)

Analyte	FRL/*BTV*[a]	MDL[a]
Aroclor-1254	0.13 mg/kg	0.013 mg/kg
Aroclor-1260	0.13 mg/kg	0.013 mg/kg
Dieldrin	0.015mg/kg	0.0015 mg/kg

[a]BTV applies to Ecological COCs. MDL is 10% of the BTV for COCs that do not have an FRL

APPENDIX E
RISK ASSESSMENT CALCULATIONS

Appendix E

Risk Assessment Calculations

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

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

APPENDIX E.1
GROUNDSKEEPER/SAMPLER

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - InhaleChem

Groundskeeper/Sampler - Inhalation of Gases & Particulates
Risk calculation for A6 under rail trestle

			UNITS	adult
Intake Equation:	CDI =	(CS*EF*ED*IR*ET)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	CA =	Concentration of chemical in air	mg/m^3	see COC list below
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Inhalation rate	m^3/hr	2.5
	ET =	Exposure time	hrs/day	8
	BW =	Body weight	kg	70
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

COC	conc mg/m^3	RfDi mg/kgday	CSFi kgday/mg	ADULT CDI mg/kgday	HQ CDI/RfD	CDI mg/kgday	ILCR CDI*CSF
1,1,2-Trichloroethane	8.48E-12	NA	5.60E-02	NA	NA	2.37E-13	1.33E-14
1,1-Dichloroethylene	3.90E-11	5.71E-02	1.75E-01	3.05E-12	5.35E-11	1.09E-12	1.91E-13
1,2-dichloroethane	2.55E-11	NA	9.10E-02	NA	NA	7.13E-13	6.49E-14
2-Butanone	NA	1.43E+00	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Nitroanaline	NA	1.14E-03	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Antimony	1.64E-08	NA	NA	NA	NA	NA	NA
Aroclor-1254	8.94E-10	NA	2.00E+00	NA	NA	2.50E-11	5.00E-11
Aroclor-1260	7.44E-10	NA	2.00E+00	NA	NA	2.08E-11	4.16E-11
Arsenic	2.86E-07	NA	1.51E+01	NA	NA	8.00E-09	1.21E-07
Barium	4.79E-06	1.43E-04	NA	3.75E-07	2.62E-03	NA	NA
Benzene	NA	8.57E-03	2.73E-02	NA	NA	NA	NA
Benzo(a)anthracene	1.70E-07	NA	3.08E-01	NA	NA	4.75E-09	1.46E-09
Benzo(a)pyrene	9.10E-08	NA	3.08E-01	NA	NA	2.54E-09	7.84E-10
Benzo(b)fluoranthene	4.29E-07	NA	3.08E+00	NA	NA	1.20E-08	3.69E-08
Benzo(k)fluoranthene	5.59E-07	NA	3.08E-02	NA	NA	1.56E-08	4.81E-10
Beryllium	2.70E-08	5.71E-06	8.40E+00	2.12E-09	3.71E-04	7.56E-10	6.35E-09
Bis(2-chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA
Boron	NA	5.71E-03	NA	NA	NA	NA	NA
Bromodichloromethane	3.90E-11	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	3.85E-03	NA	NA	NA	NA
Bromomethane	NA	1.43E-03	NA	NA	NA	NA	NA
Cadmium	1.78E-08	NA	6.30E+00	NA	NA	4.97E-10	3.13E-09
Carbazole	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	2.00E-01	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	5.25E-02	NA	NA	NA	NA
Chlordane	NA	2.00E-04	3.50E-01	NA	NA	NA	NA
Chlorobenzene	NA	1.43E-02	NA	NA	NA	NA	NA
Chloroform	NA	NA	8.05E-02	NA	NA	NA	NA
Chromium (VI)	NA	2.86E-05	4.20E+01	NA	NA	NA	NA
Chrysene	8.94E-07	NA	3.08E-03	NA	NA	1.94E-08	5.98E-11
Cobalt	NA	5.71E-06	9.80E+00	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA
Cyclohexanone	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	2.12E-08	NA	3.08E+00	NA	NA	5.94E-10	1.83E-09
Dieldrin	8.03E-10	NA	1.61E+01	NA	NA	2.25E-11	3.62E-10
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA
Ethyl ether	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	2.86E-01	3.85E-03	NA	NA	NA	NA
Fluoride	6.42E-08	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	NA	NA	1.16E+03	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	4.37E-13	NA	1.16E+03	NA	NA	1.22E-14	1.42E-11
Hexachlorodibenzofuran	NA	NA	1.16E+04	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	NA	1.16E+04	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.67E-08	NA	3.08E-01	NA	NA	2.70E-09	8.33E-10
Lead	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	1.43E-05	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA
Methanol	NA	NA	NA	NA	NA	NA	NA
Methyl-2-pentanone	NA	8.57E-01	NA	NA	NA	NA	NA
Methylene chloride	NA	8.57E-01	1.65E-03	NA	NA	NA	NA
Molybdenum	1.27E-07	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA
N-nitrosodipropylamine	NA	NA	NA	NA	NA	NA	NA
Octochlorodibenzofuran	NA	NA	1.16E+02	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	6.74E-12	NA	1.16E+02	NA	NA	1.88E-13	2.19E-11
Pentachlorodibenzofuran	NA	NA	5.78E+03	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	NA	5.78E+04	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	2.15E-07	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA
Silver	3.85E-09	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran	NA	NA	1.16E+04	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	NA	1.16E+05	NA	NA	NA	NA
Tetrachloroethylene	3.90E-11	1.71E-01	2.07E-02	3.05E-12	1.79E-11	1.09E-12	2.26E-14
Thallium	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	1.43E+00	NA	NA	NA	NA	NA
Tributyl phosphate	NA	NA	NA	NA	NA	NA	NA
Trichloroethylene	4.75E-11	1.14E-02	4.00E-01	3.72E-12	3.26E-10	1.33E-12	5.32E-13
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA
Uranium	9.96E-07	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	2.86E-02	3.08E-02	NA	NA	NA	NA
Xylenes	NA	2.86E-02	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA
				total =	**2.99E-03**	**total =**	**1.73E-07**

Air concentration is derived using air particulate value of 26 ug/m^3 (2005 SER background average from monitor AMS-12) multiplied by the soil concentration.

Groundskeeper/Sampler - Dermal Contact with Soil/Sediment
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	adult
	CDI =	(CS*AB*SA*EF*ED*AF*CF)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	CS =	Concentration of chemical in soil	mg/kg	see COC list below
	AB	Absorption factor	–	see COC list below
	SA	Surface area of exposed skin	cm^2/day	3300
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	AF =	Adherence factor	mg/cm^2	0.3
	CF =	Conversion factor	kg/mg	1.00E-06
	BW =	Body weight	kg	70
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

COC	conc	AB	RfDd	CSFd	ADULT CDI	HQ	CDI	ILCR
	mg/kg	unitless	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	3.26E-04	1.00E-02	3.24E-03	7.04E-02	1.26E-11	3.90E-09	4.51E-12	3.18E-13
1,1-Dichloroethylene	1.50E-03	1.00E-02	5.00E-02	6.00E-01	5.81E-11	1.16E-09	2.08E-11	1.25E-11
1,2-dichloroethane	9.80E-04	1.00E-02	2.00E-02	9.10E-02	3.80E-11	1.90E-09	1.36E-11	1.23E-12
2-Butanone	NA	1.00E-02	4.80E-01	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	1.00E-02	NA	9.00E-01	NA	NA	NA	NA
4-Methylphenol	NA	1.00E-02	3.25E-03	NA	NA	NA	NA	NA
4-Nitroanaline	NA	1.00E-02	2.40E-03	2.63E-02	NA	NA	NA	NA
Acetone	NA	1.00E-02	7.47E-01	NA	NA	NA	NA	NA
Antimony	6.32E-01	1.00E-03	8.00E-06	NA	2.45E-09	3.06E-04	NA	NA
Aroclor-1254	3.44E-02	1.40E-01	1.80E-05	2.22E+00	1.87E-08	1.04E-03	6.66E-09	1.48E-08
Aroclor-1260	2.86E-02	1.40E-01	1.80E-05	2.22E+00	1.55E-08	8.62E-04	5.54E-09	1.23E-08
Arsenic	1.10E+01	3.00E-02	1.23E-04	3.66E+00	1.28E-06	1.04E-02	4.57E-07	1.67E-06
Barium	1.84E+02	1.00E-03	1.40E-02	NA	7.14E-07	5.10E-05	NA	NA
Benzene	NA	1.00E-02	3.88E-03	5.67E-02	NA	NA	NA	NA
Benzo(a)anthracene	6.54E+00	1.30E-01	NA	2.35E+00	NA	NA	1.18E-06	2.76E-06
Benzo(a)pyrene	3.50E+00	1.30E-01	NA	2.35E+01	NA	NA	6.30E-07	1.48E-05
Benzo(b)fluoranthene	1.65E+01	1.30E-01	NA	2.35E+00	NA	NA	2.97E-06	6.98E-06
Benzo(k)fluoranthene	2.15E+01	1.30E-01	NA	2.35E-01	NA	NA	3.87E-06	9.09E-07
Beryllium	1.04E+00	1.00E-03	2.00E-05	4.30E+02	4.03E-09	2.01E-04	1.44E-09	6.19E-07
Bis(2-chloroisopropyl)ether	NA	1.00E-02	2.00E-02	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	1.00E-02	3.80E-03	7.37E-02	NA	NA	NA	NA
Boron	NA	1.00E-03	1.80E-01	NA	NA	NA	NA	NA
Bromodichloromethane	1.50E-03	1.00E-02	1.96E-02	6.33E-02	5.81E-11	2.97E-09	2.08E-11	1.31E-12
Bromoform	NA	1.00E-02	1.20E-02	1.32E-02	NA	NA	NA	NA
Bromomethane	NA	1.00E-02	1.12E-03	NA	NA	NA	NA	NA
Cadmium	6.84E-01	1.00E-03	1.00E-05	NA	2.65E-09	2.65E-04	NA	NA
Carbazole	NA	1.00E-02	NA	2.86E-02	NA	NA	NA	NA
Carbon disulfide	NA	2.50E-01	6.30E-02	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	1.00E-02	4.55E-04	2.00E-01	NA	NA	NA	NA
Chlordane	NA	4.00E-02	2.50E-04	7.00E-01	NA	NA	NA	NA
Chlorobenzene	NA	1.00E-02	6.20E-03	NA	NA	NA	NA	NA
Chloroform	NA	1.00E-02	2.00E-03	3.05E-02	NA	NA	NA	NA
Chromium (VI)	NA	1.00E-03	6.00E-05	NA	NA	NA	NA	NA
Chrysene	2.67E+01	1.30E-01	NA	2.35E-02	NA	NA	4.80E-06	1.13E-07
Cobalt	NA	1.00E-03	1.60E-02	NA	NA	NA	NA	NA
Copper	NA	1.00E-03	1.20E-02	NA	NA	NA	NA	NA
Cyanide	NA	1.00E-02	3.40E-03	NA	NA	NA	NA	NA
Cyclohexanone	NA	1.00E-02	4.00E+00	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	8.17E-01	1.30E-01	NA	2.35E+01	NA	NA	1.47E-07	3.45E-06
Dieldrin	3.09E-02	1.00E-02	2.50E-05	3.20E+01	1.20E-09	4.79E-05	4.28E-10	1.37E-08
Di-n-octylphthalate	NA	1.00E-02	3.60E-02	NA	NA	NA	NA	NA
Ethyl ether	NA	1.00E-02	1.60E-01	NA	NA	NA	NA	NA
Ethylbenzene	NA	1.00E-02	9.70E-02	NA	NA	NA	NA	NA
Fluoride	2.47E+00	1.00E-03	5.82E-02	NA	9.57E-09	1.64E-07	NA	NA
Heptachlorodibenzofuran	NA	1.00E-02	NA	3.00E+03	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	1.68E-05	3.00E-02	NA	3.00E+03	NA	NA	6.98E-13	2.10E-09
Hexachlorodibenzofuran	NA	1.00E-02	NA	3.00E+04	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	3.00E-02	NA	3.00E+04	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.72E+00	1.30E-01	NA	2.35E+00	NA	NA	6.69E-07	1.57E-06
Lead	NA	1.00E-03	NA	NA	NA	NA	NA	NA
Manganese	NA	1.00E-03	5.60E-03	NA	NA	NA	NA	NA
Mercury	NA	1.00E-03	2.10E-05	NA	NA	NA	NA	NA
Methanol	NA	1.00E-02	4.00E-01	NA	NA	NA	NA	NA
Methyl-2-pentanone	NA	1.00E-02	6.40E-02	NA	NA	NA	NA	NA
Methylene chloride	NA	1.00E-02	5.70E-02	7.89E-03	NA	NA	NA	NA
Molybdenum	4.89E+00	1.00E-03	1.90E-03	NA	1.89E-08	9.97E-06	NA	NA
Nickel	NA	1.00E-03	5.40E-03	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	1.00E-02	5.00E-03	1.96E-02	NA	NA	NA	NA
N-nitrosodipropylamine	NA	1.00E-02	NA	2.80E+01	NA	NA	NA	NA
Octachlorodibenzofuran	NA	1.00E-02	NA	3.00E+02	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	2.59E-04	3.00E-02	NA	3.00E+02	NA	NA	1.08E-11	3.23E-09
Pentachlorodibenzofuran	NA	1.00E-02	NA	1.50E+04	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	3.00E-02	NA	1.50E+05	NA	NA	NA	NA
Pentachlorophenol	NA	2.50E-01	3.00E-02	1.20E-01	NA	NA	NA	NA
Phenanthrene	8.26E+00	1.00E-02	NA	NA	NA	NA	NA	NA
Selenium	NA	1.00E-03	2.20E-03	NA	NA	NA	NA	NA
Silver	1.48E-01	1.00E-03	9.00E-04	NA	5.73E-10	6.37E-07	NA	NA
Tetrachlorodibenzofuran	NA	1.00E-02	NA	3.00E+04	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	3.00E-02	NA	3.00E+05	NA	NA	NA	NA
Tetrachloroethylene	1.50E-03	1.00E-02	1.00E-02	5.40E-01	5.81E-11	5.81E-09	2.08E-11	1.12E-11
Thallium	NA	1.00E-03	1.80E-05	NA	NA	NA	NA	NA
Toluene	NA	1.00E-02	6.40E-02	NA	NA	NA	NA	NA
Tributyl phosphate	NA	1.00E-02	1.00E-01	1.08E-02	NA	NA	NA	NA
Trichloroethylene	1.83E-03	1.00E-02	4.50E-05	2.67E+00	7.08E-11	1.57E-06	2.53E-11	6.76E-11
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA	NA
Uranium	3.83E+01	1.00E-03	5.10E-04	NA	1.48E-07	2.91E-04	NA	NA
Vanadium	NA	1.00E-03	7.00E-05	NA	NA	NA	NA	NA
Vinyl chloride	NA	1.00E-02	3.00E-03	1.50E+00	NA	NA	NA	NA
Xylenes	NA	1.00E-02	1.84E-01	NA	NA	NA	NA	NA
Zinc	NA	1.00E-03	6.00E-02	NA	NA	NA	NA	NA
					total =	**1.35E-02**	**total =**	**3.29E-05**

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - IngestSoilChem

Groundskeeper/Sampler - Ingestion of Soil
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	adult
	CDI =	(CS*EF*ED*IR*FI*CF)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	CS =	Concentration of chemical in soil	mg/kg	see COC list below
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Ingestion rate	mg/day	100
	FI =	Fraction of contaminated soil	unitless	1
	CF =	Conversion factor	kg/mg	1.00E-06
	BW =	Body weight	kg	70
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125

