U.S. Department of Energy

Oakland Operations Office, Oakland, California

FINAL
RADIUM/STRONTIUM TREATMENT SYSTEMS AREA REMOVAL ACTION CONFIRMATION REPORT

for the

LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH
UNIVERSITY OF CALIFORNIA, DAVIS

Prepared for:

United States Department of Energy
Oakland Operations Office
1301 Clay Street
Oakland, California 94612-5208

Prepared by:

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5801 Christie Avenue, Suite 600
Emeryville, California 94608-1827

July 5, 2002
Rev. 1

DOE Oakland Operations Contract DE-AC03-96SF20686

Weiss Associates
Environmental Science, Engineering and Management

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CONTENTS

EXECUTIVE SUMMARY S-1

1. INTRODUCTION 1-1
   - 1.1 Site Background 1-1
   - 1.2 Removal Action Objectives 1-2
   - 1.3 Report Organization 1-3

2. REMOVAL ACTION ACTIVITIES 2-1
   - 2.1 Area I Removal Action 2-1
     - 2.1.1 Mobilization and Site Setup 2-1
     - 2.1.2 Overburden Removal 2-2
     - 2.1.3 Demolition and Excavation Activities 2-3
     - 2.1.4 Shoring 2-4
     - 2.1.5 Sampling, Backfill and Compaction 2-5
     - 2.1.6 Site Restoration and Demobilization 2-5
   - 2.2 Area II Removal Action 2-6
     - 2.2.1 Mobilization and Site Setup 2-6
     - 2.2.2 Overburden Removal 2-7
     - 2.2.3 Demolition and Excavation Activities 2-7
     - 2.2.4 Sampling, Backfill and Compaction 2-9
     - 2.2.5 Site Restoration and Demobilization 2-10

3. WASTE MANAGEMENT ACTIVITIES 3-1
   - 3.1 Area I Removal Action Waste 3-1
     - 3.1.1 Asphalt and Overburden Soil 3-1
     - 3.1.2 Radium/Strontium Treatment System Area I Waste 3-2

3.1.3 Investigation-Derived Waste 3-3
3.2 Area II Removal Action Waste 3-4
3.2.1 Overburden Soil 3-4
3.2.2 Radium/Strontium Treatment System Area II Waste 3-4

4. HEALTH AND SAFETY ACTIVITIES 4-1
4.1 Identified Potential Chemical Exposure 4-1
4.2 Exposure Control Methods 4-2
4.2.1 Personal Protective Equipment 4-2
4.2.2 Engineering Controls 4-2
4.3 Chemical Air Monitoring 4-3
4.3.1 Direct Reading Instruments 4-3
4.4 Personnel Air Monitoring 4-4
4.5 Radiological Monitoring 4-4
4.6 Physiological Monitoring 4-4
4.7 Noise Monitoring 4-5
4.8 Light Monitoring 4-5
4.9 Conclusion 4-5

5. SAMPLING ACTIVITIES AND ANALYTICAL RESULTS 5-1
5.1 Excavation Screening Sampling 5-1
5.1.1 Sampling 5-1
5.1.2 Area I Analytical Results 5-2
5.1.3 Area II Analytical Results 5-2
5.2 Dry Well Delineation 5-2
5.2.1 Sampling 5-2
5.2.2 Analytical Results 5-3
5.3 Nitrate Delineation 5-4
5.3.1 Sampling 5-4
5.3.2 Analytical Results 5-4
5.4 Heating, Ventilating and Air Conditioning Water Sampling 5-4
5.4.1 Sampling 5-4
5.4.2 Analytical Results 5-5

5.5 Air Sampling 5-5
5.5.1 Air Sampling Schedule 5-5
5.6 Excavation Confirmation Sampling 5-6
5.6.1 Area I Sampling 5-6
5.6.2 Area II Sampling 5-6
5.6.3 Analytical Results 5-6
5.7 Designated-Level Analysis—Data Gaps Investigations 5-7
5.7.1 Sampling 5-7
5.7.2 Analytical Results 5-8

6. PHASE II DATA EVALUATION 6-1

6.1 Data Reduction/Verification/Reporting and Records Management 6-1
6.1.1 Quality Assurance/Quality Control Sample Collection 6-2
6.1.2 Data Reduction, Verification, Reporting, and Validation 6-2
6.1.3 Data Management 6-2
6.2 Risk Screening 6-3
6.2.1 Background Concentrations 6-3
6.2.2 Risk-Based Action Standards 6-4
6.2.3 Data Summary 6-5
6.2.4 Reasonable Maximum Exposure 6-6
6.2.5 Background Comparison 6-7
6.2.6 Risk Calculation 6-8
6.2.7 Hot Measurement Analysis 6-11
6.3 Designated-Level Analysis 6-11
6.3.1 Data Management 6-12
6.3.2 Preliminary Designated-Level Data Analysis 6-12
6.3.3 Data Gaps Investigation 6-18
6.3.4 Refined Designated Level Analysis 6-18
6.3.5 Indicator Constituents and Distribution 6-18
6.3.6 Soil Profile 6-19
6.3.7 Ground Water Goals 6-20
6.3.8 Parameter Value Estimation 6-20
6.3.9 Model Setup, Initialization, and Parameter Sensitivity Analysis 6-21
6.3.10 Refined Designated-Level Analysis Results and Conclusions 6-21

7. REMOVAL ACTION COMPLETION ANALYSIS 7-1

7.1 Removal Action Objective 1–Reduce Cancer Risk 7-1

7.2 Removal Action Objective 2–Reduce Non-Cancer Hazard Indices 7-1

7.3 Removal Action Objective 3–Mitigate Ground Water Impact 7-1

7.4 Removal Action Objective 4–Mitigate Ecological Risk 7-2

7.5 Removal Action Objective 5–Minimize Disruption to University Research 7-2

8. REFERENCES 8-1

TABLES

Table 3-1. Area I Waste, LEHR Site, Davis, California

Table 3-2. Area II Waste, LEHR Site, Davis, California

Table 5-1. Radium/Strontium Treatment Systems Area I—Excavation Screening Sampling Analytical Results

Table 5-2. Radium/Strontium Treatment Systems Area II—Screening Sampling Analytical Results

Table 5-3. Radium/Strontium Treatment Systems Area I Removal Action—Radium-226 Dry Well Delineation Analytical Results

Table 5-4. Radium/Strontium Systems Area I Removal Action—Nitrate Delineation Analytical Results

Table 5-5. Radium/Strontium Treatment Systems Area I Removal Action—Heating, Ventilating, and Air Conditioning Sample Analytical Results

Table 5-6. Radium/Strontium Treatment Systems Areas I and II Removal Actions Confirmation Sample Collection Locations

Table 5-7. Radium/Strontium Treatment Systems Areas I and II Removal Actions, Confirmation Sampling and Analytical Results Summary

Table 5-8. Radium/Strontium Treatment Systems Areas I and II Removal Actions—Confirmation Sample SSRSC035 Reanalysis Summary

Table 5-9. Designated-Level Sample Analytical Results, Radium/ Strontium Treatment System Area, LEHR Site, Davis, California

Table 5-10. Generalized Lithology, Radium/Strontium Treatment Systems Area Removal Action, LEHR Site, UC Davis, California

Table 6-1. Summary of Risk-Based Action Standards for Carcinogenic Compounds in Surface Soil at the 10^{-6} Risk Level, LEHR Site, UC Davis, California