COC	conc	RfDo	CSFo	ADULT CDI	HQ	CDI	ILCR
	mg/kg	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	3.26E-04	4.00E-03	5.70E-02	1.28E-10	3.19E-08	4.56E-11	2.60E-12
1,1-Dichloroethylene	1.50E-03	5.00E-02	6.00E-01	5.87E-10	1.17E-08	2.10E-10	1.26E-10
1,2-dichloroethane	9.80E-04	2.00E-02	9.10E-02	3.84E-10	1.92E-08	1.37E-10	1.25E-11
2-Butanone	NA	6.00E-01	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	NA	4.50E-01	NA	NA	NA	NA
4-Methylphenol	NA	5.00E-03	NA	NA	NA	NA	NA
4-Nitroanaline	NA	3.00E-03	2.10E-02	NA	NA	NA	NA
Acetone	NA	9.00E-01	NA	NA	NA	NA	NA
Antimony	6.32E-01	4.00E-04	NA	2.47E-07	6.18E-04	NA	NA
Aroclor-1254	3.44E-02	2.00E-05	2.00E+00	1.35E-08	6.73E-04	4.81E-09	9.62E-09
Aroclor-1260	2.86E-02	2.00E-05	2.00E+00	1.12E-08	5.60E-04	4.00E-09	8.00E-09
Arsenic	1.10E+01	3.00E-04	1.50E+00	4.31E-06	1.44E-02	1.54E-06	2.31E-06
Barium	1.84E+02	2.00E-01	NA	7.21E-05	3.61E-04	NA	NA
Benzene	NA	4.00E-03	5.50E-02	NA	NA	NA	NA
Benzo(a)anthracene	6.54E+00	NA	7.30E-01	NA	NA	9.14E-07	6.67E-07
Benzo(a)pyrene	3.50E+00	NA	7.30E+00	NA	NA	4.89E-07	3.57E-06
Benzo(b)fluoranthene	1.65E+01	NA	7.30E-01	NA	NA	2.31E-06	1.68E-06
Benzo(k)fluoranthene	2.15E+01	NA	7.30E-02	NA	NA	3.01E-06	2.19E-07
Beryllium	1.04E+00	2.00E-03	4.30E+00	4.07E-07	2.04E-04	1.45E-07	6.25E-07
Bis(2-chloroisopropyl)ether	NA	4.00E-02	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	2.00E-02	1.40E-02	NA	NA	NA	NA
Boron	NA	2.00E-01	NA	NA	NA	NA	NA
Bromodichloromethane	1.50E-03	2.00E-02	6.20E-02	5.87E-10	2.94E-08	2.10E-10	1.30E-11
Bromoform	NA	2.00E-02	7.90E-03	NA	NA	NA	NA
Bromomethane	NA	1.40E-03	NA	NA	NA	NA	NA
Cadmium	6.84E-01	1.00E-03	NA	2.68E-07	2.68E-04	NA	NA
Carbazole	NA	NA	2.00E-03	NA	NA	NA	NA
Carbon disulfide	NA	1.00E-01	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	7.00E-04	1.30E-01	NA	NA	NA	NA
Chlordane	NA	5.00E-04	3.50E-01	NA	NA	NA	NA
Chlorobenzene	NA	2.00E-02	NA	NA	NA	NA	NA
Chloroform	NA	1.00E-02	6.10E-03	NA	NA	NA	NA
Chromium (VI)	NA	3.00E-03	NA	NA	NA	NA	NA
Chrysene	2.67E+01	NA	7.30E-03	NA	NA	3.73E-06	2.72E-08
Cobalt	NA	2.00E-02	NA	NA	NA	NA	NA
Copper	NA	4.00E-02	NA	NA	NA	NA	NA
Cyanide	NA	2.00E-02	NA	NA	NA	NA	NA
Cyclohexanone	NA	5.00E+00	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	8.17E-01	NA	7.30E+00	NA	NA	1.14E-07	8.34E-07
Dieldrin	3.09E-02	5.00E-05	1.60E+01	1.21E-08	2.42E-04	4.32E-09	6.91E-08
Di-n-octylphthalate	NA	4.00E-02	NA	NA	NA	NA	NA
Ethyl ether	NA	2.00E-01	NA	NA	NA	NA	NA
Ethylbenzene	NA	1.00E-01	NA	NA	NA	NA	NA
Fluoride	2.47E+00	6.00E-02	NA	9.67E-07	1.61E-05	NA	NA
Heptachlorodibenzofuran	NA	NA	1.50E+03	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	1.68E-05	NA	1.50E+03	NA	NA	2.35E-12	3.53E-09
Hexachlorodibenzofuran	NA	NA	1.50E+03	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	NA	1.50E+04	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.72E+00	NA	7.30E-01	NA	NA	5.20E-07	3.80E-07
Lead	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	1.40E-01	NA	NA	NA	NA	NA
Mercury	NA	3.00E-04	NA	NA	NA	NA	NA
Methanol	NA	5.00E-01	NA	NA	NA	NA	NA
Methyl-2-pentanone	NA	8.00E-02	NA	NA	NA	NA	NA
Methylene chloride	NA	6.00E-02	7.50E-03	NA	NA	NA	NA
Molybdenum	4.89E+00	5.00E-03	NA	1.91E-06	3.83E-04	NA	NA
Nickel	NA	2.00E-02	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	2.00E-02	4.90E-03	NA	NA	NA	NA
N-nitrosodipropylamine	NA	NA	7.00E+00	NA	NA	NA	NA
Octachlorodibenzofuran	NA	NA	1.50E+02	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	2.59E-04	NA	1.50E+02	NA	NA	3.62E-11	5.43E-09
Pentachlorodibenzofuran	NA	NA	7.50E+03	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	NA	7.50E+04	NA	NA	NA	NA
Pentachlorophenol	NA	3.00E-02	1.20E-01	NA	NA	NA	NA
Phenanthrene	8.26E+00	NA	NA	NA	NA	NA	NA
Selenium	NA	5.00E-03	NA	NA	NA	NA	NA
Silver	1.48E-01	5.00E-03	NA	5.79E-08	1.16E-05	NA	NA
Tetrachlorodibenzofuran	NA	NA	1.50E+04	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	NA	1.50E+05	NA	NA	NA	NA
Tetrachloroethylene	1.50E-03	1.00E-02	5.40E-01	5.87E-10	5.87E-08	2.10E-10	1.13E-10
Thallium	NA	9.00E-05	NA	NA	NA	NA	NA
Toluene	NA	8.00E-02	NA	NA	NA	NA	NA
Tributyl phosphate	NA	2.00E-01	5.40E-03	NA	NA	NA	NA
Trichloroethylene	1.83E-03	3.00E-04	4.00E-01	7.16E-10	2.39E-06	2.56E-10	1.02E-10
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA
Uranium	3.83E+01	6.00E-04	NA	1.50E-05	2.50E-02	NA	NA
Vanadium	NA	7.00E-03	NA	NA	NA	NA	NA
Vinyl chloride	NA	3.00E-03	1.50E+00	NA	NA	NA	NA
Xylenes	NA	2.00E-01	NA	NA	NA	NA	NA
Zinc	NA	3.00E-01	NA	NA	NA	NA	NA
				total =	4.27E-02	total =	1.04E-05

Groundskeeper/Sampler - Dermal Contact with Surface Water
Risk calculation for A6 under rail trestle

			UNITS	adult
Intake Equation:	CDI =	(DA*EF*ED*SA)/(BW*AT)		
	CDI =	Chronic Daily Intake	mg/kgday	calculated below
	DA =	Dermal absorption dose	mg/cm²day	see COC list below
	EF =	Exposure frequency	days/yr	12
	ED =	Exposure duration	yrs	25
	SA =	Surface area of skin	cm²	5670
	BW =	Body weight	kg	70
	ATc =	Average time for carcinogens	days	25550
	ATn =	Average time for non-carcinogens	days	9125
where:	DA = C_v*K_p*CF*ET			
	C_v =	concentation of ith contaminant in surface water	mg/L	see COC list below
	K_p =	permeability constant for ith contaminant	cm/hr	see COC list below
	CF =	conversion factor	L/cm³	0.001
	ET =	exposure time	hr/d	1

COC	C_v	K_p	DA	RfDd	CSFd	ADULT CDI	HQ	CDI	ILCR
	mg/L	cm/hr	mg/cm²day	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	0.00E+00	6.43E-03	0.00E+00	3.24E-03	7.04E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,1-Dichloroethylene	5.00E-04	1.59E-02	7.95E-09	5.00E-02	6.00E-01	2.12E-08	4.23E-07	7.56E-09	4.54E-09
1,2-dichloroethane	5.00E-04	5.34E-03	2.67E-09	2.00E-02	9.10E-02	7.11E-09	3.56E-07	2.54E-09	2.31E-10
2-Butanone	NA	1.11E-03	NA	4.80E-01	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	1.69E-02	NA	NA	9.00E-01	NA	NA	NA	NA
4-Methylphenol	NA	9.95E-03	NA	3.25E-03	NA	NA	NA	NA	NA
4-Nitroanaline	NA	2.66E-03	NA	2.40E-03	2.63E-02	NA	NA	NA	NA
Acetone	NA	5.69E-04	NA	7.47E-01	NA	NA	NA	NA	NA
Antimony	5.00E-04	1.00E-03	5.00E-10	8.00E-06	NA	1.33E-09	1.66E-04	NA	NA
Aroclor-1254	5.00E-05	1.29E+00	6.45E-08	1.80E-05	2.22E+00	1.72E-07	9.54E-03	6.13E-08	1.36E-07
Aroclor-1260	5.00E-05	5.48E+00	2.74E-07	1.80E-05	2.22E+00	7.30E-07	4.05E-02	2.61E-07	5.79E-07
Arsenic	5.76E-03	1.00E-03	5.76E-09	1.23E-04	3.66E+00	1.53E-08	1.25E-04	5.48E-09	2.01E-08
Barium	6.90E-02	1.00E-03	6.90E-08	1.40E-02	NA	1.84E-07	1.31E-05	NA	NA
Benzene	NA	2.07E-02	NA	3.88E-03	5.67E-02	NA	NA	NA	NA
Benzo(a)anthracene	5.00E-04	9.48E-01	4.74E-07	NA	2.35E+00	NA	NA	4.51E-07	1.06E-06
Benzo(a)pyrene	5.00E-04	1.24E+00	6.20E-07	NA	2.35E+01	NA	NA	5.90E-07	1.39E-05
Benzo(b)fluoranthene	0.00E+00	6.99E-01	0.00E+00	NA	2.35E+00	NA	NA	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	1.20E+00	0.00E+00	NA	2.35E-01	NA	NA	0.00E+00	0.00E+00
Beryllium	1.94E-04	1.00E-03	1.94E-10	2.00E-05	4.30E+02	5.16E-10	2.58E-05	1.84E-10	7.92E-08
Bis(2-chloroisopropyl)ether	NA	7.63E-02	NA	2.00E-02	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	1.97E+00	NA	3.80E-03	7.37E-02	NA	NA	NA	NA
Boron	NA	1.00E-03	NA	1.80E-01	NA	NA	NA	NA	NA
Bromodichloromethane	5.00E-04	5.02E-03	2.51E-09	1.96E-02	6.33E-02	6.68E-09	3.41E-07	2.39E-09	1.51E-10
Bromoform	NA	2.77E-03	NA	1.20E-02	1.32E-02	NA	NA	NA	NA
Bromomethane	NA	3.51E-03	NA	1.12E-03	NA	NA	NA	NA	NA
Cadmium	1.08E-04	1.00E-03	1.08E-10	1.00E-05	NA	2.86E-10	2.86E-05	NA	NA
Carbazole	NA	7.97E-02	NA	NA	2.86E-02	NA	NA	NA	NA
Carbon disulfide	NA	1.56E-02	NA	6.30E-02	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	2.24E-02	NA	4.55E-04	2.00E-01	NA	NA	NA	NA
Chlordane	NA	1.57E-01	NA	2.50E-04	7.00E-01	NA	NA	NA	NA
Chlorobenzene	NA	4.07E-02	NA	6.20E-03	NA	NA	NA	NA	NA
Chloroform	NA	8.92E-03	NA	2.00E-03	3.05E-02	NA	NA	NA	NA
Chromium (VI)	NA	2.00E-03	NA	6.00E-05	NA	NA	NA	NA	NA
Chrysene	0.00E+00	1.03E+00	0.00E+00	NA	2.35E-02	NA	NA	0.00E+00	0.00E+00
Cobalt	NA	4.00E-04	NA	1.60E-02	NA	NA	NA	NA	NA
Copper	NA	1.00E-03	NA	1.20E-02	NA	NA	NA	NA	NA
Cyanide	NA	1.00E-03	NA	3.40E-03	NA	NA	NA	NA	NA
Cyclohexanone	NA	1.80E-03	NA	4.00E+00	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	5.00E-04	1.68E+00	8.40E-07	NA	2.35E+01	NA	NA	7.99E-07	1.88E-05
Dieldrin	2.00E-05	4.45E-02	8.90E-10	2.50E-05	3.20E+01	2.37E-09	9.48E-05	8.46E-10	2.71E-08
Di-n-octylphthalate	NA	4.45E+00	NA	3.60E-02	NA	NA	NA	NA	NA
Ethyl ether	NA	2.88E-03	NA	1.60E-01	NA	NA	NA	NA	NA
Ethylbenzene	NA	7.39E-02	NA	9.70E-02	NA	NA	NA	NA	NA
Fluoride	4.73E-01	1.00E-03	4.73E-07	5.82E-02	NA	1.26E-06	2.16E-05	NA	NA
Heptachlorodibenzofuran	NA	2.55E+00	NA	NA	3.00E+03	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	0.00E+00	3.22E+00	0.00E+00	NA	3.00E+03	NA	NA	0.00E+00	0.00E+00
Hexachlorodibenzofuran	NA	2.38E+00	NA	NA	3.00E+04	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	5.29E+00	NA	NA	3.00E+04	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.00E+00	2.23E+00	0.00E+00	NA	2.35E+00	NA	NA	0.00E+00	0.00E+00
Lead	NA	1.00E-04	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	1.00E-03	NA	1.84E-03	NA	NA	NA	NA	NA
Mercury	NA	1.00E-03	NA	2.10E-05	NA	NA	NA	NA	NA
Methanol	NA	3.45E-04	NA	4.00E-01	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	3.97E-03	NA	6.40E-02	NA	NA	NA	NA	NA
Methylene chloride	NA	4.46E-03	NA	5.70E-02	7.89E-03	NA	NA	NA	NA
Molybdenum	6.99E-03	1.00E-03	6.99E-09	1.90E-03	NA	1.86E-08	9.79E-06	NA	NA
Nickel	NA	2.00E-04	NA	5.40E-03	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	1.96E-02	NA	5.00E-03	1.96E-02	NA	NA	NA	NA
N-nitrosodipropylamine	NA	2.83E-03	NA	NA	2.80E+01	NA	NA	NA	NA
Octachlorodibenzofuran	NA	4.78E+00	NA	NA	3.00E+02	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	0.00E+00	1.65E+01	0.00E+00	NA	3.00E+02	NA	NA	0.00E+00	0.00E+00
Pentachlorodibenzofuran	NA	1.06E+00	NA	NA	1.50E+04	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	3.79E-01	NA	NA	1.50E+05	NA	NA	NA	NA
Pentachlorophenol	NA	1.95E-01	NA	3.00E-02	1.20E-01	NA	NA	NA	NA
Phenanthrene	0.00E+00	2.29E-01	0.00E+00	NA	NA	NA	NA	NA	NA
Selenium	NA	1.00E-03	NA	2.20E-03	NA	NA	NA	NA	NA
Silver	2.00E-04	6.00E-04	1.20E-10	9.00E-04	NA	3.20E-10	3.55E-07	NA	NA
Tetrachlorodibenzofuran	NA	1.12E+00	NA	NA	3.00E+04	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	1.39E+00	NA	NA	3.00E+05	NA	NA	NA	NA
Tetrachloroethylene	5.00E-04	4.81E-02	2.41E-08	1.00E-02	5.40E-01	6.40E-08	6.40E-06	2.29E-08	1.24E-08
Thallium	NA	1.00E-03	NA	1.80E-05	NA	NA	NA	NA	NA
Toluene	NA	4.53E-02	NA	6.40E-02	NA	NA	NA	NA	NA
Tributyl phosphate	NA	3.13E-02	NA	1.00E-01	1.08E-02	NA	NA	NA	NA
Trichloroethylene	5.00E-04	1.57E-02	7.85E-09	4.50E-05	2.67E+00	2.09E-08	4.65E-04	7.47E-09	1.99E-08
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium	2.42E-02	1.00E-03	2.42E-08	5.10E-04	NA	6.44E-08	1.26E-04	NA	NA
Vanadium	NA	1.00E-03	NA	7.00E-05	NA	NA	NA	NA	NA
Vinyl chloride	NA	1.13E-02	NA	3.00E-03	1.50E+00	NA	NA	NA	NA
Xylenes	NA	7.04E-02	NA	1.84E-01	NA	NA	NA	NA	NA
Zinc	NA	6.00E-04	NA	6.00E-02	NA	NA	NA	NA	NA
						total =	5.12E-02	total =	3.46E-05