Table 6-2. Summary of Risk-Based Action Standards for Non-Carcinogenic Compounds in Surface Soil at a Hazard Quotient of 1.0, LEHR Site, UC Davis, California

Table 6-3. Background Comparison for Constituents of Concern with Risk-Based Action Standards Less Than Background, LEHR Radium/Strontium Area Removal Action, UC Davis, California

Table 6-4. Screening Analysis for Risk Constituents of Concern, LEHR Radium/Strontium Treatment System Areas Removal Action, UC Davis, California

Table 6-5. Risk Screening Summary, LEHR Radium/Strontium Area Removal Actions, UC Davis, California

Table 6-6. Constituents of Concern that Exceeded US EPA Residential Preliminary Remediation Goal Values, LEHR Radium/Strontium Area Removal Actions, UC Davis, California

Table 6-7. Hot Measurement Analysis Summary, LEHR Radium/Strontium Area Removal Actions, UC Davis, California

Table 6-8. Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Phase 1 - Steps 1, 2, and 3

Table 6-9. Preliminary Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Step 4, UC Davis, California

Table 6-10. Preliminary Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Step 4, Wilcoxon Rank Sum Test Results for Analytes Remaining After Step 3, UC Davis, California

Table 6-11. Summary Evaluation of Potential Impact of Designated-Level Constituents of Concern in Radium/Strontium Area Soil on Ground Water, LEHR Site, UC Davis, California

Table A-1. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area I Removal Action

Table A-2. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area II Removal Action

Table A-3. Maximum Detected Semi-Volatile Organic Compounds in the Waste Characterization Soil Samples from the Radium/Strontium Treatment Systems Area II Removal Action

Table D-1. Vadose Zone Modeling Results, Radium/Strontium Area, Updated Radium Strontium Area Lithology, 10.8 cm/yr Infiltration, LEHR Site, UC Davis, California

Table D-2. Representative Soil Profile, Radium/Strontium Leach Field Area, LEHR Site, UC Davis, California

Table D-3. Summary of Physical and Hydraulic Properties for Representative Vadose Zone Model Soil Types at the Radium/Strontium Area, LEHR Site, UC Davis, California

Table E-1. Risk Scenario 2—East Residential Farmer

Table E-2. One-Dimensional Vadose Zone Modeling Physical Parameters

Table E-3. Mercury Chemical-Specific and Toxicological Parameters

Table E-4. Radium/Strontium Area Risk-Based Action Standard Calculation, Mercury

Table E-5. Non-Isothermal, Unsaturated Flow and Transport Results and Soil to Off-Site Ground Water Conversion Factor for Mercury, Radium/Strontium Area

FIGURES

Figure 1-1. LEHR Site Location Map, UC Davis, California

Figure 1-2. Approximate Location of Radium/Strontium Treatment Systems Area II Structures Prior to Removal Action, LEHR Site, UC Davis, California

Figure 2-1. Radium/Strontium Treatment Systems Areas I and II Removal Action and Support Areas, LEHR Site, UC Davis, California

Figure 2-2. Radium/Strontium Treatment Systems Area I Site Features, Showing As-Built Underground Utilities, Radium Distribution System and Excavation Limits, LEHR Site, UC Davis, California

Figure 2-3. Cross Section A-A' Along Dry Wells and Leach Trenches, Radium/Strontium Treatment Systems Area I, LEHR Site, UC Davis, California

Figure 2-4. Upper Radium Dry Well Structure, LEHR Site, UC Davis, California

Figure 2-5. Radium/Strontium Treatment Systems Area II Excavation Boundary, LEHR Site, UC Davis, California

Figure 5-1. Radium/Strontium Treatment Systems Area, Excavation Screening Sample Locations, LEHR Site, UC Davis, California

Figure 5-2. Radium/Strontium Treatment Systems Area I, Excavation Screening Sample Nitrate Isoconcentration Contours, LEHR Site, UC Davis, California

Figure 5-3. Dry Well #1 Radium-226 Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

Figure 5-4. Dry Well #1 Nitrate Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

Figure 5-5. Dry Well #2 Radium-226 Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

Figure 5-6. Dry Well #2 Nitrate Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

Figure 5-7. Dry Well #3 Radium-226 Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

Figure 5-8. Dry Well #3 Nitrate Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

Figure 5-9. Radium/Strontium Treatment Systems Area, Excavation Confirmation Sample Locations, LEHR Site, UC Davis, California

Figure 5-10. Vertical Excavation Limits Showing Dry Well Removal and Confirmation Sample Locations, LEHR Site, UC Davis, California

Figure 5-11. Air Monitoring Station Locations, LEHR Site, UC Davis, California

Figure 5-12. Designated-Level Sample Locations, LEHR Radium/Strontium Treatment Systems Area, UC Davis, California

Figure 6-1. Radium/Strontium Treatment Systems Area Removal Action Phase II Data Evaluation Decision Flow Diagram, LEHR, UC Davis, California

Figure 6-2. LEHR Data Evaluation Process

Figure 6-3. Locations of Receptors for Risk Scenarios 1, 2 and 3, LEHR Site, UC Davis, California

Figure 6-4a. Mercury Frequency Distribution Comparing Background Data to Confirmation Sample Results, LEHR Site, UC Davis, California

Figure 6-4b. Stratified Mercury Frequency Distribution Comparing Background Data to Confirmation Sample Results Less Than Four Feet Below Ground Surface, LEHR Site, UC Davis, California

Figure 6-4c. Stratified Mercury Frequency Distribution Comparing Background Data to Confirmation Sample Results Greater Than Four Feet Below Ground Surface, LEHR Site, UC Davis, California

Figure 6-5. Risk Screening Analysis Decision Flowchart, LEHR Site, UC Davis, California

Figure 6-6. Designated-Level Analysis Decision Flow Chart, LEHR Site, UC Davis, California

Figure 6-7. Preliminary Designated-Level Analysis Flow Chart, LEHR Site, UC Davis, California

APPENDICES

Appendix A. Radium/Strontium Treatment System Removal Actions Waste Characterization Results

Appendix B. Confirmation Sample Analytical Results

Appendix C. Histograms

Appendix D. Designated-Level Modeling Input and Results

Appendix E. Risk-Based Action Standard Recalculation for Mercury

Appendix F. Radium/Strontium Treatment Systems Area 1 Removal Action Overburden Soil Data

ABBREVIATIONS AND ACRONYMS

ACM	asbestos-containing material
AH	animal hospital
ALARA	As-Low-As-Reasonably-Achievable
ASTM	American Standard for Testing and Materials
bgs	below ground surface
C-14	carbon-14
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CLSM	controlled low-strength material
Co-60	cobalt-60
COC(s)	constituent(s) of concern
Cs-137	cesium-137
cu yd	cubic yard(s)
DAC	derived air concentration
DDT	dichlordiphenyl trichlor
DL	designated-level
DOE	U.S. Department of Energy
DP(s)	daughter product(s)
DST	domestic septic tank
DW	dry well
ECI	Ecology Control Industries
EE/CA	Engineering Evaluation/Cost Analysis
ft	foot/feet
H&S	health and safety
HDPE	high density polyethylene
HI	hazard index

HQ	hazard quotient
HSP	Health and Safety Procedure
HVAC	heating, ventilating, and air conditioning
in.	inch
IT Corp	IT Corporation
K_d	soil adsorption coefficient
LEHR	Laboratory for Energy-Related Health Research
LLW	low-level waste
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mL/g	milliliters per gram
NUFT	Non-Isothermal Unsaturated Flow and Transport
PCBs	polychlorinated biphenyls
pCi/g	picoCuries per gram
pCi/L	picoCuries per liter
PHSP	Project Health and Safety Plan
PID	photoionization detector
PM_{10}	particulate matter less than 10 microns aerodynamic diameter
PPE	personal protective equipment
PRG	preliminary remediation goal
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
RA	removal action
Ra/Sr	Radium/Strontium
Ra-226	radium-226
RAOs	removal action objectives
RBAS	risk-based action standards
RCT	Radiological Control Technician
RDL	reported detection limit
RME	reasonable maximum exposure
RPP	Radiological Protection Program

RSO	Radiological Safety Officer
SAP	sampling and analysis plan
SC	screening criteria
SOP	standard operating procedure
sq ft	square feet
Sr-90	strontium-90
SVOC	semi-volatile organic compound
SWT	Southwest Trenches
TSM	tailgate safety meetings
TWA	time-weighted average
UC Davis	University of California, Davis
UCL	upper confidence limit
UDM	Unique Domains Method
US EPA	United States Environmental Protection Agency
VOC	volatile organic compound
WA	Weiss Associates
WAC	waste acceptance criteria
WDPs	Western Dog Pens
WP	work plan
WRS	Wilcoxon Rank Sum
µg/kg	micrograms per kilogram

EXECUTIVE SUMMARY

A non-time-critical removal action (RA) was conducted at the Radium-226/Strontium-90 (Ra-226/Sr-90) Treatment Systems Area (the Site) located at the Laboratory for Energy-Related Health Research (LEHR), University of California, Davis (UC Davis), California. The RA was implemented according to the National Contingency Plan, 40 Code of Federal Regulations Part 300.415. This report was prepared according to "Superfund Removal Procedures, Removal Response Reporting: POLREPS and OSC Reports," United States Environmental Protection Agency (US EPA) Publication 9360.3-03 (US EPA, 1994).

The objectives of the RA were defined in the Engineering Evaluation/Cost Analysis (WA, 1998b) as follows:

1. Lower the excess cumulative cancer risk to an individual from exposure to site contaminants to a nominal range of 10^{-4} to 10^{-6}, using 10^{-6} as the point of departure;
2. Reduce the non-cancer hazard indices below 1.0;
3. Mitigate potential future impact to ground water;
4. Mitigate potential ecological risks during and after the RA; and,
5. Minimize impact to on-site university research.

The RA at the Site was conducted according to the *Work Plan for the Removal Action at Southwest Trenches, Ra/Sr Treatment Systems, and Domestic Septic System Areas*, (WA, 2000c). The Radium/Strontium (Ra/Sr) Treatment Systems were divided into two areas (Figure 1-2). Ra/Sr Area I consisted of Domestic Septic Tank (DST) 2, the distribution box, piping, three dry wells, and the Northern and Southern Leach Trenches. Area I RA activities began in May 1999 and were completed by November 1999. Area II consisted of the Ra-226 Tank, the Sr-90 Tank, the Sr-90 Tank Leach Field and the influent tank piping. The Area II RA occurred from July to November 2000.

The Area I RA was implemented in two phases. DST 2, associated piping, three upper (zero to ten feet below ground surface [ft bgs]) dry well structures, and two leach trenches were removed during the first phase of the RA. During the first phase of the excavation, 804 cubic yards (cu yd) of material were removed and packaged for off-site disposal as low-level waste (LLW). Following removal of these subsurface structures and the surrounding contaminated soil, confirmation samples were collected and backfill and compaction activities commenced. Approximately 1,700 cu yd of soil were required for backfilling the excavations. An off-site source of clean backfill soil was identified, tested, and deemed appropriate for use on site. Excavations were backfilled and compacted in accordance with the work plan (WP) requirements.

The second phase of the Area I RA consisted of defining the extent of contamination surrounding the lower dry well structures (10 to 40 ft bgs) and their removal. To delineate the lateral and vertical extent of contamination, soil samples were collected from the dry well sides in all four compass directions to the water table. Samples were collected using a direct-push drill rig and analyzed for nitrate, Ra-226 and Sr-90.

Once the extent of the contamination was defined, the three cobble-filled dry wells were removed to an average depth of 42 ft using six- and ten-foot diameter augers. Excavation screening samples were collected to guide soil removal. Confirmation samples were collected at the completion of the excavation activities. The lower portions of the dry wells were then filled with controlled low-strength material to eight ft bgs and backfilled and compacted to grade with clean fill. A total of approximately 1,275 cu yd of LLW (concrete, cobbles, soil) and 441 cu yd of overburden soil were removed from the Site. Site restoration activities consisted of paving, sewer line replacement, and permanently rerouting gas and water lines along the western edge of the excavation.

The Area II RA was also implemented in two phases. The Sr-90 Leach Field and influent piping associated with both the Ra-226 and Sr-90 tanks were removed during the first phase of the RA. A total of 300 cu yd of material was removed and packaged for off-site disposal during the first phase of the excavation. The second phase of the Area II RA consisted of excavating and removing the Ra-226 and Sr-90 Tanks. A total of 1,200 cu yd of material was removed and packaged for off-site disposal during the second phase of the excavation. Following removal of these subsurface structures and the surrounding contaminated soil, confirmation samples were collected, and backfill and compaction activities commenced. Approximately 1,600 cu yd of soil were required for backfilling the excavations. An off-site source of clean backfill soil was identified, tested and deemed appropriate for use on site. Excavations were backfilled and compacted in accordance with the WP requirements.

A two-phased data evaluation approach was used to determine if the removal action objectives (RAOs) were achieved during the 1999 and 2000 RAs. The Phase I Data Evaluations occurred immediately following the RA while the excavations were open, and was based on analyses of screening samples collected during the RAs and analyzed only for "driver constituents of concern (COCs)." Prior to backfilling Area I and II excavations, screening analytical results were presented to the LEHR Remedial Project Managers (RPMs) at meetings on July 27, 1999 and October 24, 2000 to reach consensus on whether cleanup goals were attained for driver COCs. These meetings satisfied the Phase I Data Evaluation objectives as described in the RA WP (WA, 2000c). At both of the meetings, a decision was reached to collect confirmation samples, backfill the excavations and restore the Site.

The Phase II Data Evaluation is the subject of this report and was completed after all analytical results from the RA confirmation sampling were received. The objective of the confirmation sampling was to ensure the attainment of cleanup goals using a statistically-based sampling design. The statistical approach used to determine the required number of confirmation samples and the grid size was in accordance with US EPA guidance (US EPA, 1994).

The confirmation samples were collected from the excavation sidewalls and floor to verify that the cleanup criteria for all COCs were met. A total of 38 samples and 4 duplicate samples were collected between 1 and 42 ft bgs from the Area I excavation. A total of 33 primary and 4 duplicate confirmation soil samples were collected between 1.5 and 12 ft bgs from the Area II excavation. The excavation confirmation samples were packaged and shipped to an off-site laboratory for analysis of the full set of COCs, consisting of radionuclides, pesticides/polychlorinated biphenyls, metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and nitrate.