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - IngestSWchem

Groundskeeper/Sampler - Ingestion of Surface Water
Risk calculation for A6 under rail trestle

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

COC	CW	RfDo	CSFo	ADULT CDI	HQ	CDI	ILCR
	mg/L	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	0.00E+00	4.00E-03	5.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,1-Dichloroethylene	5.00E-04	5.00E-02	6.00E-01	2.35E-09	4.70E-08	8.39E-10	5.03E-10
1,2-dichloroethane	5.00E-04	2.00E-02	9.10E-02	2.35E-09	1.17E-07	8.39E-10	7.63E-11
2-Butanone	NA	6.00E-01	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	NA	4.50E-01	NA	NA	NA	NA
4-Methylphenol	NA	5.00E-03	NA	NA	NA	NA	NA
4-Nitroanaline	NA	3.00E-03	2.10E-02	NA	NA	NA	NA
Acetone	NA	9.00E-01	NA	NA	NA	NA	NA
Antimony	5.00E-04	4.00E-04	NA	2.35E-09	5.87E-06	NA	NA
Aroclor-1254	5.00E-05	2.00E-05	4.00E-01	2.35E-10	1.17E-05	8.39E-11	3.35E-11
Aroclor-1260	5.00E-05	2.00E-05	4.00E-01	2.35E-10	1.17E-05	8.39E-11	3.35E-11
Arsenic	5.76E-03	3.00E-04	1.50E+00	2.71E-08	9.02E-05	9.67E-09	1.45E-08
Barium	6.90E-02	2.00E-01	NA	3.24E-07	1.62E-06	NA	NA
Benzene	NA	4.00E-03	5.50E-02	NA	NA	NA	NA
Benzo(a)anthracene	5.00E-04	NA	7.30E-01	NA	NA	8.39E-10	6.12E-10
Benzo(a)pyrene	5.00E-04	NA	7.30E+00	NA	NA	8.39E-10	6.12E-09
Benzo(b)fluoranthene	0.00E+00	NA	7.30E-01	NA	NA	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	NA	7.30E-02	NA	NA	0.00E+00	0.00E+00
Beryllium	1.94E-04	2.00E-03	4.30E+00	9.10E-10	4.55E-07	3.25E-10	1.40E-09
Bis(2-chloroisopropyl)ether	NA	4.00E-02	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	2.00E-02	1.40E-02	NA	NA	NA	NA
Boron	NA	2.00E-01	NA	NA	NA	NA	NA
Bromodichloromethane	5.00E-04	2.00E-02	6.20E-02	2.35E-09	1.17E-07	8.39E-10	5.20E-11
Bromoform	NA	2.00E-02	7.90E-03	NA	NA	NA	NA
Bromomethane	NA	1.40E-03	NA	NA	NA	NA	NA
Cadmium	1.08E-04	1.00E-03	NA	5.05E-10	5.05E-07	NA	NA
Carbazole	NA	NA	2.00E-03	NA	NA	NA	NA
Carbon disulfide	NA	1.00E-01	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	7.00E-04	1.30E-01	NA	NA	NA	NA
Chlordane	NA	5.00E-04	3.50E-01	NA	NA	NA	NA
Chlorobenzene	NA	2.00E-02	NA	NA	NA	NA	NA
Chloroform	NA	1.00E-02	6.10E-03	NA	NA	NA	NA
Chromium (VI)	NA	3.00E-03	NA	NA	NA	NA	NA
Chrysene	0.00E+00	NA	7.30E-03	NA	NA	0.00E+00	0.00E+00
Cobalt	NA	2.00E-02	NA	NA	NA	NA	NA
Copper	NA	4.00E-02	NA	NA	NA	NA	NA
Cyanide	NA	2.00E-02	NA	NA	NA	NA	NA
Cyclohexanone	NA	5.00E+00	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	5.00E-04	NA	7.30E+00	NA	NA	8.39E-10	6.12E-09
Dieldrin	2.00E-05	5.00E-05	1.60E+01	9.39E-11	1.88E-06	3.35E-11	5.37E-10
Di-n-octylphthalate	NA	4.00E-02	NA	NA	NA	NA	NA
Ethyl ether	NA	2.00E-01	NA	NA	NA	NA	NA
Ethylbenzene	NA	1.00E-01	NA	NA	NA	NA	NA
Fluoride	4.73E-01	6.00E-02	NA	2.22E-06	3.70E-05	NA	NA
Heptachlorodibenzofuran	NA	NA	1.50E+03	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	0.00E+00	NA	1.50E+03	NA	NA	0.00E+00	0.00E+00
Hexachlorodibenzofuran	NA	NA	1.50E+03	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	NA	1.50E+04	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.00E+00	NA	7.30E-01	NA	NA	0.00E+00	0.00E+00
Lead	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	4.60E-02	NA	NA	NA	NA	NA
Mercury	NA	3.00E-04	NA	NA	NA	NA	NA
Methanol	NA	5.00E-01	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	8.00E-02	NA	NA	NA	NA	NA
Methylene chloride	NA	6.00E-02	7.50E-03	NA	NA	NA	NA
Molybdenum	6.99E-03	5.00E-03	NA	3.28E-08	6.56E-06	NA	NA
Nickel	NA	2.00E-02	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	2.00E-02	4.90E-03	NA	NA	NA	NA
N-nitrosodipropylamine	NA	NA	7.00E+00	NA	NA	NA	NA
Octachlorodibenzofuran	NA	NA	1.50E+02	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	0.00E+00	NA	1.50E+02	NA	NA	0.00E+00	0.00E+00
Pentachlorodibenzofuran	NA	NA	7.50E+03	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	NA	7.50E+04	NA	NA	NA	NA
Pentachlorophenol	NA	3.00E-02	1.20E-01	NA	NA	NA	NA
Phenanthrene	0.00E+00	NA	NA	NA	NA	NA	NA
Selenium	NA	5.00E-03	NA	NA	NA	NA	NA
Silver	2.00E-04	5.00E-03	NA	9.39E-10	1.88E-07	NA	NA
Tetrachlorodibenzofuran	NA	NA	1.50E+04	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	NA	1.50E+05	NA	NA	NA	NA
Tetrachloroethylene	5.00E-04	1.00E-02	5.40E-01	2.35E-09	2.35E-07	8.39E-10	4.53E-10
Thallium	NA	9.00E-05	NA	NA	NA	NA	NA
Toluene	NA	8.00E-02	NA	NA	NA	NA	NA
Tributyl phosphate	NA	2.00E-01	5.40E-03	NA	NA	NA	NA
Trichloroethylene	5.00E-04	3.00E-04	4.00E-01	2.35E-09	7.83E-06	8.39E-10	3.35E-10
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA
Uranium	2.42E-02	6.00E-04	NA	1.14E-07	1.89E-04	NA	NA
Vanadium	NA	7.00E-03	NA	NA	NA	NA	NA
Vinyl chloride	NA	3.00E-03	1.50E+00	NA	NA	NA	NA
Xylenes	NA	2.00E-01	NA	NA	NA	NA	NA
Zinc	NA	3.00E-01	NA	NA	NA	NA	NA
				total =	**3.65E-04**	**total =**	**3.08E-08**

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - InhaleRad

Groundskeeper/Sampler - Inhalation of Gases & Particulates
Risk calculation for A6 under rail trestle - increment above background

Intake Equation:			UNITS	adult
	CDI =	(CA*EF*ED*IR*ET)		
	CDI =	Chronic Daily Intake	pCi	calculated below
	CA =	Concentration of radionuclide in air	pCi/m^3	see COC list below
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Inhalation rate	m^3/hr	2.5
	ET =	Exposure time	hrs/day	8

COC	conc	CSFi	ADULT	
			CDI	ILCR
	pCi/m^3	1/pCi	pCi	CDI*CSF
Cesium-137 + D	5.67E-06	1.19E-11	2.83E-01	3.37E-12
Lead-210 + D	NA	1.39E-08	NA	NA
Neptunium-237 + D	NA	1.77E-08	NA	NA
Plutonium-238	NA	3.36E-08	NA	NA
Plutonium-239/240	NA	3.33E-08	NA	NA
Radium-226 + D	0.00E+00	1.16E-08	0.00E+00	0.00E+00
Radium-228 + D	0.00E+00	5.23E-09	0.00E+00	0.00E+00
Radon-222+ D	0.00E+00	1.80E-11	0.00E+00	0.00E+00
Strontium-90 + D	NA	1.13E-10	NA	NA
Technetium-99	2.12E-04	1.41E-11	1.06E+01	1.50E-10
Thorium-228 + D	0.00E+00	1.43E-07	0.00E+00	0.00E+00
Thorium-230	2.86E-05	2.85E-08	1.43E+00	4.08E-08
Thorium-232	0.00E+00	4.33E-08	0.00E+00	0.00E+00
Uranium-234	5.70E-05	1.14E-08	2.85E+00	3.25E-08
Uranium-235 + D	2.60E-06	1.01E-08	1.30E-01	1.31E-09
Uranium-238 + D	5.59E-05	9.35E-09	2.80E+00	2.61E-08
			total =	**1.01E-07**

Air concentration is derived using air particulate value of 26 ug/m^3 (2005 SER background average from monitor AMS-12) multiplied by the soil concentration.

Rn-222 is derived by multiplying the soil Ra-226 value by 256 g/m^3. This conversion factor is based on Rn-222 air background and Ra-226 soil background (i.e., 400 pCi/m^3 divided by 1.56 pCi/g)

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - IngestSoilRad

Groundskeep/Sampler - Ingestion of Soil
Risk calculation for A6 under rail trestle - increment above background

Intake Equation:			UNITS	adult
	CDI =	(CS*EF*ED*IR*FI)		
	CDI =	Chronic Daily Intake	pCi	calculated below
	CS =	Concentration of radionuclide in soil	pCi/g	see COC list below
	EF =	Exposure frequency	days/yr	100
	ED =	Exposure duration	yrs	25
	IR =	Ingestion rate	g/day	0.1
	FI =	Fraction of contaminated soil	unitless	1

COC	conc	CSFos	ADULT	
			CDI	ILCR
	pCi/g	1/pCi	pCi	CDI*CSF
Cesium-137 + D	2.18E-01	4.33E-11	5.45E+01	2.36E-09
Lead-210 + D	NA	2.66E-09	NA	NA
Neptunium-237 + D	NA	1.62E-10	NA	NA
Plutonium-238	NA	2.72E-10	NA	NA
Plutonium-239/240	NA	2.76E-10	NA	NA
Radium-226 + D	0.00E+00	7.30E-10	0.00E+00	0.00E+00
Radium-228 + D	0.00E+00	2.29E-09	0.00E+00	0.00E+00
Radon-222+ D	NA	NA	NA	NA
Strontium-90 + D	NA	1.44E-10	NA	NA
Technetium-99	8.16E+00	7.66E-12	2.04E+03	1.56E-08
Thorium-228 + D	0.00E+00	8.09E-10	0.00E+00	0.00E+00
Thorium-230	1.10E+00	2.02E-10	2.75E+02	5.56E-08
Thorium-232	0.00E+00	2.31E-10	0.00E+00	0.00E+00
Uranium-234	2.19E+00	1.58E-10	5.48E+02	8.67E-08
Uranium-235 + D	1.00E-01	1.63E-10	2.50E+01	4.08E-09
Uranium-238 + D	2.15E+00	2.10E-10	5.38E+02	1.13E-07
			total =	**2.77E-07**

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - IngestSWrad

Groundskeeper/Sampler - Ingestion of Surface Water
Risk calculation for A6 under rail trestle - increment above background

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

COC	conc	CSFow	ADULT	
			CDI	ILCR
	pCi/L	1/pCi	pCi	CDI*CSF
Cesium-137 + D	3.00E-01	3.04E-11	9.00E-01	2.74E-11
Lead-210 + D	NA	1.27E-09	NA	NA
Neptunium-237 + D	NA	6.74E-11	NA	NA
Plutonium-238	NA	1.31E-10	NA	NA
Plutonium-239/240	NA	1.35E-10	NA	NA
Radium-226 + D	2.63E-01	3.86E-10	7.89E-01	3.05E-10
Radium-228 + D	7.50E-01	1.04E-09	2.25E+00	2.34E-09
Radon-222+ D	NA	NA	NA	NA
Strontium-90 + D	NA	7.40E-11	NA	NA
Technetium-99	6.30E+00	2.75E-12	1.89E+01	5.20E-11
Thorium-228 + D	6.80E-01	3.00E-10	2.04E+00	6.12E-10
Thorium-230	9.36E-02	9.10E-11	2.81E-01	2.56E-11
Thorium-232	7.50E-01	1.01E-10	2.25E+00	2.27E-10
Uranium-234	7.67E+00	7.07E-11	2.30E+01	1.63E-09
Uranium-235 + D	3.50E-01	7.18E-11	1.05E+00	7.53E-11
Uranium-238 + D	7.49E+00	8.71E-11	2.25E+01	1.96E-09
			total =	**7.25E-09**

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - ExternalRad

Groundskeeper/Sampler - External Radiation
Risk calculation for A6 under rail trestle - increment above background

Intake Equation:			UNITS	adult
	CDI =	$(CS*EF*ED*ET_o*(1-SH_o))+(CS*EF*ED*ET_i*(1-SH_i))$		
	CDI =	Chronic Daily Intake	yr pCi/g	calculated below
	CS =	Concentration of radionuclide in soil	pCi/g	see COC list below
	EF =	Fraction of year exposed to radiation	--	0.27
	ED =	Exposure duration	yrs	25
	ET_o =	Fraction of day spent outdoors	--	0.33
	ET_i =	Fraction of day spent indoors	--	0.00
	SH_o =	Shield factor outdoors	--	0.25
	SH_i =	Shield factor indoors	--	0.5

COC	conc	CSFx	ADULT	
			CDI	ILCR
	pCi/g	g/pCi yr	yr pCi/g	CDI*CSF
Cesium-137 + D	2.18E-01	2.55E-06	3.73E-01	9.51E-07
Lead-210 + D	NA	4.21E-09	NA	NA
Neptunium-237 + D	NA	7.97E-07	NA	NA
Plutonium-238	NA	7.22E-11	NA	NA
Plutonium-239/240	NA	2.00E-10	NA	NA
Radium-226 + D	0.00E+00	8.49E-06	0.00E+00	0.00E+00
Radium-228 + D	0.00E+00	4.53E-06	0.00E+00	0.00E+00
Radon-222+ D	NA	NA	NA	NA
Strontium-90 + D	NA	1.96E-08	NA	NA
Technetium-99	8.16E+00	8.14E-11	1.40E+01	1.14E-09
Thorium-228 + D	0.00E+00	7.76E-06	0.00E+00	0.00E+00
Thorium-230	1.10E+00	8.19E-10	1.88E+00	1.54E-09
Thorium-232	0.00E+00	3.42E-10	0.00E+00	0.00E+00
Uranium-234	2.19E+00	2.52E-10	3.75E+00	9.46E-10
Uranium-235 + D	1.00E-01	5.43E-07	1.71E-01	9.30E-08
Uranium-238 + D	2.15E+00	1.14E-07	3.68E+00	4.19E-07
			total =	1.47E-06

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - SumPaths

Groundskeeper/Sampler - Summation of all Pathways
Risk calculation for A6 under rail trestle