The Phase II Data Evaluation consisted of conducting a risk analysis, designated-level (DL) analysis, and RA completion analysis. The risk analysis assessed whether the first and second RAOs for the Ra/Sr Treatment Systems Area RA were attained. The risk analysis consisted of the following:

- Calculating the Reasonable Maximum Exposure (RME) concentration for each COC;
- Completing a background comparison for COCs with risk-based action standard (RBAS) values less than background;
- Performing a risk analysis for carcinogens and non-carcinogens using the RBAS;
- Comparing RMEs to US EPA Preliminary Remediation Goals (PRGs); and,
- Completing a hot measurement analysis.

The risk analysis demonstrated that the cumulative residual risk for carcinogens falls within the EPA's Comprehensive Environmental Response, Compensation and Liability Act risk range of 10^{-4} to 10^{-6} and only slightly exceeds the 10^{-6} level in Exposure Scenarios 1 and 2 (on-site researcher and east side residential farmer, respectively). Thus, RAO No. 1 has been attained as a result of RA activities by reducing the cumulative cancer risk to a nominal range of 10^{-4} to 10^{-6}.

The cumulative non-cancer hazard quotient (HQ) is 1.19, above the HQ of 1.0. Therefore, this RAO may not have been attained. None of the non-carcinogenic COCs exceeded their respective residential PRG values. Two of the carcinogenic COCs (cesium-137 [Cs-137] and hexavalent chromium) exceed their respective residential PRG values.

The third RAO was to mitigate any potential future impacts to ground water by reducing COC concentrations in soil. To determine whether this objective has been attained, a DL analysis was conducted.

The DL analysis consisted of:

- Preliminary DL Analysis: Evaluate confirmation sampling results and identify DL COCs and hot spot areas;
- Data Gaps Investigation: Collect additional vertical profile data, if needed, for each DL COC at the hot spot area; and,

- Refined DL Analysis: Model and calculate the DL values that protect ground water using the vertical profile of DL COCs.

The preliminary DL analysis and screening consisted of four screening steps: 1) identifying detected versus non-detected analytes, 2) comparing magnitude and frequency with background, 3) identifying chemical and physical properties of detected analytes, and 4) evaluating Wilcoxon Rank Sum Test/DL/natural attenuation. The confirmation sampling results were screened using these screening criteria to determine if any analytes pose a threat to the ground water beneath the Site.

Five analytes were identified as DL COCs requiring additional evaluation. These analytes include hexavalent chromium, nitrate, mercury, carbon-14 (C-14), and Cs-137. The data gaps investigation focused on collecting additional vertical distribution data for the DL COCs. Thirteen soil borings were advanced to the water table, soil samples were collected at various depths, and samples were analyzed for one of the five COCs.

These results were used to refine the DL analysis. Based on the DL analysis, Cs-137 in the Ra/Sr Area presents no threat to ground water. Any ground water impact resulting from hexavalent chromium, mercury and C-14 in Ra/Sr Area soil would likely be very localized and below maximum contaminant levels (MCLs).

Based on the DL analysis, nitrate in Ra/Sr Area soil may locally impact ground water above background and/or the MCL, but the impact is likely insignificant on a site-wide or regional scale. The DL analysis is a conservative estimation of potential future ground water impact and is expected to overestimate actual impacts. To put the potential nitrate impact into perspective, the total nitrate as nitrogen above background in the Ra/Sr Area is estimated at only 366 pounds, compared to: a) 1,100 pounds nitrate as nitrogen in one acre of vadose zone soil at the average background concentration; b) an estimated 17,000 pounds nitrate as nitrogen potentially reaching ground water annually from normal agricultural practices in the immediate vicinity of LEHR; and, c) an estimated 36,500 pounds nitrate as nitrogen historically discharged annually to Putah Creek from the UC Davis outfall.

Lastly, RA completion analysis was performed to determine whether RAOs had been met, as discussed below.

Removal Action Objective 1–Reduce Cancer Risk

The first RAO was to reduce the excess cumulative cancer risk from the site to the nominal range of 10^{-4} to 10^{-6} using 10^{-6} as the point of departure. As discussed in Section 6.2.6.1, this objective has been attained as a result of RA activities by reducing the cumulative cancer risk to a nominal range of 10^{-4} to 10^{-6}.

Removal Action Objective 2–Reduce Non-Cancer Hazard Indices

The second RAO was to reduce the cumulative non-cancer HQ below 1.0. The cumulative non-carcinogenic Scenario 2 RME/RBAS ratio is 1.19. Therefore, this RAO may not have been attained. Attainment of this RAO will be determined during the planned Site-Wide Risk Assessment.

Removal Action Objective 3–Mitigate Ground Water Impact

The third RAO was to mitigate potential future impacts to ground water associated with residual COC concentrations in soil. The RA successfully removed all sources and structures with the potential to create an environmental release in the Ra/Sr Area; thereby mitigating future potential impacts to ground water. The DL analysis (Section 6.3) indicates that some residual nitrate, mercury and C-14 in soil in the Ra/Sr Area may result in future localized impacts above background and/or MCLs. However, these residual COCs are not widespread and do not pose a significant short- or long-term threat to ground water. The evaluation of the possible need for future remedial action to address these residual COCs will be addressed in the U.S. Department of Energy (DOE)-Areas Remedial Investigation/Feasibility Study (RI/FS). Based on the analytical results obtained during the confirmation and DL data gaps sampling and the DL modeling, the RA has attained this RAO by mitigating ground water impacts.

Removal Action Objective 4–Mitigate Ecological Risk

The fourth RAO was to mitigate potential ecological risks during and after the RA. During the RA, mitigation measures were implemented to protect sensitive habitat. No impact to ecological receptors was observed during the RA. Since no ecological risk screening has been performed at the Site, no ecological risk-based screening standards are available for comparison and evaluation of this RAO. Attainment of this RAO, however, will be determined during the planned Site-Wide Risk Assessment.

Removal Action Objective 5–Minimize Disruption to University Research

The fifth RAO was to minimize disruption to university research activities while conducting the RA. The RA implemented at the Ra/Sr Treatment Systems during the summers of 1999 and 2000 did not significantly disrupt university research and therefore this objective has been attained.

1. INTRODUCTION

This report presents the results of the non-time-critical removal action (RA) conducted at the Radium/Strontium (Ra/Sr) Treatment Systems Area (the Site) located at the Laboratory for Energy-Related Health Research (LEHR), University of California, Davis (UC Davis), California. The site location is shown on Figure 1-1. This RA Confirmation Report includes the Phase II Data Evaluation described in the RA Work Plan (WA, 2000c), documents the RA activities performed at the Ra/Sr Treatment Systems Area, presents the analytical results of the sampling performed, and evaluates whether removal action objectives (RAOs) have been achieved.

The RA was implemented in accordance with the National Contingency Plan, 40 Code of Federal Regulation (CFR) Part 300.415. This report was prepared according to "Superfund Removal Procedures, Removal Response Reporting: POLREPS and OSC Reports" United States Environmental Protection Agency (US EPA) Publication 9360.3-03, June 1994. This report was prepared by Weiss Associates (WA) under U.S. Department of Energy (DOE) Environmental Restoration/Waste Management Contract No. DE-AC03-96SF20686.

Section 1.1 discusses site background, including historical and current uses of the area, conditions prior to start of the RA, and constituents of concern (COCs). The RAOs are presented in Section 1.2, and report organization is described in Section 1.3.