	HQ	ILCR	rad only ILCR
Inhale	2.99E-03	2.74E-07	1.01E-07
Dermal Soil	1.35E-02	3.29E-05	NA
Ingest Soil	4.27E-02	1.07E-05	2.77E-07
Dermal Surface Water	5.12E-02	3.46E-05	NA
Ingest Surface Water	3.65E-04	3.80E-08	7.25E-09
External Radiation	NA	1.47E-06	1.47E-06
SUM	**1.11E-01**	**8.00E-05**	**1.85E-06**

increment above background

Summation of all paths for individual nuclides

	Total ILCR
Cesium-137 + D	9.54E-07
Lead-210 + D	NA
Neptunium-237 + D	NA
Plutonium-238	NA
Plutonium-239/240	NA
Radium-226 + D	3.05E-10
Radium-228 + D	2.34E-09
Radon-222+ D	0.00E+00
Strontium-90 + D	NA
Technetium-99	1.70E-08
Thorium-228 + D	6.12E-10
Thorium-230	9.79E-08
Thorium-232	2.27E-10
Uranium-234	1.22E-07
Uranium-235 + D	9.85E-08
Uranium-238 + D	5.60E-07
SUM	**1.85E-06**

increment above background

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - SumPaths

Summation of all paths for individual chemicals

	Total ILCR	Total HQ
1,1,2-Trichloroethane	2.93E-12	3.58E-08
1,1-Dichloroethylene	5.18E-09	4.83E-07
1,2-dichloroethane	3.21E-10	4.94E-07
2-Butanone	NA	NA
3,3-Dichlorobenzidine	NA	NA
4-Methylphenol	NA	NA
4-Nitroanaline	NA	NA
Acetone	NA	NA
Antimony	No CSFs	1.10E-03
Aroclor-1254	1.61E-07	1.13E-02
Aroclor-1260	5.99E-07	4.20E-02
Arsenic	4.13E-06	2.50E-02
Barium	No CSFs	3.05E-03
Benzene	NA	NA
Benzo(a)anthracene	4.49E-06	No RfDs
Benzo(a)pyrene	3.22E-05	No RfDs
Benzo(b)fluoranthene	8.70E-06	No RfDs
Benzo(k)fluoranthene	1.13E-06	No RfDs
Beryllium	1.33E-06	8.02E-04
Bis(2-chloroisopropyl)ether	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA
Boron	NA	NA
Bromodichloromethane	2.17E-10	4.91E-07
Bromoform	NA	NA
Bromomethane	NA	NA
Cadmium	3.13E-09	5.62E-04
Carbazole	NA	NA
Carbon disulfide	NA	NA
Carbon tetrachloride	NA	NA
Chlordane	NA	NA
Chlorobenzene	NA	NA
Chloroform	NA	NA
Chromium (VI)	NA	NA
Chrysene	1.40E-07	No RfDs
Cobalt	NA	NA
Copper	NA	NA
Cyanide	NA	NA
Cyclohexanone	NA	NA
Dibenzo(a,h)anthracene	2.31E-05	No RfDs
Dieldrin	1.11E-07	3.86E-04
Di-n-octylphthalate	NA	NA

APPENDIX E.1
Groundskeeper / Sampler - Zone 6 - SumPaths

Summation of all paths for individual chemicals (continued)

	Total ILCR	HQ
Ethyl ether	NA	NA
Ethylbenzene	NA	NA
Fluoride	No CSFs	7.49E-05
Heptachlorodibenzofuran	NA	NA
Heptachlorodibenzo-p-dioxin	5.64E-09	No RfDs
Hexachlorodibenzofuran	NA	NA
Hexachlorodibenzo-p-dioxin	NA	NA
Indeno(1,2,3-cd)pyrene	1.95E-06	No RfDs
Lead	NA	NA
Manganese	NA	NA
Mercury	NA	NA
Methanol	NA	NA
4-Methyl-2-pentanone	NA	NA
Methylene chloride	NA	NA
Molybdenum	No CSFs	4.09E-04
Nickel	NA	NA
N-nitrosodiphenylamine	NA	NA
N-nitrosodipropylamine	NA	NA
Octachlorodibenzofuran	NA	NA
Octochlorodibenzo-p-dioxin	8.69E-09	No RfDs
Pentachlorodibenzofuran	NA	NA
Pentachlorodibenzo-p-dioxin	NA	NA
Pentachlorophenol	NA	NA
Phenanthrene	No CSFs	No RfDs
Selenium	NA	NA
Silver	No CSFs	1.28E-05
Tetrachlorodibenzofuran	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	NA
Tetrachloroethylene	1.29E-08	6.70E-06
Thallium	NA	NA
Toluene	NA	NA
Tributyl phosphate	NA	NA
Trichloroethylene	2.04E-08	4.76E-04
Trifluorochloromethane	NA	NA
Uranium	No CSFs	2.56E-02
Vanadium	NA	NA
Vinyl chloride	NA	NA
Xylenes	NA	NA
Zinc	NA	NA
SUM	**7.81E-05**	**1.11E-01**

APPENDIX E.2
UNDEVELOPED PARK USER

TABLE E.2
Undeveloped Park User - Zone 6 - InhaleChem

Undeveloped Park User - Inhalation of Gases & Particulates
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	Assigned Values			
	CDI =	(CA*EF*ED*IR*ET)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday	child	youth	adult	senior
	CA =	Concentration of chemical in air	mg/m³	see table of COCs below			
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Inhalation rate	m³/hr	1	1	1	1
	ET =	Exposure time	hrs/day	2	2	2	2
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	RfDi	CSFi	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/m³	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	8.48E-12	NA	5.60E-02	NA	NA	2.65E-15	1.49E-16	NA	NA	3.39E-15	1.90E-16	NA	NA	2.65E-15	1.49E-16	NA	NA	2.65E-15	1.49E-16	NA	NA	1.14E-14	6.36E-16
1,1-Dichloroethylene	3.90E-11	5.71E-02	1.75E-01	2.85E-13	4.99E-12	1.22E-14	2.14E-15	1.82E-13	3.19E-12	1.56E-14	2.73E-15	6.11E-14	1.07E-12	1.22E-14	2.14E-15	1.22E-13	2.14E-12	1.22E-14	2.14E-15	1.22E-13	2.13E-12	5.22E-14	9.14E-15
1,2-dichloroethane	2.55E-11	NA	9.10E-02	NA	NA	7.98E-15	7.26E-16	NA	NA	1.02E-14	9.27E-16	NA	NA	7.98E-15	7.26E-16	NA	NA	7.98E-15	7.26E-16	NA	NA	3.41E-14	3.11E-15
2-Butanone	NA	1.43E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroanaline	NA	1.14E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	1.64E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	8.94E-10	NA	2.00E+00	NA	NA	2.80E-13	5.60E-13	NA	NA	3.58E-13	7.15E-13	NA	NA	2.80E-13	5.60E-13	NA	NA	2.80E-13	5.60E-13	NA	NA	1.20E-12	2.40E-12
Aroclor-1260	7.44E-10	NA	2.00E+00	NA	NA	2.33E-13	4.66E-13	NA	NA	2.97E-13	5.94E-13	NA	NA	2.33E-13	4.66E-13	NA	NA	2.33E-13	4.66E-13	NA	NA	9.96E-13	1.99E-12
Arsenic	2.86E-07	NA	1.51E+01	NA	NA	8.95E-11	1.35E-09	NA	NA	1.14E-10	1.73E-09	NA	NA	8.95E-11	1.35E-09	NA	NA	8.95E-11	1.35E-09	NA	NA	3.83E-10	5.78E-09
Barium	4.79E-06	1.43E-04	NA	3.50E-08	2.45E-04	NA	NA	2.23E-08	1.56E-04	NA	NA	7.50E-09	5.25E-05	NA	NA	1.50E-08	1.05E-04	NA	NA	1.50E-08	1.05E-04	NA	NA
Benzene	NA	8.57E-03	2.73E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.70E-07	NA	3.08E-01	NA	NA	5.32E-11	1.64E-11	NA	NA	6.80E-11	2.09E-11	NA	NA	5.32E-11	1.64E-11	NA	NA	5.32E-11	1.64E-11	NA	NA	2.28E-10	7.01E-11
Benzo(a)pyrene	9.10E-08	NA	3.08E-01	NA	NA	2.85E-11	8.78E-12	NA	NA	3.64E-11	1.12E-11	NA	NA	2.85E-11	8.78E-12	NA	NA	2.85E-11	8.78E-12	NA	NA	1.22E-10	3.75E-11
Benzo(b)fluoranthene	4.29E-07	NA	3.08E+00	NA	NA	1.34E-10	4.14E-10	NA	NA	1.71E-10	5.28E-10	NA	NA	1.34E-10	4.14E-10	NA	NA	1.34E-10	4.14E-10	NA	NA	5.74E-10	1.77E-09
Benzo(k)fluoranthene	5.59E-07	NA	3.08E-02	NA	NA	1.75E-10	5.39E-12	NA	NA	2.23E-10	6.88E-12	NA	NA	1.75E-10	5.39E-12	NA	NA	1.75E-10	5.39E-12	NA	NA	7.49E-10	2.31E-11
Beryllium	2.70E-08	5.71E-06	8.40E+00	1.98E-10	3.46E-05	8.47E-12	7.11E-11	1.26E-10	2.21E-05	1.08E-11	9.08E-11	4.23E-11	7.41E-06	8.47E-12	7.11E-11	8.47E-11	1.48E-05	8.47E-12	7.11E-11	8.45E-11	1.48E-05	3.62E-11	3.04E-10
Bis(2-chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	5.71E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	3.90E-11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	3.85E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	1.43E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.78E-08	NA	6.30E+00	NA	NA	5.57E-12	3.51E-11	NA	NA	7.11E-12	4.48E-11	NA	NA	5.57E-12	3.51E-11	NA	NA	5.57E-12	3.51E-11	NA	NA	2.38E-11	1.50E-10
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	5.25E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane	NA	2.00E-04	3.50E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	1.43E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	8.05E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (VI)	NA	2.86E-05	4.20E+01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	6.94E-07	NA	3.08E-03	NA	NA	2.17E-10	6.69E-13	NA	NA	2.77E-10	8.55E-13	NA	NA	2.17E-10	6.69E-13	NA	NA	2.17E-10	6.69E-13	NA	NA	9.30E-10	2.86E-12
Cobalt	NA	5.71E-06	9.80E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	2.12E-08	NA	3.08E+00	NA	NA	6.65E-12	2.05E-11	NA	NA	8.49E-12	2.62E-11	NA	NA	6.65E-12	2.05E-11	NA	NA	6.65E-12	2.05E-11	NA	NA	2.84E-11	8.76E-11
Dieldrin	8.03E-10	NA	1.61E+01	NA	NA	2.52E-13	4.05E-12	NA	NA	3.21E-13	5.17E-12	NA	NA	2.52E-13	4.05E-12	NA	NA	2.52E-13	4.05E-12	NA	NA	1.08E-12	1.73E-11
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE E.2
Undeveloped Park User - Zone 6 - InhaleChem

Undeveloped Park User - Inhalation of Gases & Particulates
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	Assigned Values			
	CDI =	(CA*EF*ED*IR*ET)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday	child	youth	adult	senior
	CA =	Concentration of chemical in air	mg/m^3	see table of COCs below			
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Inhalation rate	m^3/hr	1	1	1	1
	ET =	Exposure time	hrs/day	2	2	2	2
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	RfDi	CSFi	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/m^3	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	2.86E-01	3.85E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoride	6.42E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	NA	NA	1.16E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	4.37E-13	NA	1.16E+03	NA	NA	1.37E-16	1.59E-13	NA	NA	1.75E-16	2.03E-13	NA	NA	1.37E-16	1.59E-13	NA	NA	1.37E-16	1.59E-13	NA	NA	5.86E-16	6.79E-13
Hexachlorodibenzofuran	NA	NA	1.16E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	NA	1.16E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.67E-08	NA	3.08E-01	NA	NA	3.03E-11	9.33E-12	NA	NA	3.87E-11	1.19E-11	NA	NA	3.03E-11	9.33E-12	NA	NA	3.03E-11	9.33E-12	NA	NA	1.30E-10	3.99E-11
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	1.43E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methanol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-2-pentanone	NA	8.57E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	8.57E-01	1.65E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	1.27E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodipropylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octochlorodibenzofuran	NA	NA	1.16E+02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	6.74E-12	NA	1.16E+02	NA	NA	2.11E-15	2.45E-13	NA	NA	2.69E-15	3.12E-13	NA	NA	2.11E-15	2.45E-13	NA	NA	2.11E-15	2.45E-13	NA	NA	9.02E-15	1.05E-12
Pentachlorodibenzofuran	NA	NA	5.78E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	NA	5.78E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	2.15E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	3.85E-09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran	NA	NA	1.16E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	NA	1.16E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	3.90E-11	1.71E-01	2.07E-02	2.85E-13	1.67E-12	1.22E-14	2.53E-16	1.82E-13	1.06E-12	1.56E-14	3.23E-16	6.11E-14	3.57E-13	1.22E-14	2.53E-16	1.22E-13	7.14E-13	1.22E-14	2.53E-16	1.22E-13	7.13E-13	5.22E-14	1.08E-15
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	1.43E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tributyl phosphate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethylene	4.75E-11	1.14E-02	4.00E-01	3.47E-13	3.05E-11	1.49E-14	5.95E-15	2.22E-13	1.94E-11	1.90E-14	7.60E-15	7.44E-14	6.53E-12	1.49E-14	5.95E-15	1.49E-13	1.31E-11	1.49E-14	5.95E-15	1.49E-13	1.30E-11	6.37E-14	2.55E-14
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium	9.96E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	2.86E-02	3.08E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes	NA	2.86E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
																				total =	1.20E-04	total =	8.29E-09

Air concentration is derived using an air particulate value of 26 ug/m^3(2005 SER background average from monitor AMS-12) multiplied by the soil concentration.

TABLE E.2
Undeveloped Park User - Zone 6 - DermalSoilChem

Undeveloped Park User - Dermal Contact with Soil/Sediment
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CS*AB*SA*EF*ED*AF*CF)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday				
	CS =	Concentration of chemical in soil	mg/kg	see table of COCs below			
	AB	Absorption factor	--	see table of COCs below			
	SA	Surface area of exposed skin	cm^2/day	2800	4370	5700	5700
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	AF =	Adherence factor	mg/cm^2	0.2	0.2	0.07	0.07
	CF =	Conversion factor	kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	AB	RfDd	CSFd	CHILD				YOUTH				ADULT				SENIOR				SUM			
					CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/kg	unitless	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	3.26E-04	1.00E-02	3.24E-03	7.04E-02	6.67E-12	2.06E-09	2.86E-13	2.01E-14	6.65E-12	2.05E-09	5.70E-13	4.01E-14	1.02E-12	3.14E-10	2.04E-13	1.43E-14	2.04E-12	6.29E-10	2.04E-13	1.43E-14	2.95E-12	9.09E-10	1.26E-12	8.89E-14
1,1-Dichloroethylene	1.50E-03	1.00E-02	5.00E-02	6.00E-01	3.07E-11	6.14E-10	1.32E-12	7.89E-13	3.06E-11	6.11E-10	2.62E-12	1.57E-12	4.68E-12	9.37E-11	9.37E-13	5.62E-13	9.37E-12	1.87E-10	9.37E-13	5.62E-13	1.36E-11	2.71E-10	5.81E-12	3.49E-12
1,2-dichloroethane	9.80E-04	1.00E-02	2.00E-02	9.10E-02	2.01E-11	1.00E-09	8.60E-13	7.82E-14	2.00E-11	9.99E-10	1.71E-12	1.56E-13	3.06E-12	1.53E-10	6.12E-13	5.57E-14	6.12E-12	3.06E-10	6.12E-13	5.57E-14	8.86E-12	4.43E-10	3.80E-12	3.46E-13
2-Butanone	NA	1.00E-02	4.80E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	1.00E-02	NA	9.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	1.00E-02	3.25E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroanaline	NA	1.00E-02	2.40E-03	2.63E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	1.00E-02	7.47E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	6.32E-01	1.00E-03	8.00E-06	NA	1.29E-09	1.62E-04	NA	NA	1.29E-09	1.61E-04	NA	NA	1.97E-10	2.47E-05	NA	NA	3.95E-10	4.93E-05	NA	NA	5.71E-10	7.14E-05	NA	NA
Aroclor-1254	3.44E-02	1.40E-01	1.80E-05	2.22E+00	9.85E-09	5.47E-04	4.22E-10	9.37E-10	9.81E-09	5.45E-04	8.41E-10	1.87E-09	1.50E-09	8.36E-05	3.01E-10	6.68E-10	3.01E-09	1.67E-04	3.01E-10	6.68E-10	4.35E-09	2.42E-04	1.87E-09	4.14E-09
Aroclor-1260	2.86E-02	1.40E-01	1.80E-05	2.22E+00	8.19E-09	4.55E-04	3.51E-10	7.79E-10	8.16E-09	4.53E-04	6.99E-10	1.55E-09	1.25E-09	6.95E-05	2.50E-10	5.55E-10	2.50E-09	1.39E-04	2.50E-10	5.55E-10	3.62E-09	2.01E-04	1.55E-09	3.44E-09
Arsenic	1.10E+01	3.00E-02	1.23E-04	3.66E+00	6.75E-07	5.49E-03	2.89E-08	1.06E-07	6.73E-07	5.47E-03	5.76E-08	2.11E-07	1.03E-07	8.38E-04	2.06E-08	7.54E-08	2.06E-07	1.68E-03	2.06E-08	7.54E-08	2.98E-07	2.42E-03	1.28E-07	4.68E-07
Barium	1.84E+02	1.00E-03	1.40E-02	NA	3.77E-07	2.69E-05	NA	NA	3.76E-07	2.68E-05	NA	NA	5.76E-08	4.11E-06	NA	NA	1.15E-07	8.22E-06	NA	NA	1.67E-07	1.19E-05	NA	NA
Benzene	NA	1.00E-02	3.88E-03	5.67E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	6.54E+00	1.30E-01	NA	2.35E+00	NA	NA	7.45E-08	1.75E-07	NA	NA	1.49E-07	3.49E-07	NA	NA	5.31E-08	1.25E-07	NA	NA	5.31E-08	1.25E-07	NA	NA	3.29E-07	7.74E-07
Benzo(a)pyrene	3.50E+00	1.30E-01	NA	2.35E+01	NA	NA	3.99E-08	9.37E-07	NA	NA	7.95E-08	1.87E-06	NA	NA	2.84E-08	6.68E-07	NA	NA	2.84E-08	6.68E-07	NA	NA	1.76E-07	4.14E-06
Benzo(b)fluoranthene	1.65E+01	1.30E-01	NA	2.35E+00	NA	NA	1.88E-07	4.42E-07	NA	NA	3.75E-07	8.80E-07	NA	NA	1.34E-07	3.15E-07	NA	NA	1.34E-07	3.15E-07	NA	NA	8.31E-07	1.95E-06
Benzo(k)fluoranthene	2.15E+01	1.30E-01	NA	2.35E-01	NA	NA	2.45E-07	5.76E-08	NA	NA	4.88E-07	1.15E-07	NA	NA	1.75E-07	4.10E-08	NA	NA	1.75E-07	4.10E-08	NA	NA	1.08E-06	2.54E-07
Beryllium	1.04E+00	1.00E-03	2.00E-05	4.30E+02	2.13E-09	1.06E-04	9.12E-11	3.92E-08	2.12E-09	1.06E-04	1.82E-10	7.81E-08	3.25E-10	1.62E-05	6.50E-11	2.79E-08	6.50E-10	3.25E-05	6.50E-11	2.79E-08	9.40E-10	4.70E-05	4.03E-10	1.73E-07
Bis(2-chloroisopropyl)ether	NA	1.00E-02	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	1.00E-02	3.80E-03	7.37E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	1.00E-03	1.80E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1.50E-03	1.00E-02	1.96E-02	6.33E-02	3.07E-11	1.57E-09	1.32E-12	8.32E-14	3.06E-11	1.56E-09	2.62E-12	1.66E-13	4.68E-12	2.39E-10	9.37E-13	5.93E-14	9.37E-12	4.78E-10	9.37E-13	5.93E-14	1.36E-11	6.92E-10	5.81E-12	3.68E-13
Bromoform	NA	1.00E-02	1.20E-02	1.32E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	1.00E-02	1.12E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	6.84E-01	1.00E-03	1.00E-05	NA	1.40E-09	1.40E-04	NA	NA	1.39E-09	1.39E-04	NA	NA	2.14E-10	2.14E-05	NA	NA	4.27E-10	4.27E-05	NA	NA	6.18E-10	6.18E-05	NA	NA
Carbazole	NA	1.00E-02	NA	2.86E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	2.50E-01	6.30E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	1.00E-02	4.55E-04	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane	NA	4.00E-02	2.50E-04	7.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	1.00E-02	6.20E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	1.00E-02	2.00E-03	3.05E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (VI)	NA	1.00E-03	6.00E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	2.67E+01	1.30E-01	NA	2.35E-02	NA	NA	3.04E-07	7.15E-09	NA	NA	6.06E-07	1.42E-08	NA	NA	2.17E-07	5.10E-09	NA	NA	2.17E-07	5.10E-09	NA	NA	1.34E-06	3.16E-08
Cobalt	NA	1.00E-03	1.60E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	1.00E-03	1.20E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	1.00E-02	3.40E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexanone	NA	1.00E-02	4.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	8.17E-01	1.30E-01	NA	2.35E+01	NA	NA	9.31E-09	2.19E-07	NA	NA	1.86E-08	4.36E-07	NA	NA	6.63E-09	1.56E-07	NA	NA	6.63E-09	1.56E-07	NA	NA	4.11E-08	9.67E-07
Dieldrin	3.09E-02	1.00E-02	2.50E-05	3.20E+01	6.32E-10	2.53E-05	2.71E-11	8.67E-10	6.30E-10	2.52E-05	5.40E-11	1.73E-09	9.65E-11	3.86E-06	1.93E-11	6.18E-10	1.93E-10	7.72E-06	1.93E-11	6.18E-10	2.79E-10	1.12E-05	1.20E-10	3.83E-09
Di-n-octylphthalate	NA	1.00E-02	3.60E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE E.2
Undeveloped Park User - Zone 6 - DermalSoilChem

Undeveloped Park User - Dermal Contact with Soil/Sediment
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CS*AB*SA*EF*ED*AF*CF)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday				
	CS =	Concentration of chemical in soil	mg/kg	see table of COCs below			
	AB	Absorption factor	–	see table of COCs below			
	SA	Surface area of exposed skin	cm^2/day	2800	4370	5700	5700
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	AF =	Adherence factor	mg/cm^2	0.2	0.2	0.07	0.07
	CF =	Conversion factor	kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	AB	RfDd	CSFd	CHILD				YOUTH				ADULT				SENIOR				SUM			
					CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/kg	unitless	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	NA	1.00E-02	1.60E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	1.00E-02	9.70E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoride	2.47E+00	1.00E-03	5.82E-02	NA	5.05E-09	8.68E-08	NA	NA	5.03E-09	8.65E-08	NA	NA	7.71E-10	1.33E-08	NA	NA	1.54E-09	2.65E-08	NA	NA	2.23E-09	3.84E-08	NA	NA
Heptachlorodibenzofuran	NA	1.00E-02	NA	3.00E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	1.68E-05	3.00E-02	NA	3.00E+03	NA	NA	4.42E-14	1.33E-10	NA	NA	8.81E-14	2.64E-10	NA	NA	3.15E-14	9.46E-11	NA	NA	3.15E-14	9.46E-11	NA	NA	1.95E-13	5.86E-10
Hexachlorodibenzofuran	NA	1.00E-02	NA	3.00E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	3.00E-02	NA	3.00E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.72E+00	1.30E-01	NA	2.35E+00	NA	NA	4.24E-08	9.96E-08	NA	NA	8.45E-08	1.99E-07	NA	NA	3.02E-08	7.10E-08	NA	NA	3.02E-08	7.10E-08	NA	NA	1.87E-07	4.40E-07
Lead	NA	1.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	1.00E-03	5.60E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	1.00E-03	2.10E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methanol	NA	1.00E-02	4.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-2-pentanone	NA	1.00E-02	6.40E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	1.00E-02	5.70E-02	7.89E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	4.89E+00	1.00E-03	1.90E-03	NA	1.00E-08	5.26E-06	NA	NA	9.96E-09	5.24E-06	NA	NA	1.53E-09	8.04E-07	NA	NA	3.05E-09	1.61E-06	NA	NA	4.42E-09	2.33E-06	NA	NA
Nickel	NA	1.00E-03	5.40E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	1.00E-02	5.00E-03	1.96E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodipropylamine	NA	1.00E-02	NA	2.80E+01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	NA	1.00E-02	NA	3.00E+02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	2.59E-04	3.00E-02	NA	3.00E+02	NA	NA	6.82E-13	2.05E-10	NA	NA	1.36E-12	4.07E-10	NA	NA	4.86E-13	1.46E-10	NA	NA	4.86E-13	1.46E-10	NA	NA	3.01E-12	9.03E-10
Pentachlorodibenzofuran	NA	1.00E-02	NA	1.50E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	3.00E-02	NA	1.50E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	2.50E-01	3.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	8.26E+00	1.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	1.00E-03	2.20E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1.48E-01	1.00E-03	9.00E-04	NA	3.03E-10	3.36E-07	NA	NA	3.02E-10	3.35E-07	NA	NA	4.62E-11	5.14E-08	NA	NA	9.24E-11	1.03E-07	NA	NA	1.34E-10	1.49E-07	NA	NA
Tetrachlorodibenzofuran	NA	1.00E-02	NA	3.00E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	3.00E-02	NA	3.00E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	1.50E-03	1.00E-02	1.00E-02	5.40E-01	3.07E-11	3.07E-09	1.32E-12	7.10E-13	3.06E-11	3.06E-09	2.62E-12	1.41E-12	4.68E-12	4.68E-10	9.37E-13	5.06E-13	9.37E-12	9.37E-10	9.37E-13	5.06E-13	1.36E-11	1.36E-09	5.81E-12	3.14E-12
Thallium	NA	1.00E-03	1.80E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	1.00E-02	6.40E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tributyl phosphate	NA	1.00E-02	1.00E-01	1.08E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethylene	1.83E-03	1.00E-02	4.50E-05	2.67E+00	3.74E-11	8.31E-07	1.60E-12	4.28E-12	3.73E-11	8.28E-07	3.19E-12	8.53E-12	5.71E-12	1.27E-07	1.14E-12	3.05E-12	1.14E-11	2.54E-07	1.14E-12	3.05E-12	1.65E-11	3.67E-07	7.08E-12	1.89E-11
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium	3.83E+01	1.00E-03	5.10E-04	NA	7.84E-08	1.54E-04	NA	NA	7.81E-08	1.53E-04	NA	NA	1.20E-08	2.35E-05	NA	NA	2.39E-08	4.69E-05	NA	NA	3.46E-08	6.79E-05	NA	NA
Vanadium	NA	1.00E-03	7.00E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	1.00E-02	3.00E-03	1.50E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes	NA	1.00E-02	1.84E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	1.00E-03	6.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
																					total =	**3.14E-03**	**total =**	**9.21E-06**

TABLE E.2
Undeveloped Park User - Zone 6 - IngestSoilChem

Undeveloped Park User - Ingestion of Soil
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	Assigned Values			
	CDI =	(CS*EF*ED*IR*FI*CF)/(BW*AT)		child	youth	adult	senior
	CDI =	Chronic Daily Intake	mg/kgday				
	CS =	Concentration of chemical in soil	mg/kg	see table of COCs below			
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Ingestion rate	mg/day	200	100	100	100
	FI =	Fraction of contaminated soil	unitless	1	1	1	1
	CF =	Conversion factor	kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	RfDo	CSFo	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/kg	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	3.26E-04	4.00E-03	5.70E-02	2.38E-10	5.96E-08	1.02E-11	5.82E-13	7.60E-11	1.90E-08	6.52E-12	3.71E-13	2.55E-11	6.38E-09	5.11E-12	2.91E-13	5.11E-11	1.28E-08	5.11E-12	2.91E-13	6.29E-11	1.57E-08	2.69E-11	1.54E-12
1,1-Dichloroethylene	1.50E-03	5.00E-02	6.00E-01	1.10E-09	2.19E-08	4.70E-11	2.82E-11	3.50E-10	7.00E-09	3.00E-11	1.80E-11	1.17E-10	2.35E-09	2.35E-11	1.41E-11	2.35E-10	4.70E-09	2.35E-11	1.41E-11	2.89E-10	5.78E-09	1.24E-10	7.43E-11
1,2-dichloroethane	9.80E-04	2.00E-02	9.10E-02	7.16E-10	3.58E-08	3.07E-11	2.79E-12	2.29E-10	1.14E-08	1.96E-11	1.78E-12	7.67E-11	3.84E-09	1.53E-11	1.40E-12	1.53E-10	7.67E-09	1.53E-11	1.40E-12	1.89E-10	9.45E-09	8.10E-11	7.37E-12
2-Butanone	NA	6.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	NA	4.50E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	5.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroanaline	NA	3.00E-03	2.10E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	9.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	6.32E-01	4.00E-04	NA	4.62E-07	1.15E-03	NA	NA	1.47E-07	3.68E-04	NA	NA	4.95E-08	1.24E-04	NA	NA	9.89E-08	2.47E-04	NA	NA	1.22E-07	3.05E-04	NA	NA
Aroclor-1254	3.44E-02	2.00E-05	2.00E+00	2.51E-08	1.26E-03	1.08E-09	2.15E-09	8.02E-09	4.01E-04	6.88E-10	1.38E-09	2.69E-09	1.35E-04	5.39E-10	1.08E-09	5.39E-09	2.69E-04	5.39E-10	1.08E-09	6.63E-09	3.32E-04	2.84E-09	5.68E-09
Aroclor-1260	2.86E-02	2.00E-05	2.00E+00	2.09E-08	1.04E-03	8.95E-10	1.79E-09	6.67E-09	3.33E-04	5.72E-10	1.14E-09	2.24E-09	1.12E-04	4.48E-10	8.95E-10	4.48E-09	2.24E-04	4.48E-10	8.95E-10	5.51E-09	2.76E-04	2.36E-09	4.73E-09
Arsenic	1.10E+01	3.00E-04	1.50E+00	8.04E-06	2.68E-02	3.44E-07	5.17E-07	2.56E-06	8.55E-03	2.20E-07	3.30E-07	8.61E-07	2.87E-03	1.72E-07	2.58E-07	1.72E-06	5.74E-03	1.72E-07	2.58E-07	2.12E-06	7.07E-03	9.09E-07	1.36E-06
Barium	1.84E+02	2.00E-01	NA	1.35E-04	6.73E-04	NA	NA	4.30E-05	2.15E-04	NA	NA	1.44E-05	7.21E-05	NA	NA	2.89E-05	1.44E-04	NA	NA	3.55E-05	1.78E-04	NA	NA
Benzene	NA	4.00E-03	5.50E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	6.54E+00	NA	7.30E-01	NA	NA	2.05E-07	1.49E-07	NA	NA	1.31E-07	9.54E-08	NA	NA	1.02E-07	7.47E-08	NA	NA	1.02E-07	7.47E-08	NA	NA	5.40E-07	3.94E-07
Benzo(a)pyrene	3.50E+00	NA	7.30E+00	NA	NA	1.10E-07	8.00E-07	NA	NA	7.00E-08	5.11E-07	NA	NA	5.48E-08	4.00E-07	NA	NA	5.48E-08	4.00E-07	NA	NA	2.89E-07	2.11E-06
Benzo(b)fluoranthene	1.65E+01	NA	7.30E-01	NA	NA	5.17E-07	3.77E-07	NA	NA	3.30E-07	2.41E-07	NA	NA	2.58E-07	1.89E-07	NA	NA	2.58E-07	1.89E-07	NA	NA	1.36E-06	9.95E-07
Benzo(k)fluoranthene	2.15E+01	NA	7.30E-02	NA	NA	6.73E-07	4.91E-08	NA	NA	4.30E-07	3.14E-08	NA	NA	3.37E-07	2.46E-08	NA	NA	3.37E-07	2.46E-08	NA	NA	1.78E-06	1.30E-07
Beryllium	1.04E+00	2.00E-03	4.30E+00	7.60E-07	3.80E-04	3.26E-08	1.40E-07	2.42E-07	1.21E-04	2.08E-08	8.94E-08	8.14E-08	4.07E-05	1.63E-08	7.00E-08	1.63E-07	8.14E-05	1.63E-08	7.00E-08	2.00E-07	1.00E-04	8.59E-08	3.69E-07
Bis(2-chloroisopropyl)ether	NA	4.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	2.00E-02	1.40E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1.50E-03	2.00E-02	6.20E-02	1.10E-09	5.48E-08	4.70E-11	2.91E-12	3.50E-10	1.75E-08	3.00E-11	1.86E-12	1.17E-10	5.87E-09	2.35E-11	1.46E-12	2.35E-10	1.17E-08	2.35E-11	1.46E-12	2.89E-10	1.45E-08	1.24E-10	7.68E-12
Bromoform	NA	2.00E-02	7.90E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	1.40E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	6.84E-01	1.00E-03	NA	5.00E-07	5.00E-04	NA	NA	1.59E-07	1.59E-04	NA	NA	5.35E-08	5.35E-05	NA	NA	1.07E-07	1.07E-04	NA	NA	1.32E-07	1.32E-04	NA	NA
Carbazole	NA	NA	2.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	1.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	7.00E-04	1.30E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane	NA	5.00E-04	3.50E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	1.00E-02	6.10E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (VI)	NA	3.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	2.67E+01	NA	7.30E-03	NA	NA	8.36E-07	6.10E-09	NA	NA	5.34E-07	3.90E-09	NA	NA	4.18E-07	3.05E-09	NA	NA	4.18E-07	3.05E-09	NA	NA	2.21E-06	1.61E-08
Cobalt	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	4.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexanone	NA	5.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	8.17E-01	NA	7.30E+00	NA	NA	2.56E-08	1.87E-07	NA	NA	1.63E-08	1.19E-07	NA	NA	1.28E-08	9.34E-08	NA	NA	1.28E-08	9.34E-08	NA	NA	6.75E-08	4.93E-07
Dieldrin	3.09E-02	5.00E-05	1.60E+01	2.26E-08	4.52E-04	9.68E-10	1.55E-08	7.20E-09	1.44E-04	6.18E-10	9.88E-09	2.42E-09	4.84E-05	4.84E-10	7.74E-09	4.84E-09	9.68E-05	4.84E-10	7.74E-09	5.96E-09	1.19E-04	2.55E-09	4.08E-08
Di-n-octylphthalate	NA	4.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE E.2
Undeveloped Park User - Zone 6 - IngestSoilChem