1.1 Site Background

The Atomic Energy Commission (now DOE) began conducting radiological studies on laboratory animals, particularly beagles, in the early 1950s. Initial studies were carried out on the main UC Davis campus and involved the irradiation of beagles. The site began operating in its present location in 1958 when full-scale experimental use of radioactive materials began. Research at LEHR through the mid-1980s focused on the health effects from chronic exposure to radionuclides, primarily strontium-90 (Sr-90) and radium-226 (Ra-226). Animal Hospital (AH) Buildings 1 and 2 housed the beagles involved in the Sr-90 and Ra-226 studies, respectively. Wastewater from AH-1 and AH-2 was treated by the Sr-90 and Ra-226 Treatment Systems, respectively. The treatment systems are shown on Figure 1-2.

The Ra-226 Treatment System consisted of two septic tanks, each with two compartments separated by a weir, and an effluent distribution box feeding three dry wells and two leach trenches via distribution pipelines. The two Ra-226 septic tanks, with a combined capacity of 14,400 gallons, were located between AH-1 and AH-2. The contents of the septic tanks were homogenized, pumped, solidified and shipped to Hanford for disposal as low-level waste (LLW) in 1992 (Chemical Waste

Management, 1992). Since 1992, the tanks accumulated some water, apparently from rainwater infiltration.

The three Ra-226 dry wells were installed to facilitate subsurface infiltration of wastewater. These dry wells, each with a diameter of about 2.5 feet (ft), consisted of open boreholes filled with gravel to depths between about 6 and 40 ft below ground surface (bgs) (WA, 1998a). Due to frequent exceedances of the infiltration capacity of the original dry well system, cobble-lined leach trenches were added in 1965. The Southern Leach Trench extended south from the dry wells and was about 140 ft long, 3 ft wide and 14 ft deep. The Northern Leach Trench extended north from the dry wells and was about 40 ft long, 3 ft wide and 14 ft deep.

The Sr-90 Treatment System consisted of a series of nine interconnected "Imhoff" tanks (Tanks A through I), and a leach field (WA, 1998a). The tanks were concrete and coated with a plastic material. The total capacity of these tanks was 46,000 gallons. In 1962, Building H-322 was built over a portion of the original leach field (along the eastern side of the tank). To enhance infiltration capacity, a second leach field was constructed to augment the original field.

In 1991 and 1992, liquids and sludge remaining in the tanks were removed, solidified, and disposed at Hanford as LLW. Water, apparently from precipitation, accumulated in several of the tanks and approximately 12 cu yd of sludge and debris remained in Tank A prior to the RA.

The COCs at the Ra/Sr Treatment Systems Area were identified during previous environmental investigations. Constituents detected above background were considered to be COCs. Additional information regarding background and previous investigations performed at the Ra/Sr Treatment Systems Area may be found in:

- Final Engineering Evaluation/Cost Analysis (EE/CA) (WA, 1998a); and,
- Final Site Characterization Summary Report (WA, 1997c).

Three COCs were either consistently detected at the Ra/Sr Treatment Systems Area or were associated with past operations and releases to the environment. These were considered "driver COCs" and their concentrations were used during the RA to guide the excavation activities. The driver COCs at the Ra/Sr Treatment Systems Area are Ra-226, Sr-90, and nitrate.

1.2 Removal Action Objectives

The objectives of the Ra/Sr RAs were defined in the EE/CA as:

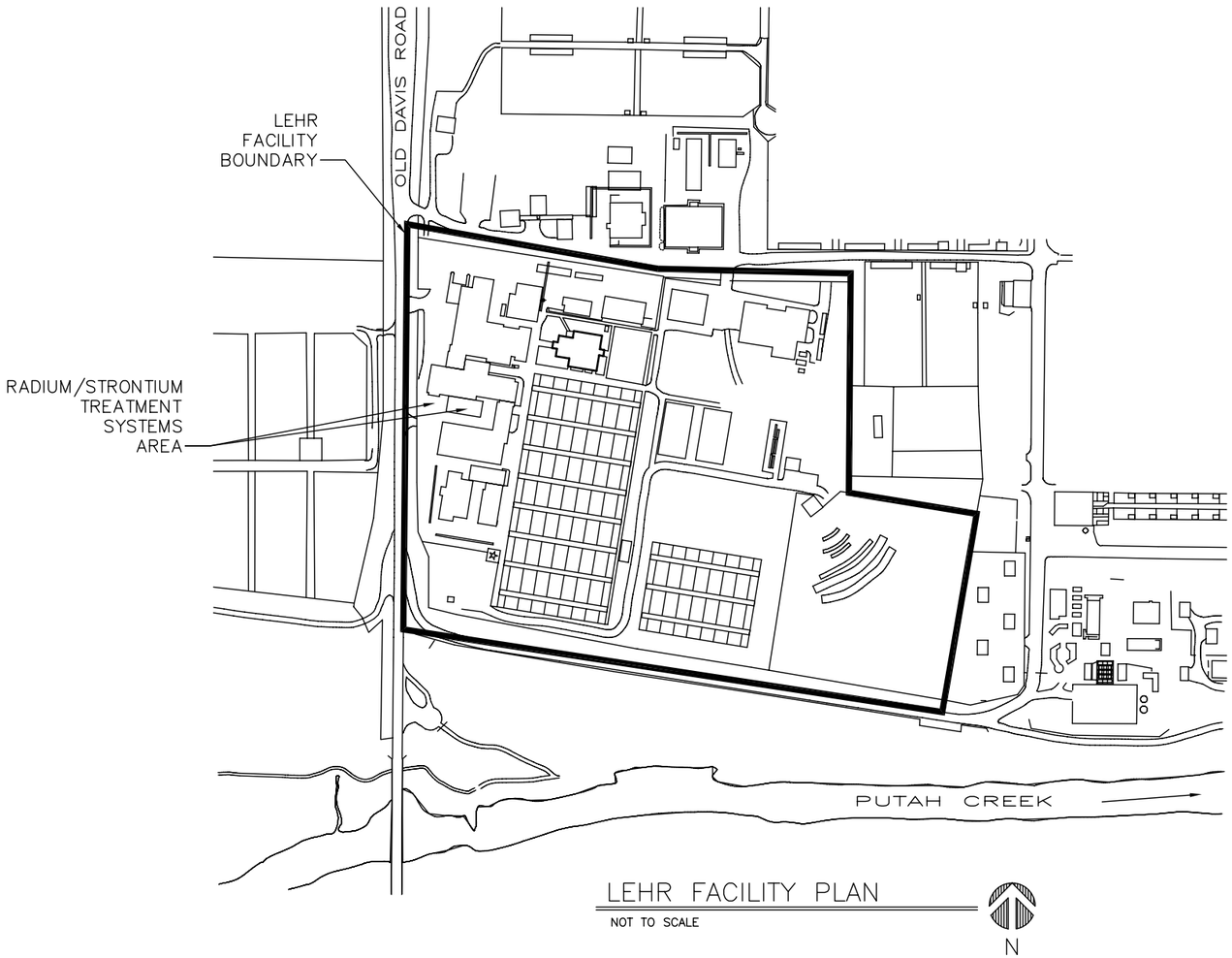
1. Lower the excess cumulative cancer risk to an individual from exposure to site contaminants to a nominal range of 10^{-4} to 10^{-6}, using 10^{-6} as the point of departure;
2. Reduce the non-cancer hazard indices below 1;
3. Mitigate potential future impact to ground water;

4. Mitigate potential ecological risks during and after the RA; and,
5. Minimize impact to on-site university research.

As discussed in the Work Plan (WP) (WA, 2000c), two phases of data evaluation were conducted for the RA to determine attainment of the RAOs. Phase I occurred immediately following the RA and was based on field screening sample results. Phase II is presented in this report and is based on confirmation and designated-level (DL) sample results.

1.3 Report Organization

Section 2 of this report describes the RA activities including demolition, soil excavation, waste removal and sorting, backfilling of excavations, and final site restoration. Section 3 presents the waste management activities from generation through packaging, storage and disposal. Section 4 summarizes the health and safety (H&S) activities performed during the RA. Section 5 presents the sampling activities and analytical results generated as a result of the RA. Section 6 contains the Phase II Data Evaluation including statistical evaluation, risk analysis and DL analysis. Section 7 evaluates whether the RAOs were attained.



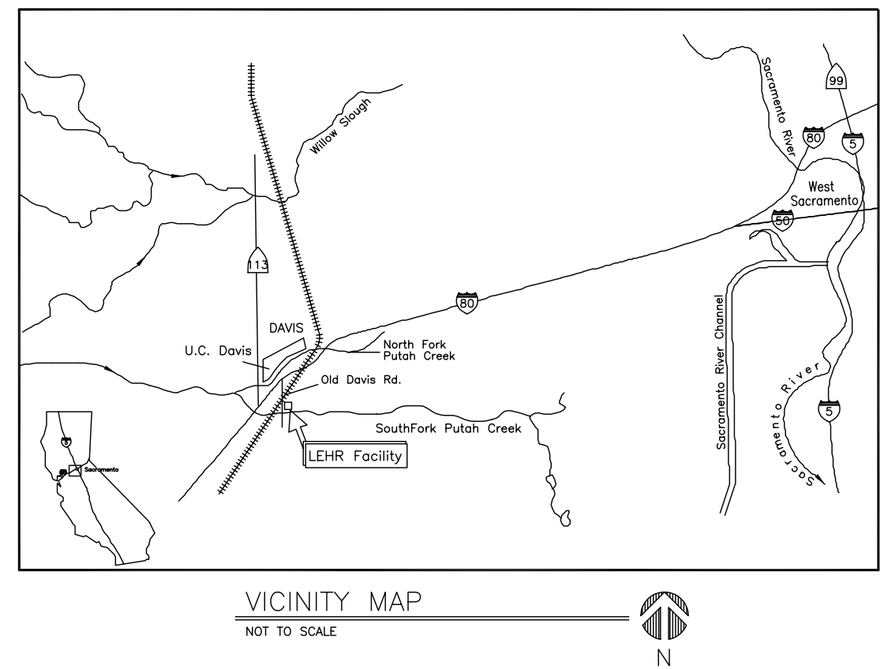


Figure 1-1. LEHR Site Location Map, UC Davis, California

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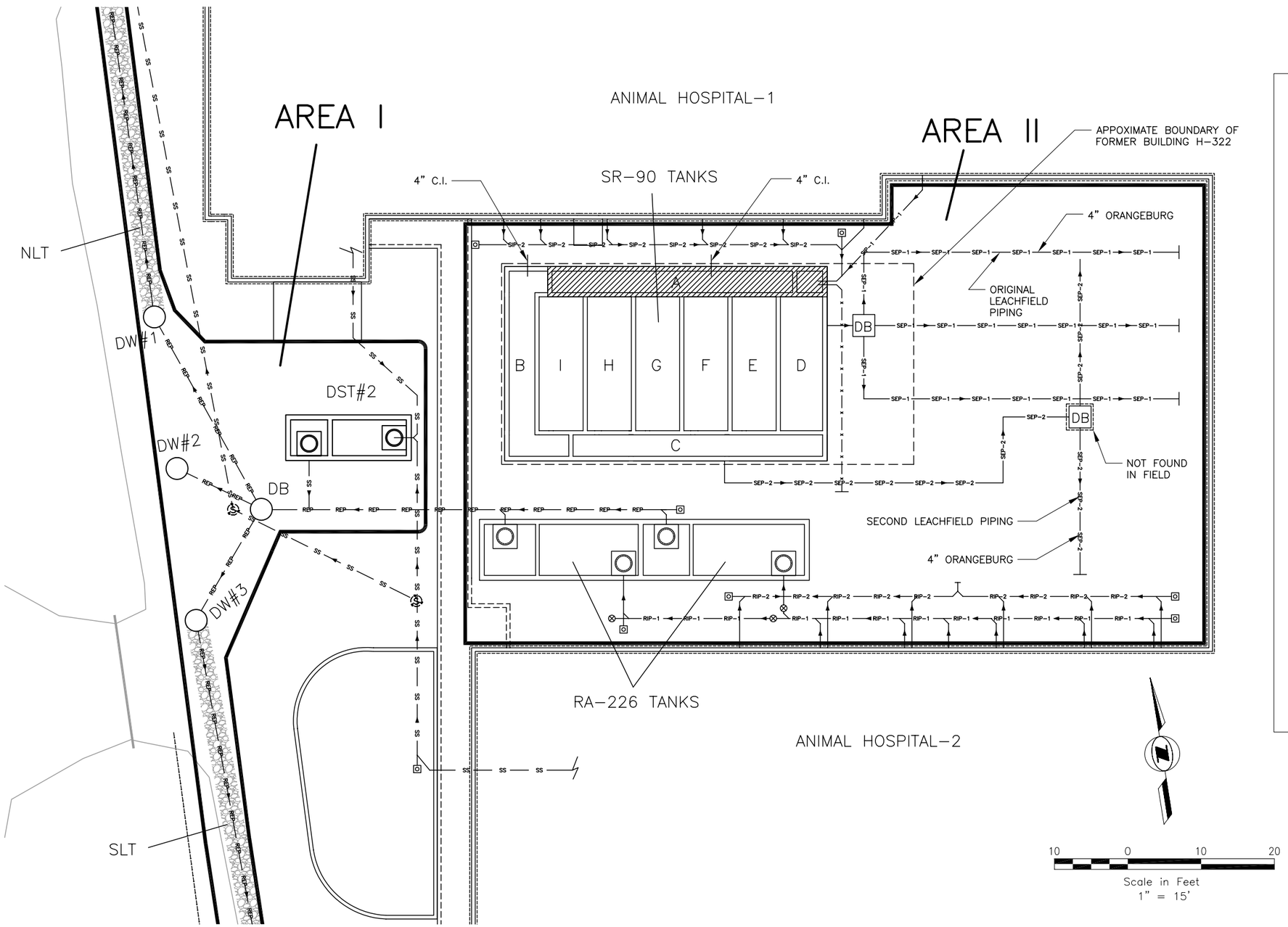

LEGEND

- TANK A OF THE SR-90 TANKS CONTAINED APPROXIMATELY 12 CUBIC YARDS OF SLUDGE AND DEBRIS PRIOR TO THE REMOVAL ACTION
- COBBLES/GRAVEL
- TANK HATCH
- VALVE
- CLEANOUT
- SANITARY SEWER MANHOLE

C.I. – CAST IRON
SR-90 – STRONTIUM-90
RA-226 – RADIUM-226
NLT – NORTHERN LEACH TRENCH (EXTENDS APPROXIMATELY 50 FEET NORTH FROM DW-1)
SLT – SOUTHERN LEACH TRENCH (EXTENDS APPROXIMATELY 145 FEET SOUTH FROM DW-3)
DW – DRY WELL
DST – DOMESTIC SEPTIC TANK
DB – DISTRIBUTION BOX
SS – SANITARY SEWER LINE
REP – RA-226 TREATMENT SYSTEM EFFLUENT PIPE
RIP – RA-226 TREATMENT SYSTEM INFLUENT PIPE
SIP – SR-90 TREATMENT SYSTEM INFLUENT PIPE
SEP – SR-90 TREATMENT SYSTEM EFFLUENT PIPE

◄ FLOW DIRECTION

— x — x — 4" COPPER PIPE – ORIGIN OR PURPOSE OF LINE NOT KNOWN

NOTES:
ALL INFORMATION PRESENTED IN THE DRAWING IS BASED ON HISTORICAL DRAWINGS PROVIDED BY THE UNIVERSITY OF CALIFORNIA, DAVIS AND FIELD OBSERVATIONS MADE BY WEISS ASSOCIATES DURING THE 1999 & 2000 REMOVAL ACTIONS.