Undeveloped Park User - Ingestion of Soil
Risk calculation for A6 under rail trestle

Intake Equation:

		UNITS	Assigned Values			
			child	youth	adult	senior
CDI =	(CS*EF*ED*IR*FI*CF)/(BW*AT)					
CDI =	Chronic Daily Intake	mg/kgday				
CS =	Concentration of chemical in soil	mg/kg	see table of COCs below			
EF =	Exposure frequency	days/yr	20	40	20	40
ED =	Exposure duration	yrs	3	6	14	7
IR =	Ingestion rate	mg/day	200	100	100	100
FI =	Fraction of contaminated soil	unitless	1	1	1	1
CF =	Conversion factor	kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06
BW =	Body weight	kg	15	47	70	70
ATc =	Average time for carcinogens	days	25550	25550	25550	25550
ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	conc	RfDo	CSFo	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/kg	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	NA	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	1.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoride	2.47E+00	6.00E-02	NA	1.80E-06	3.01E-05	NA	NA	5.76E-07	9.60E-06	NA	NA	1.93E-07	3.22E-06	NA	NA	3.87E-07	6.44E-06	NA	NA	4.76E-07	7.93E-06	NA	NA
Heptachlorodibenzofuran	NA	NA	1.50E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	1.68E-05	NA	1.50E+03	NA	NA	5.27E-13	7.90E-10	NA	NA	3.36E-13	5.04E-10	NA	NA	2.63E-13	3.95E-10	NA	NA	2.63E-13	3.95E-10	NA	NA	1.39E-12	2.08E-09
Hexachlorodibenzofuran	NA	NA	1.50E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	NA	1.50E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.72E+00	NA	7.30E-01	NA	NA	1.16E-07	8.50E-08	NA	NA	7.43E-08	5.43E-08	NA	NA	5.82E-08	4.25E-08	NA	NA	5.82E-08	4.25E-08	NA	NA	3.07E-07	2.24E-07
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	1.40E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	3.00E-04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methanol	NA	5.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-2-pentanone	NA	8.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	6.00E-02	7.50E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	4.89E+00	5.00E-03	NA	3.57E-06	7.14E-04	NA	NA	1.14E-06	2.28E-04	NA	NA	3.83E-07	7.66E-05	NA	NA	7.66E-07	1.53E-04	NA	NA	9.43E-07	1.89E-04	NA	NA
Nickel	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	2.00E-02	4.90E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodipropylamine	NA	NA	7.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	NA	NA	1.50E+02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	2.59E-04	NA	1.50E+02	NA	NA	8.12E-12	1.22E-09	NA	NA	5.18E-12	7.77E-10	NA	NA	4.06E-12	6.09E-10	NA	NA	4.06E-12	6.09E-10	NA	NA	2.14E-11	3.21E-09
Pentachlorodibenzofuran	NA	NA	7.50E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	NA	7.50E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	3.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	8.26E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	5.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1.48E-01	5.00E-03	NA	1.08E-07	2.16E-05	NA	NA	3.45E-08	6.90E-06	NA	NA	1.16E-08	2.32E-06	NA	NA	2.32E-08	4.63E-06	NA	NA	2.85E-08	5.71E-06	NA	NA
Tetrachlorodibenzofuran	NA	NA	1.50E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	NA	1.50E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	1.50E-03	1.00E-02	5.40E-01	1.10E-09	1.10E-07	4.70E-11	2.54E-11	3.50E-10	3.50E-08	3.00E-11	1.62E-11	1.17E-10	1.17E-08	2.35E-11	1.27E-11	2.35E-10	2.35E-08	2.35E-11	1.27E-11	2.89E-10	2.89E-08	1.24E-10	6.69E-11
Thallium	NA	9.00E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	8.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tributyl phosphate	NA	2.00E-01	5.40E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethylene	1.83E-03	3.00E-04	4.00E-01	1.34E-09	4.45E-06	5.72E-11	2.29E-11	4.26E-10	1.42E-06	3.65E-11	1.46E-11	1.43E-10	4.77E-07	2.86E-11	1.14E-11	2.86E-10	9.54E-07	2.86E-11	1.14E-11	3.52E-10	1.17E-06	1.51E-10	6.04E-11
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium	3.83E+01	6.00E-04	NA	2.80E-05	4.67E-02	NA	NA	8.93E-06	1.49E-02	NA	NA	3.00E-06	5.00E-03	NA	NA	6.00E-06	1.00E-02	NA	NA	7.39E-06	1.23E-02	NA	NA
Vanadium	NA	7.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	3.00E-03	1.50E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes	NA	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	3.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
																				total =	2.10E-02	total =	6.15E-06

TABLE E.2
Undeveloped Park User • Zone 6 • DermalSWchem

Undeveloped Park User • Dermal Contact with Surface Water
Risk calculation for A6 under rail trestle

			UNITS	Assigned Values: child	youth	adult	senior
Intake Equation:	CDI =	(DA*EF*ED*SA)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday	calculated below			
	DA =	Dermal absorption dose	mg/cm²day	see COC list below			
	EF =	Exposure frequency	days/yr	12	12	12	12
	ED =	Exposure duration	yrs	3	6	14	7
	SA =	Surface area of skin	cm²	2180	4470	6070	6070
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555
where:	DA = C_v*K_p*CF*ET						
	C_v =	concentation of ith contaminant in surface water	mg/L	see COC list below			
	K_p =	permeability constant for ith contaminant	cm/hr	see COC list below			
	CF =	conversion factor	L/cm³	0.001	0.001	0.001	0.001
	ET =	exposure time	hr/d	1	1	1	1

COC	C_v	K_p	DA	RfDd	CSFd	CHILD CDI	CHILD HQ	CHILD CDI	CHILD ILCR	YOUTH CDI	YOUTH HQ	YOUTH CDI	YOUTH ILCR
	mg/L	cm/hr	mg/cm²day	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	0.00E+00	6.43E-03	0.00E+00	3.24E-03	7.04E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,1-Dichloroethylene	5.00E-04	1.59E-02	7.95E-09	5.00E-02	6.00E-01	3.80E-08	7.60E-07	1.63E-09	9.77E-10	2.49E-08	4.97E-07	2.13E-09	1.28E-09
1,2-dichloroethane	5.00E-04	5.34E-03	2.67E-09	2.00E-02	9.10E-02	1.28E-08	6.38E-07	5.47E-10	4.98E-11	8.35E-09	4.17E-07	7.16E-10	6.51E-11
2-Butanone	NA	1.11E-03	NA	4.80E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	1.69E-02	NA	NA	9.00E-01	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	9.95E-03	NA	3.25E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroanaline	NA	2.66E-03	NA	2.40E-03	2.63E-02	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	5.69E-04	NA	7.47E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	5.00E-04	1.00E-03	5.00E-10	8.00E-06	NA	2.39E-09	2.99E-04	NA	NA	1.56E-09	1.95E-04	NA	NA
Aroclor-1254	5.00E-05	1.29E+00	6.45E-08	1.80E-05	2.22E+00	3.08E-07	1.71E-02	1.32E-08	2.93E-08	2.02E-07	1.12E-02	1.73E-08	3.84E-08
Aroclor-1260	5.00E-05	5.48E+00	2.74E-07	1.80E-05	2.22E+00	1.31E-06	7.27E-02	5.61E-08	1.25E-07	8.57E-07	4.76E-02	7.34E-08	1.63E-07
Arsenic	5.76E-03	1.00E-03	5.76E-09	1.23E-04	3.66E+00	2.75E-08	2.24E-04	1.18E-09	4.32E-09	1.80E-08	1.46E-04	1.54E-09	5.65E-09
Barium	6.90E-02	1.00E-03	6.90E-08	1.40E-02	NA	3.29E-07	2.35E-05	NA	NA	2.16E-07	1.54E-05	NA	NA
Benzene	NA	2.07E-02	NA	3.88E-03	5.67E-02	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	5.00E-04	9.48E-01	4.74E-07	NA	2.35E+00	NA	NA	9.71E-08	2.28E-07	NA	NA	1.27E-07	2.99E-07
Benzo(a)pyrene	5.00E-04	1.24E+00	6.20E-07	NA	2.35E+01	NA	NA	1.27E-07	2.98E-06	NA	NA	1.66E-07	3.90E-06
Benzo(b)fluoranthene	0.00E+00	6.99E-01	0.00E+00	NA	2.35E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	1.20E+00	0.00E+00	NA	2.35E-01	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Beryllium	1.94E-04	1.00E-03	1.94E-10	2.00E-05	4.30E+02	9.26E-10	4.63E-05	3.97E-11	1.71E-08	6.06E-10	3.03E-05	5.19E-11	2.23E-08
Bis(2-chloroisopropyl)ether	NA	7.63E-02	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	1.97E+00	NA	3.80E-03	7.37E-02	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	1.00E-03	NA	1.80E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	5.00E-04	5.02E-03	2.51E-09	1.96E-02	6.33E-02	1.20E-08	6.12E-07	5.14E-10	3.25E-11	7.85E-09	4.00E-07	6.73E-10	4.26E-11
Bromoform	NA	2.77E-03	NA	1.20E-02	1.32E-02	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	3.51E-03	NA	1.12E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.08E-04	1.00E-03	1.08E-10	1.00E-05	NA	5.14E-10	5.14E-05	NA	NA	3.36E-10	3.36E-05	NA	NA
Carbazole	NA	7.97E-02	NA	NA	2.86E-02	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	1.56E-02	NA	6.30E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	2.24E-02	NA	4.55E-04	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane	NA	1.57E-01	NA	2.50E-04	7.00E-01	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	4.07E-02	NA	6.20E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	8.92E-03	NA	2.00E-03	3.05E-02	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (VI)	NA	2.00E-03	NA	6.00E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.00E+00	1.03E+00	0.00E+00	NA	2.35E-02	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Cobalt	NA	4.00E-04	NA	1.60E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	1.00E-03	NA	1.20E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	1.00E-03	NA	3.40E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexanone	NA	1.80E-03	NA	4.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	5.00E-04	1.68E+00	8.40E-07	NA	2.35E+01	NA	NA	1.72E-07	4.04E-06	NA	NA	2.25E-07	5.29E-06
Dieldrin	2.00E-05	4.45E-02	8.90E-10	2.50E-05	3.20E+01	4.25E-09	1.70E-04	1.82E-10	5.83E-09	2.78E-09	1.11E-04	2.39E-10	7.63E-09
Di-n-octylphthalate	NA	4.45E+00	NA	3.60E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA

COC	ADULT CDI	ADULT HQ	ADULT CDI	ADULT ILCR	SENIOR CDI	SENIOR HQ	SENIOR CDI	SENIOR ILCR	SUM CDI	SUM HQ	SUM CDI	SUM ILCR
	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,1-Dichloroethylene	2.27E-08	4.53E-07	4.53E-09	2.72E-09	2.27E-08	4.53E-07	2.27E-09	1.36E-09	2.46E-08	4.93E-07	1.06E-08	6.33E-09
1,2-dichloroethane	7.61E-09	3.81E-07	1.52E-09	1.39E-10	7.61E-09	3.81E-07	7.61E-10	6.93E-11	8.27E-09	4.14E-07	3.55E-09	3.23E-10
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroanaline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	1.43E-09	1.78E-04	NA	NA	1.43E-09	1.78E-04	NA	NA	1.55E-09	1.94E-04	NA	NA
Aroclor-1254	1.84E-07	1.02E-02	3.68E-08	8.16E-08	1.84E-07	1.02E-02	1.84E-08	4.08E-08	2.00E-07	1.11E-02	8.57E-08	1.90E-07
Aroclor-1260	7.81E-07	4.34E-02	1.56E-07	3.47E-07	7.81E-07	4.34E-02	7.81E-08	1.73E-07	8.49E-07	4.72E-02	3.64E-07	8.08E-07
Arsenic	1.64E-08	1.34E-04	3.29E-09	1.20E-08	1.64E-08	1.34E-04	1.64E-09	6.01E-09	1.79E-08	1.45E-04	7.65E-09	2.80E-08
Barium	1.97E-07	1.40E-05	NA	NA	1.97E-07	1.40E-05	NA	NA	2.14E-07	1.53E-05	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	2.70E-07	6.35E-07	NA	NA	1.35E-07	3.18E-07	NA	NA	6.29E-07	1.48E-06
Benzo(a)pyrene	NA	NA	3.54E-07	8.31E-06	NA	NA	1.77E-07	4.15E-06	NA	NA	8.23E-07	1.93E-05
Benzo(b)fluoranthene	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Benzo(k)fluoranthene	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Beryllium	5.52E-10	2.76E-05	1.10E-10	4.75E-08	5.52E-10	2.76E-05	5.52E-11	2.38E-08	6.00E-10	3.00E-05	2.57E-10	1.11E-07
Bis(2-chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	7.16E-09	3.65E-07	1.43E-09	9.06E-11	7.16E-09	3.65E-07	7.16E-10	4.53E-11	7.78E-09	3.97E-07	3.33E-09	2.11E-10
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	3.06E-10	3.06E-05	NA	NA	3.06E-10	3.06E-05	NA	NA	3.33E-10	3.33E-05	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (VI)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	4.79E-07	1.13E-05	NA	NA	2.39E-07	5.63E-06	NA	NA	1.12E-06	2.62E-05
Dieldrin	2.54E-09	1.01E-04	5.07E-10	1.62E-08	2.54E-09	1.01E-04	2.54E-10	8.12E-09	2.76E-09	1.10E-04	1.18E-09	3.78E-08
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE E.2
Undeveloped Park User - Zone 6 - DermalSWchem