ALL PIPES ARE CAST IRON UNLESS OTHERWISE NOTED.

Figure 1-2. Approximate Location of Radium/Strontium Treatment Systems Area II Structures Prior to Removal Action, LEHR Site, UC Davis, California

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2. REMOVAL ACTION ACTIVITIES

The RAs at the Ra/Sr Treatment Systems Area were conducted in accordance with the *Work Plan for the Removal Action at Southwest Trenches, Ra/Sr Treatment Systems, and Domestic Septic System Areas* (WA, 2000c). For purposes of the RA, the treatment system was divided into two areas. Area I consisted of Domestic Septic Tank (DST) 2, the distribution box, piping, three dry wells, and the Northern and Southern Leach Trenches (Figure 1-2). Area II consisted of the Ra-226 Tank, the Sr-90 Tank, the Sr-90 Tank leach field, and the Sr-90 and Ra-226 Tank influent pipes. The RAs occurred during two time periods: the Area I RA occurred from May to October 1999, and the Area II RA occurred from July to November 2000. The RA for each area is described in the following sections.

2.1 Area I Removal Action

2.1.1 Mobilization and Site Setup

Weiss Associates (WA) and its subcontractor, IT Corporation (IT Corp), mobilized to the site in May 1999 to begin the RA. Figure 2-1 shows the Ra/Sr Treatment Systems Area I and RA support areas. Site setup activities consisted of:

- Mobilizing equipment and personnel to the Ra/Sr Treatment Systems Area I;
- B-25 box segregation;
- Rerouting heating, ventilating and air conditioning (HVAC);
- Installing temporary fencing around the excavation perimeter;
- Removing two trees;
- Establishing the work area, storage area, and the on-site laboratory;
- Clearing the Western Dog Pen (WDP) aisles for waste storage;
- Constructing a worker cool-down room; and,
- Conducting a utility survey.

B-25 box segregation consisted of properly classifying and segregating the empty on-site B-25 boxes based on capacity and physical condition. Each box was examined to determine refurbishment needs and capacity. Full B-25 boxes from the Southwest Trenches (SWT) RA were also reorganized to optimize space for storage in the WDP aisles.

The HVAC system for AH-2 was evaluated and a reroute plan was devised with UC Davis assistance to minimize the potential for airborne contamination to enter the AH-2 HVAC system. A temporary wooden duct was built around the air intake closet located on the west side of AH-2 extending to the central portion of the roof. AH-1 was used for storage of construction-, sampling-, and H&S-related supplies. In addition, part of the building was converted into an on-site analytical laboratory. Pacific Northwest National Laboratory contracted with DOE to provide analytical instrumentation and technical support for on-site Ra-226, cesium-137 (Cs-137) and Sr-90 analysis.

The WDP aisles were cleared of physical barriers such as fence posts, solid wastes stored from previous demolition activities including fencing and posts, and other debris. A worker cool-down room was constructed on the south side of AH-1 to provide a shaded, air conditioned area where workers could take a break without removing their personal protective equipment (PPE).

As part of the setup activities, a ten-foot by ten-foot grid system was established throughout the RA area as the horizontal coordinate reference system for marking and locating objects in the field. The origin of the grid system was located at the northwest corner of the Ra/Sr Treatment Systems Area. The north-south grids were labeled with an "S" and numerically increased from "0" to "24" from north to south. Similarly, the east-west grids were labeled with a "E" and increased from "0" to "8" from west to east. For example, E7S8 meant a location within Area I that was 70 ft to the east and 80 ft to the south of the origin. The grid system is shown in Figures 5-1 and 5-9.

2.1.2 Overburden Removal

2.1.2.1 Asphalt

Prior to the start of the RA, California Pavement Maintenance, a subcontractor, removed and pulverized the asphalt overlaying DST 2, the distribution box, piping, the three dry wells and a portion of the leach trenches. Approximately 152 cu yd of pulverized asphalt were transported to the former Cobalt-60 (Co-60) Field for temporary storage. Additional sections of asphalt were later removed using the excavator bucket and stockpiled in the former Co-60 Field.

2.1.2.2 Soil

Approximately 441 cu yd of overburden soil were removed during the course of the RA. Soil excavated from the ground surface to a maximum depth of four ft bgs, depending on the location of subsurface structures, was considered overburden. This determination was made based on on-site laboratory results. The overburden was stockpiled in Aisle C of the WDPs.

2.1.3 Demolition and Excavation Activities

2.1.3.1 Domestic Septic Tank 2, Distribution Box and Piping

DST 2 was demolished using a hydraulic breaker attachment to the excavator. The tank was constructed of reinforced concrete. The tank dimensions were 8 ft wide by 16 ft long by 10 ft deep. The excavation in this area reached an approximate depth of 12 ft bgs. The top two to four ft of soil were classified as overburden and stockpiled in the WDPs to minimize the amount of low-level radioactive waste generated. The concrete, rebar, tank sediments and surrounding soil were packaged in B-25 boxes and handled as LLW. Following the excavation, two 8-ft by 8-ft trench shields were installed to provide slope stability for worker safety and future sampling activities.

The effluent piping from both DST 2 and the Ra-226 Tank led to a distribution box (Figure 1-2). This cast iron piping totaled 30 ft in length. At the distribution box, vitrified clay piping totaling 80 ft in length was connected to each of three dry well structures. The RA began at DST 2 and moved west to the distribution box. Figure 2-2 shows the Area I excavation boundaries and the structures that were removed.

2.1.3.2 Northern and Southern Leach Trenches

Based on historical information such as drawings and field investigations, it was assumed that no leach trench existed north of Dry Well (DW) 1. During excavation activities near the distribution box, the Northern Leach Trench was discovered. Excavation of the Northern Leach Trench commenced following the removal of the upper dry well structures (zero to ten ft bgs) and the Southern Leach Trench.

Based on the lack of historical information, it was assumed that the Southern Leach Trench terminated approximately 91 ft south of DW 3 (WA, 1998a). However, the Southern Leach Trench extended south for 145 ft from DW 3. The Northern Leach Trench began at DW 1 and continued north for 50 ft. Leach trench widths measured between four and six ft, and depths ranged from 10 to 16 ft bgs. The upper two to four ft of soil were excavated and stored in the overburden stockpile. Beneath this soil, a textile fabric was found above the cast iron leach line (Figure 2-3). This four-inch (in.) diameter leach line extended approximately 145 ft south from DW 3 and 40 ft north from DW 1. The Southern Leach Trench pipe was solid for the first 10 ft, then became perforated for the remaining 135 ft. The leach line was embedded in one to two ft of two-inch diameter gravel. Beneath the gravel, cobbles up to one foot in diameter filled the remainder of the trench.