Undeveloped Park User - Dermal Contact with Surface Water
Risk calculation for A6 under rail trestle

			UNITS	Assigned Values child	youth	adult	senior
Intake Equation:	CDI =	(DA*EF*ED*SA)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday	calculated below			
	DA =	Dermal absorption dose	mg/cm²day	see COC list below			
	EF =	Exposure frequency	days/yr	12	12	12	12
	ED =	Exposure duration	yrs	3	6	14	7
	SA =	Surface area of skin	cm²	2180	4470	6070	6070
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555
where:	DA = C_v*K_p*CF*ET						
	C_v =	concentation of ith contaminant in surface water	mg/L	see COC list below			
	K_p =	permeability constant for ith contaminant	cm/hr	see COC list below			
	CF =	conversion factor	L/cm³	0.001	0.001	0.001	0.001
	ET =	exposure time	hr/d	1	1	1	1

COC	C_v	K_p	DA	RfDd	CSFd	CHILD CDI	CHILD HQ	CHILD CDI	CHILD ILCR	YOUTH CDI	YOUTH HQ	YOUTH CDI	YOUTH ILCR	ADULT CDI	ADULT HQ	ADULT CDI	ADULT ILCR	SENIOR CDI	SENIOR HQ	SENIOR CDI	SENIOR ILCR	SUM CDI	SUM HQ	SUM CDI	SUM ILCR
	mg/L	cm/hr	mg/cm²day	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	NA	2.88E-03	NA	1.60E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	7.39E-02	NA	9.70E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoride	4.73E-01	1.00E-03	4.73E-07	5.82E-02	NA	2.26E-06	3.88E-05	NA	NA	1.48E-06	2.54E-05	NA	NA	1.35E-06	2.31E-05	NA	NA	1.35E-06	2.31E-05	NA	NA	1.46E-06	2.52E-05	NA	NA
Heptachlorodibenzofuran	NA	2.55E+00	NA	NA	3.00E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	0.00E+00	3.22E+00	0.00E+00	NA	3.00E+03	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Hexachlorodibenzofuran	NA	2.38E+00	NA	NA	3.00E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	5.29E+00	NA	NA	3.00E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.00E+00	2.23E+00	0.00E+00	NA	2.35E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Lead	NA	1.00E-04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	1.00E-03	NA	1.84E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	1.00E-03	NA	2.10E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methanol	NA	3.45E-04	NA	4.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	3.97E-03	NA	6.40E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	4.46E-03	NA	5.70E-02	7.89E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	6.99E-03	1.00E-03	6.99E-09	1.90E-03	NA	3.34E-08	1.76E-05	NA	NA	2.18E-08	1.15E-05	NA	NA	1.99E-08	1.05E-05	NA	NA	1.99E-08	1.05E-05	NA	NA	2.17E-08	1.14E-05	NA	NA
Nickel	NA	2.00E-04	NA	5.40E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	1.96E-02	NA	5.00E-03	1.96E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodipropylamine	NA	2.83E-03	NA	NA	2.80E+01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	NA	4.78E+00	NA	NA	3.00E+02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	0.00E+00	1.65E+01	0.00E+00	NA	3.00E+02	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Pentachlorodibenzofuran	NA	1.06E+00	NA	NA	1.50E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	3.79E-01	NA	NA	1.50E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	1.95E-01	NA	3.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.00E+00	2.29E-01	0.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	1.00E-03	NA	2.20E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	2.00E-04	6.00E-04	1.20E-10	9.00E-04	NA	5.73E-10	6.37E-07	NA	NA	3.75E-10	4.17E-07	NA	NA	3.42E-10	3.80E-07	NA	NA	3.42E-10	3.80E-07	NA	NA	3.72E-10	4.13E-07	NA	NA
Tetrachlorodibenzofuran	NA	1.12E+00	NA	NA	3.00E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	1.39E+00	NA	NA	3.00E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	5.00E-04	4.81E-02	2.41E-08	1.00E-02	5.40E-01	1.15E-07	1.15E-05	4.92E-09	2.66E-09	7.52E-08	7.52E-06	6.45E-09	3.48E-09	6.86E-08	6.86E-06	1.37E-08	7.40E-09	6.86E-08	6.86E-06	6.86E-09	3.70E-09	7.45E-08	7.45E-06	3.19E-08	1.72E-08
Thallium	NA	1.00E-03	NA	1.80E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	4.53E-02	NA	6.40E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tributyl phosphate	NA	3.13E-02	NA	1.00E-01	1.08E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.00E-04	1.57E-02	7.85E-09	4.50E-05	2.67E+00	3.75E-08	8.34E-04	1.61E-09	4.29E-09	2.45E-08	5.45E-04	2.10E-09	5.62E-09	2.24E-08	4.97E-04	4.48E-09	1.20E-08	2.24E-08	4.97E-04	2.24E-09	5.98E-09	2.43E-08	5.41E-04	1.04E-08	2.78E-08
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium	2.42E-02	1.00E-03	2.42E-08	5.10E-04	NA	1.15E-07	2.26E-04	NA	NA	7.56E-08	1.48E-04	NA	NA	6.89E-08	1.35E-04	NA	NA	6.89E-08	1.35E-04	NA	NA	7.49E-08	1.47E-04	NA	NA
Vanadium	NA	1.00E-03	NA	7.00E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	1.13E-02	NA	3.00E-03	1.50E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes	NA	7.04E-02	NA	1.84E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	6.00E-04	NA	6.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
																						total =	5.95E-02	total =	4.83E-05

TABLE E.2
Undeveloped Park User - Zone 6 - IngestSWchem

Undeveloped Park User - Ingestion of Surface Water
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CW*EF*ED*IR)/(BW*AT)	mg/kgday				
	CDI =	Chronic Daily Intake	mg/kgday				
	CW =	Concentration of chemical in water	mg/L	see COC table below			
	EF =	Exposure frequency	days/yr	12	12	12	12
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Ingestion rate	L/day	0.035	0.035	0.015	0.015
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	CW	RfDo	CSFo	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/L	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
1,1,2-Trichloroethane	0.00E+00	4.00E-03	5.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,1-Dichloroethylene	5.00E-04	5.00E-02	6.00E-01	3.84E-08	7.67E-07	1.64E-09	9.86E-10	1.22E-08	2.45E-07	1.05E-09	6.30E-10	3.52E-09	7.05E-08	7.05E-10	4.23E-10	3.52E-09	7.05E-08	3.52E-10	2.11E-10	8.75E-09	1.75E-07	3.75E-09	2.25E-09
1,2-dichloroethane	5.00E-04	2.00E-02	9.10E-02	3.84E-08	1.92E-06	1.64E-09	1.50E-10	1.22E-08	6.12E-07	1.05E-09	9.55E-11	3.52E-09	1.76E-07	7.05E-10	6.41E-11	3.52E-09	1.76E-07	3.52E-10	3.21E-11	8.75E-09	4.37E-07	3.75E-09	3.41E-10
2-Butanone	NA	6.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3-Dichlorobenzidine	NA	NA	4.50E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	5.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroanaline	NA	3.00E-03	2.10E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	9.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	5.00E-04	4.00E-04	NA	3.84E-08	9.59E-05	NA	NA	1.22E-08	3.06E-05	NA	NA	3.52E-09	8.81E-06	NA	NA	3.52E-09	8.81E-06	NA	NA	8.75E-09	2.19E-05	NA	NA
Aroclor-1254	5.00E-05	2.00E-05	4.00E-01	3.84E-09	1.92E-04	1.64E-10	6.58E-11	1.22E-09	6.12E-05	1.05E-10	4.20E-11	3.52E-10	1.76E-05	7.05E-11	2.82E-11	3.52E-10	1.76E-05	3.52E-11	1.41E-11	8.75E-10	4.37E-05	3.75E-10	1.50E-10
Aroclor-1260	5.00E-05	2.00E-05	4.00E-01	3.84E-09	1.92E-04	1.64E-10	6.58E-11	1.22E-09	6.12E-05	1.05E-10	4.20E-11	3.52E-10	1.76E-05	7.05E-11	2.82E-11	3.52E-10	1.76E-05	3.52E-11	1.41E-11	8.75E-10	4.37E-05	3.75E-10	1.50E-10
Arsenic	5.76E-03	3.00E-04	1.50E+00	4.42E-07	1.47E-03	1.89E-08	2.84E-08	1.41E-07	4.70E-04	1.21E-08	1.81E-08	4.06E-08	1.35E-04	8.12E-09	1.22E-08	4.06E-08	1.35E-04	4.06E-09	6.09E-09	1.01E-07	3.36E-04	4.32E-08	6.48E-08
Barium	6.90E-02	2.00E-01	NA	5.29E-06	2.64E-05	NA	NA	1.69E-06	8.44E-06	NA	NA	4.86E-07	2.43E-06	NA	NA	4.86E-07	2.43E-06	NA	NA	1.21E-06	6.03E-06	NA	NA
Benzene	NA	4.00E-03	5.50E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	5.00E-04	NA	7.30E-01	NA	NA	1.64E-09	1.20E-09	NA	NA	1.05E-09	7.66E-10	NA	NA	7.05E-10	5.14E-10	NA	NA	3.52E-10	2.57E-10	NA	NA	3.75E-09	2.74E-09
Benzo(a)pyrene	5.00E-04	NA	7.30E+00	NA	NA	1.64E-09	1.20E-08	NA	NA	1.05E-09	7.66E-09	NA	NA	7.05E-10	5.14E-09	NA	NA	3.52E-10	2.57E-09	NA	NA	3.75E-09	2.74E-08
Benzo(b)fluoranthene	0.00E+00	NA	7.30E-01	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	NA	7.30E-02	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Beryllium	1.94E-04	2.00E-03	4.30E+00	1.49E-08	7.43E-06	6.37E-10	2.74E-09	4.74E-09	2.37E-06	4.07E-10	1.75E-09	1.36E-09	6.82E-07	2.73E-10	1.17E-09	1.36E-09	6.82E-07	1.36E-10	5.87E-10	3.39E-09	1.70E-06	1.45E-09	6.25E-09
Bis(2-chloroisopropyl)ether	NA	4.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	2.00E-02	1.40E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	5.00E-04	2.00E-02	6.20E-02	3.84E-08	1.92E-06	1.64E-09	1.02E-10	1.22E-08	6.12E-07	1.05E-09	6.51E-11	3.52E-09	1.76E-07	7.05E-10	4.37E-11	3.52E-09	1.76E-07	3.52E-10	2.18E-11	8.75E-09	4.37E-07	3.75E-09	2.32E-10
Bromoform	NA	2.00E-02	7.90E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	1.40E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.08E-04	1.00E-03	NA	8.25E-09	8.25E-06	NA	NA	2.63E-09	2.63E-06	NA	NA	7.57E-10	7.57E-07	NA	NA	7.57E-10	7.57E-07	NA	NA	1.88E-09	1.88E-06	NA	NA
Carbazole	NA	NA	2.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	1.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	7.00E-04	1.30E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane	NA	5.00E-04	3.50E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	1.00E-02	6.10E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (VI)	NA	3.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.00E+00	NA	7.30E-03	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Cobalt	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	4.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexanone	NA	5.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	5.00E-04	NA	7.30E+00	NA	NA	1.64E-09	1.20E-08	NA	NA	1.05E-09	7.66E-09	NA	NA	7.05E-10	5.14E-09	NA	NA	3.52E-10	2.57E-09	NA	NA	3.75E-09	2.74E-08
Dieldrin	2.00E-05	5.00E-05	1.60E+01	1.53E-09	3.07E-05	6.58E-11	1.05E-09	4.90E-10	9.79E-06	4.20E-11	6.72E-10	1.41E-10	2.82E-06	2.82E-11	4.51E-10	1.41E-10	2.82E-06	1.41E-11	2.25E-10	3.50E-10	7.00E-06	1.50E-10	2.40E-09
Di-n-octylphthalate	NA	4.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE E.2
Undeveloped Park User - Zone 6 - IngestSWchem

Undeveloped Park User - Ingestion of Surface Water
Risk calculation for A6 under rail trestle

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CW*EF*ED*IR)/(BW*AT)					
	CDI =	Chronic Daily Intake	mg/kgday				
	CW =	Concentration of chemical in water	mg/L	see COC table below			
	EF =	Exposure frequency	days/yr	12	12	12	12
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Ingestion rate	L/day	0.035	0.035	0.015	0.015
	BW =	Body weight	kg	15	47	70	70
	ATc =	Average time for carcinogens	days	25550	25550	25550	25550
	ATn =	Average time for non-carcinogens	days	1095	2190	5110	2555

COC	CW	RfDo	CSFo	CHILD				YOUTH				ADULT				SENIOR				SUM			
				CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR	CDI	HQ	CDI	ILCR
	mg/L	mg/kgday	kgday/mg	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF	mg/kgday	CDI/RfD	mg/kgday	CDI*CSF
Ethyl ether	NA	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	1.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoride	4.73E-01	6.00E-02	NA	3.62E-05	6.04E-04	NA	NA	1.16E-05	1.93E-04	NA	NA	3.33E-06	5.55E-05	NA	NA	3.33E-06	5.55E-05	NA	NA	8.27E-06	1.38E-04	NA	NA
Heptachlorodibenzofuran	NA	NA	1.50E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	0.00E+00	NA	1.50E+03	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Hexachlorodibenzofuran	NA	NA	1.50E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzo-p-dioxin	NA	NA	1.50E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.00E+00	NA	7.30E-01	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	4.60E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	3.00E-04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methanol	NA	5.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	8.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	6.00E-02	7.50E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	6.99E-03	5.00E-03	NA	5.36E-07	1.07E-04	NA	NA	1.71E-07	3.42E-05	NA	NA	4.92E-08	9.85E-06	NA	NA	4.92E-08	9.85E-06	NA	NA	1.22E-07	2.45E-05	NA	NA
Nickel	NA	2.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodiphenylamine	NA	2.00E-02	4.90E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-nitrosodipropylamine	NA	NA	7.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	NA	NA	1.50E+02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octochlorodibenzo-p-dioxin	0.00E+00	NA	1.50E+02	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00
Pentachlorodibenzofuran	NA	NA	7.50E+03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	NA	NA	7.50E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	3.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	5.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	2.00E-04	5.00E-03	NA	1.53E-08	3.07E-06	NA	NA	4.90E-09	9.79E-07	NA	NA	1.41E-09	2.82E-07	NA	NA	1.41E-09	2.82E-07	NA	NA	3.50E-09	7.00E-07	NA	NA
Tetrachlorodibenzofuran	NA	NA	1.50E+04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	NA	1.50E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	5.00E-04	1.00E-02	5.40E-01	3.84E-08	3.84E-06	1.64E-09	8.88E-10	1.22E-08	1.22E-06	1.05E-09	5.67E-10	3.52E-09	3.52E-07	7.05E-10	3.80E-10	3.52E-09	3.52E-07	3.52E-10	1.90E-10	8.75E-09	8.75E-07	3.75E-09	2.02E-09
Thallium	NA	9.00E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	8.00E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tributyl phosphate	NA	2.00E-01	5.40E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.00E-04	3.00E-04	4.00E-01	3.84E-08	1.28E-04	1.64E-09	6.58E-10	1.22E-08	4.08E-05	1.05E-09	4.20E-10	3.52E-09	1.17E-05	7.05E-10	2.82E-10	3.52E-09	1.17E-05	3.52E-10	1.41E-10	8.75E-09	2.92E-05	3.75E-09	1.50E-09
Trifluorochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium	2.42E-02	6.00E-04	NA	1.85E-06	3.09E-03	NA	NA	5.92E-07	9.86E-04	NA	NA	1.70E-07	2.84E-04	NA	NA	1.70E-07	2.84E-04	NA	NA	4.23E-07	7.05E-04	NA	NA
Vanadium	NA	7.00E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	3.00E-03	1.50E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes	NA	2.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	3.00E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
																				total =	1.36E-03	total =	1.38E-07

TABLE E.2
Undeveloped Park User - Zone 6 - InhaleRad

Undeveloped Park User - Inhalation of Gases & Particulates
Risk calculation for A6 under rail trestle - increment above background

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

COC	conc	CSFi	CHILD		YOUTH		ADULT		SENIOR		SUM	
			CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR
	pCi/m^3	1/pCi	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF
Cesium-137 + D	5.67E-06	1.19E-11	6.80E-04	8.09E-15	2.72E-03	3.24E-14	3.17E-03	3.78E-14	3.17E-03	3.78E-14	9.75E-03	1.16E-13
Lead-210 + D	NA	1.39E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Neptunium-237 + D	NA	1.77E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plutonium-238	NA	3.36E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plutonium-239/240	NA	3.33E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226 + D	0.00E+00	1.16E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radium-228 + D	0.00E+00	5.23E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radon-222+ D	0.00E+00	1.80E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Strontium-90 + D	NA	1.13E-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Technetium-99	2.12E-04	1.41E-11	2.55E-02	3.59E-13	1.02E-01	1.44E-12	1.19E-01	1.68E-12	1.19E-01	1.68E-12	3.65E-01	5.15E-12
Thorium-228 + D	0.00E+00	1.43E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thorium-230	2.86E-05	2.85E-08	3.43E-03	9.78E-11	1.37E-02	3.91E-10	1.60E-02	4.56E-10	1.60E-02	4.56E-10	4.92E-02	1.40E-09
Thorium-232	0.00E+00	4.33E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Uranium-234	5.70E-05	1.14E-08	6.84E-03	7.80E-11	2.74E-02	3.12E-10	3.19E-02	3.64E-10	3.19E-02	3.64E-10	9.81E-02	1.12E-09
Uranium-235 + D	2.60E-06	1.01E-08	3.12E-04	3.15E-12	1.25E-03	1.26E-11	1.46E-03	1.47E-11	1.46E-03	1.47E-11	4.48E-03	4.52E-11
Uranium-238 + D	5.59E-05	9.35E-09	6.71E-03	6.27E-11	2.68E-02	2.51E-10	3.13E-02	2.93E-10	3.13E-02	2.93E-10	9.61E-02	8.99E-10
											total =	**3.47E-09**

Air concentration is derived using an air particulate value of 26 ug/m^3 (2005 SER background average from monitor AMS-12) multiplied by the soil concentration.

Rn-222 is derived by multiplying the soil Ra-226 value by 256 g/m^3. This conversion factor is based on Rn-222 air background and Ra-226 soil background (i.e., 400 pCi/m^3 divided by 1.56 pCi/g)

TABLE E.2
Undeveloped Park User - Zone 6 - IngestSoilRad

Undeveloped Park User - Ingestion of Soil
Risk calculation for A6 under rail trestle - increment above background

Intake Equation:			UNITS	Assigned Values			
	CDI =	(CS*EF*ED*IR*FI)					
	CDI =	Chronic Daily Intake	pCi	child	youth	adult	senior
	CS =	Concentration of radionuclide in soil	pCi/g	see table of COCs below			
	EF =	Exposure frequency	days/yr	20	40	20	40
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Ingestion rate	g/day	0.2	0.1	0.1	0.1
	FI =	Fraction of contaminated soil	unitless	1	1	1	1

COC	conc	CSFos	CHILD		YOUTH		ADULT		SENIOR		SUM	
			CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR
	pCi/g	1/pCi	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF
Cesium-137 + D	2.18E-01	4.33E-11	2.62E+00	1.13E-10	5.23E+00	2.27E-10	6.10E+00	2.64E-10	6.10E+00	2.64E-10	2.01E+01	8.68E-10
Lead-210 + D	NA	2.66E-09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Neptunium-237 + D	NA	1.62E-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plutonium-238	NA	2.72E-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plutonium-239/240	NA	2.76E-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226 + D	0.00E+00	7.30E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radium-228 + D	0.00E+00	2.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radon-222+ D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium-90 + D	NA	1.44E-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Technetium-99	8.16E+00	7.66E-12	9.79E+01	7.50E-10	1.96E+02	1.50E-09	2.28E+02	1.75E-09	2.28E+02	1.75E-09	7.51E+02	5.75E-09
Thorium-228 + D	0.00E+00	8.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thorium-230	1.10E+00	2.02E-10	1.32E+01	2.67E-09	2.64E+01	5.33E-09	3.08E+01	6.22E-09	3.08E+01	6.22E-09	1.01E+02	2.04E-08
Thorium-232	0.00E+00	2.31E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Uranium-234	2.19E+00	1.58E-10	2.63E+01	4.16E-09	5.26E+01	8.32E-09	6.14E+01	9.70E-09	6.14E+01	9.70E-09	2.02E+02	3.19E-08
Uranium-235 + D	1.00E-01	1.63E-10	1.20E+00	1.96E-10	2.40E+00	3.92E-10	2.80E+00	4.57E-10	2.80E+00	4.57E-10	9.21E+00	1.50E-09
Uranium-238 + D	2.15E+00	2.10E-10	2.58E+01	5.42E-09	5.16E+01	1.08E-08	6.02E+01	1.26E-08	6.02E+01	1.26E-08	1.98E+02	4.15E-08
											total =	**1.02E-07**

TABLE E.2
Undeveloped Park User - Zone 6 - IngestSWrad

Undeveloped Park User - Ingestion of Surface Water
Risk calculation for A6 under rail trestle - increment above background

Intake Equation:			UNITS	Assigned Values			
				child	youth	adult	senior
	CDI =	(CW*EF*ED*IR)/(BW*AT)					
	CDI =	Chronic Daily Intake	pCi				
	CW =	Concentration of radionuclide in water	pCi/L	see COC table below			
	EF =	Exposure frequency	days/yr	12	12	12	12
	ED =	Exposure duration	yrs	3	6	14	7
	IR =	Ingestion rate	L/day	0.035	0.035	0.015	0.015

COC	conc	CSF	CHILD		YOUTH		ADULT		SENIOR		SUM	
			CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR
	pCi/L	1/pCi	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF	pCi	CDI*CSF
Cesium-137 + D	3.00E-01	3.04E-11	3.78E-01	1.15E-11	7.56E-01	2.30E-11	7.56E-01	2.30E-11	3.78E-01	1.15E-11	2.27E+00	6.89E-11
Lead-210 + D	NA	1.27E-09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Neptunium-237 + D	NA	6.74E-11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plutonium-238	NA	1.31E-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plutonium-239/240	NA	1.35E-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226 + D	2.63E-01	3.86E-10	3.31E-01	1.28E-10	6.63E-01	2.56E-10	6.63E-01	2.56E-10	3.31E-01	1.28E-10	1.99E+00	7.67E-10
Radium-228 + D	7.50E-01	1.04E-09	9.45E-01	9.83E-10	1.89E+00	1.97E-09	1.89E+00	1.97E-09	9.45E-01	9.83E-10	5.67E+00	5.90E-09
Radon-222+ D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium-90 + D	NA	7.40E-11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Technetium-99	6.30E+00	2.75E-12	7.94E+00	2.18E-11	1.59E+01	4.37E-11	1.59E+01	4.37E-11	7.94E+00	2.18E-11	4.76E+01	1.31E-10
Thorium-228 + D	6.80E-01	3.00E-10	8.57E-01	2.57E-10	1.71E+00	5.14E-10	1.71E+00	5.14E-10	8.57E-01	2.57E-10	5.14E+00	1.54E-09
Thorium-230	9.36E-02	9.10E-11	1.18E-01	1.07E-11	2.36E-01	2.15E-11	2.36E-01	2.15E-11	1.18E-01	1.07E-11	7.08E-01	6.44E-11
Thorium-232	7.50E-01	1.01E-10	9.45E-01	9.54E-11	1.89E+00	1.91E-10	1.89E+00	1.91E-10	9.45E-01	9.54E-11	5.67E+00	5.73E-10
Uranium-234	7.67E+00	7.07E-11	9.66E+00	6.83E-10	1.93E+01	1.37E-09	1.93E+01	1.37E-09	9.66E+00	6.83E-10	5.80E+01	4.10E-09
Uranium-235 + D	3.50E-01	7.18E-11	4.40E-01	3.16E-11	8.81E-01	6.32E-11	8.81E-01	6.32E-11	4.40E-01	3.16E-11	2.64E+00	1.90E-10
Uranium-238 + D	7.49E+00	8.71E-11	9.44E+00	8.22E-10	1.89E+01	1.64E-09	1.89E+01	1.64E-09	9.44E+00	8.22E-10	5.66E+01	4.93E-09
											total =	**1.83E-08**

TABLE E.2
Undeveloped Park User - Zone 6 - ExternalRad

Undeveloped Park User - External Radiation
Risk calculation for A6 under rail trestle - increment above background

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

COC	conc	CSFx	CHILD		YOUTH		ADULT		SENIOR		SUM	
			CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR	CDI	ILCR
	pCi/g	g/pCi yr	yr pCi/g	CDI*CSF	yr pCi/g	CDI*CSF	yr pCi/g	CDI*CSF	yr pCi/g	CDI*CSF	yr pCi/g	CDI*CSF
Cesium-137 + D	2.18E-01	2.55E-06	2.24E-03	5.71E-09	8.96E-03	2.28E-08	1.05E-02	2.67E-08	1.05E-02	2.67E-08	3.21E-02	8.19E-08
Lead-210 + D	NA	4.21E-09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Neptunium-237 + D	NA	7.97E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plutonium-238	NA	7.22E-11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plutonium-239/240	NA	2.00E-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226 + D	0.00E+00	8.49E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radium-228 + D	0.00E+00	4.53E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radon-222+ D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium-90 + D	NA	1.96E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Technetium-99	8.16E+00	8.14E-11	8.38E-02	6.82E-12	3.35E-01	2.73E-11	3.91E-01	3.18E-11	3.91E-01	3.18E-11	1.20E+00	9.78E-11
Thorium-228 + D	0.00E+00	7.76E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thorium-230	1.10E+00	8.19E-10	1.13E-02	9.26E-12	4.52E-02	3.70E-11	5.27E-02	4.32E-11	5.27E-02	4.32E-11	1.62E-01	1.33E-10
Thorium-232	0.00E+00	3.42E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Uranium-234	2.19E+00	2.52E-10	2.25E-02	5.68E-12	9.02E-02	2.27E-11	1.05E-01	2.65E-11	1.05E-01	2.65E-11	3.23E-01	8.14E-11
Uranium-235 + D	1.00E-01	5.43E-07	1.03E-03	5.58E-10	4.11E-03	2.23E-09	4.80E-03	2.61E-09	4.80E-03	2.61E-09	1.47E-02	8.00E-09
Uranium-238 + D	2.15E+00	1.14E-07	2.21E-02	2.52E-09	8.84E-02	1.01E-08	1.03E-01	1.18E-08	1.03E-01	1.18E-08	3.17E-01	3.61E-08
											total =	**1.26E-07**

TABLE E.2
Undeveloped Park User - Zone 6 - SumPaths

Undeveloped Park User - Summation of all Pathways
Risk calculation for A6 under rail trestle

	HQ	ILCR	rad only ILCR	increment above background
Inhale	1.20E-04	1.18E-08	3.47E-09	
Dermal Soil	3.14E-03	9.21E-06	NA	
Ingest Soil	2.10E-02	6.25E-06	1.02E-07	
Dermal Surface Water	5.95E-02	4.83E-05	NA	
Ingest Surface Water	1.36E-03	1.38E-07	1.83E-08	
External Radiation	NA	1.45E-07	1.26E-07	
SUM	**8.52E-02**	**6.40E-05**	**2.50E-07**	

Summation of all paths for individual nuclides

	Total ILCR	increment above background
Cesium-137 + D	8.28E-08	
Lead-210 + D	NA	
Neptunium-237 + D	NA	
Plutonium-238	NA	
Plutonium-239/240	NA	
Radium-226 + D	7.67E-10	
Radium-228 + D	5.90E-09	
Radon-222+ D	0.00E+00	
Strontium-90 + D	NA	
Technetium-99	5.98E-09	
Thorium-228 + D	1.54E-09	
Thorium-230	2.20E-08	
Thorium-232	5.73E-10	
Uranium-234	3.72E-08	
Uranium-235 + D	9.74E-09	
Uranium-238 + D	8.35E-08	
SUM	**2.50E-07**	

TABLE E.2
Undeveloped Park User - Zone 6 - SumPaths

Summation of all paths for individual chemicals

	Total	
	ILCR	HQ
1,1,2-Trichloroethane	7.06E-11	1.66E-08
1,1-Dichloroethylene	8.66E-09	6.74E-07
1,2-dichloroethane	6.72E-10	8.61E-07
2-Butanone	NA	NA
3,3-Dichlorobenzidine	NA	NA
4-Methylphenol	NA	NA
4-Nitroanaline	NA	NA
Acetone	NA	NA
Antimony	no CSFs	5.91E-04
Aroclor-1254	2.00E-07	1.17E-02
Aroclor-1260	8.16E-07	4.77E-02
Arsenic	1.93E-06	9.97E-03
Barium	no CSFs	3.16E-04
Benzene	NA	NA
Benzo(a)anthracene	2.65E-06	no RfDs
Benzo(a)pyrene	2.56E-05	no RfDs
Benzo(b)fluoranthene	2.95E-06	no RfDs
Benzo(k)fluoranthene	3.84E-07	no RfDs
Beryllium	6.60E-07	1.94E-04
Bis(2-chloroisopropyl)ether	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA
Boron	NA	NA
Bromodichloromethane	4.52E-10	8.49E-07
Bromoform	NA	NA
Bromomethane	NA	NA
Cadmium	1.50E-10	2.29E-04
Carbazole	NA	NA
Carbon disulfide	NA	NA
Carbon tetrachloride	NA	NA
Chlordane	NA	NA
Chlorobenzene	NA	NA
Chloroform	NA	NA
Chromium (VI)	NA	NA
Chrysene	4.77E-08	no RfDs
Cobalt	NA	NA
Copper	NA	NA
Cyanide	NA	NA
Cyclohexanone	NA	NA
Dibenzo(a,h)anthracene	2.77E-05	no RfDs
Dieldrin	8.49E-08	2.48E-04
Di-n-octylphthalate	NA	NA

TABLE E.2
Undeveloped Park User - Zone 6 - SumPaths

Summation of all paths for individual chemicals (continued)

	Total ILCR	Total HQ
Ethyl ether	NA	NA
Ethylbenzene	NA	NA
Fluoride	no CSFs	1.71E-04
Heptachlorodibenzofuran	NA	NA
Heptachlorodibenzo-p-dioxin	2.67E-09	no RfDs
Hexachlorodibenzofuran	NA	NA
Hexachlorodibenzo-p-dioxin	NA	NA
Indeno(1,2,3-cd)pyrene	6.64E-07	no RfDs
Lead	NA	NA
Manganese	NA	NA
Mercury	NA	NA
Methanol	NA	NA
Methyl-2-pentanone	NA	NA
Methylene chloride	NA	NA
Molybdenum	no CSFs	2.27E-04
Nickel	NA	NA
N-nitrosodiphenylamine	NA	NA
N-nitrosodipropylamine	NA	NA
Octachlorodibenzofuran	NA	NA
Octochlorodibenzo-p-dioxin	4.12E-09	no RfDs
Pentachlorodibenzofuran	NA	NA
Pentachlorodibenzo-p-dioxin	NA	NA
Pentachlorophenol	NA	NA
Phenanthrene	no CSFs	no RfDs
Selenium	NA	NA
Silver	no CSFs	6.97E-06
Tetrachlorodibenzofuran	NA	NA
Tetrachlorodibenzo-p-dioxin	NA	NA
Tetrachloroethylene	1.93E-08	8.36E-06
Thallium	NA	NA
Toluene	NA	NA
Tributyl phosphate	NA	NA
Trichloroethylene	2.94E-08	5.71E-04
Trifluorochloromethane	NA	NA
Uranium	no CSFs	1.32E-02
Vanadium	NA	NA
Vinyl chloride	NA	NA
Xylenes	NA	NA
Zinc	NA	NA
SUM	**6.38E-05**	**8.52E-02**