2.1.3.3 Radium Dry Wells

The three dry wells consisted of an upper and lower structure. The upper structure consisted of a three-foot diameter concrete manway that extended approximately 7.5 ft bgs (Figure 2-4). The lower section of the manway was filled with two-in. gravel, which continued for approximately one to two ft beneath the bottom of the manway. Beneath this gravel, large cobbles up to one foot in diameter filled a 2.5 ft-diameter column that extended to a depth of about 42 ft bgs. The upper 10 to 16 ft of the dry well structures were removed following excavation of the distribution box.

Excavation began at DW 1 in the north and proceeded south. The dry wells were removed in two stages because of space and equipment limitations.

After backfilling and compacting the upper dry well area, Agra Foundations, Inc. mobilized to the Site to remove the lower portion of the dry wells. The lower portions of the dry wells were removed as follows:

- DW 1 was drilled out to a depth of 43 ft bgs using a 6-ft diameter auger;
- The drill rig was mobilized to DW 2 with an 8-ft diameter auger and drilled to 42 ft bgs;
- The rig returned to DW 1 and over-drilled it with a 10-ft diameter auger to 20 ft bgs to remove residual contamination;
- Bins were dumped into a stockpile prior to SuperSack loading. All of the soil and cobbles removed by the drill rig were temporarily loaded into a custom-built steel bin. Compact excavators were used to load material from this bin into SuperSacks for waste disposal;
- A specialized down-hole video unit was used to confirm that all the dry well cobbles had been removed.
- Excavation screening samples were collected during dry well removal as discussed in Section 5.1. Screening samples collected from the DW 1 and DW 2 sidewalls at depths ranging from 15 to 25 ft bgs had elevated Ra-226 concentrations. Additional soil was removed in these areas by increasing the boring diameter to 12 ft. When no excavation screening samples had elevated activities, confirmation samples were collected (Figure 5-10);
- Portions of the dry well excavations were backfilled with controlled low-strength material (CLSM). The CLSM consisted of a blend of aggregate, cement, pozzolans, water and other admixtures. DWs 1 and 2 were then filled with CLSM to eight ft bgs. The remainder was temporarily backfilled to grade with sand so that the drill rig could mobilize to DW 3; and,
- DW 3 was drilled out to a depth of 42.5 ft, using a 10-ft diameter auger. DW 3 was then filled with CLSM to approximately ten ft bgs and backfilled to grade with clean fill.

2.1.4 Shoring

In order to protect the water, gas and sanitary sewer lines, shoring was used during Area I excavation activities. Shoring was also used to minimize the amount of clean soil that sloughed onto the excavation floor. A trench shield and steel plates were used to shore the DST 2 excavation area and the upper dry well excavation area. Trench jack shoring with plywood were used in the Northern and Southern Leach Trench excavations to protect the utility lines.

2.1.5 Sampling, Backfill and Compaction

Prior to backfilling, confirmation samples were collected from the sidewalls and floors of the excavations and analyzed for a full suite of COCs including radionuclides, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), metals, hexavalent chromium, and nitrate. Sampling activities and analytical results are discussed in Section 5.

Approximately 1,700 cu yd of soil were required for backfilling of the excavations. An off-site source of clean backfill soil was identified in the West Sacramento area. The soil vendor (Manley and Sons Trucking, Inc.), indicated that the material originated from a location near the LEHR facility and had been used for levee construction by the US Army Corps of Engineers in the 1960s.

Eight representative samples were collected from the imported soil stockpile and analyzed for radiochemicals using EPA methods and laboratory standard operating procedures (SOPs). Two of the eight samples were also analyzed for VOCs and SVOCs, pesticides/PCBs and metals using EPA Contract Laboratory Program (CLP) methods. Hexavalent chromium and nitrate were also analyzed using EPA methods.

In addition to the chemical and radiochemical analyses, geotechnical tests were performed on the imported fill, including a hydraulic conductivity (permeability) test using American Standard for Testing and Materials (ASTM) Method D-5084 and compaction (moisture-density relationship) test using ASTM Method D-1557. Based on the analytical results, the imported fill material did not contain chemicals or radionuclides at concentrations significantly above background or risk-based action standards (RBAS)/residential preliminary remediation goals (PRG) (10^{-6} risk), and was therefore deemed suitable for use as backfill at the Ra/Sr Treatment Systems Area. The material exhibited an average permeability of 2×10^{-6} centimeters per second as measured by ASTM Method D-5084, at a compaction of 95%.

Prior to the start of backfilling, a professional land survey crew surveyed the excavation boundaries and confirmation sample locations. The excavations were then cleared of loose material and a permeable geotextile fabric was placed at the bottom and along the sides of the excavations to mark the extent of the excavations. Backfill soil was placed in 8-in. loose lifts and compacted to the required minimum of 85% compaction in the unpaved areas and 90% compaction in the paved areas. Compaction was conducted using a sheepsfoot roller and a vibratory compactor. In-place soil density and moisture content were determined using a portable nuclear density/moisture gauge.

2.1.6 Site Restoration and Demobilization

Site restoration activities consisted of replacing sewer lines, permanently rerouting gas and water lines along the western edge of the excavation and paving. The area immediately to the west of AH-1 was repaved using six inches of sub-base rock and three inches of asphalt.

During DST 2 demolition/excavation activities, a suspected abandoned sewer line (Figure 2-2) was breached at the joint when the soil beneath the line fell away. The line was capped, and approximately five cubic yards of liquid-impacted soil were segregated and sampled. Following RA activities, the sewer line was replaced.

The gas and water lines along the western edge of the excavation had to be rerouted to allow use of a ten-foot diameter auger for the dry well removal. An approximate 100-ft section of both the gas and water lines was permanently rerouted along the western edge of the excavation area. Figure 2-2 shows the construction details for the gas and water line reroutes. Finally, all equipment and personnel from the Ra/Sr Treatment Systems Area were demobilized upon completion of the RA.

2.2 Area II Removal Action

2.2.1 Mobilization and Site Setup

WA and IT Corp mobilized to the site for the Ra/Sr Treatment Systems Area II RA in July 2000. Prior to mobilization to the site, the temporary wooden rain cover on top of the Sr-90 Tank was removed and disposed as non-hazardous waste. Also, UC Davis electricians removed a power pole, wires and transformers from Area II.

Area II setup activities consisted of:

- Removing a chain link fence located between Areas I and II;
- Moving air compressors from Area II;
- Installing temporary fencing around the excavation area and waste storage area perimeters;
- Installing a windscreen on perimeter fencing;
- Installing fencing to protect ground water monitoring wells located in the RA vicinity and near the transport routes;
- Removing one tree in the excavation area;
- Securing and sealing all doors and windows opening into Area II;
- Establishing the work area, storage area and the on-site laboratory;
- Weed abatement in the Western and Eastern Dog Pens and the Co-60 Field;
- Installing and testing scales for weighing the soft-sided containers;
- Conducting an underground utility survey of the Ra/Sr Treatment Systems Area II and waste transport route; and,

- Sampling wood debris in the Sr-90 Imhoff Tanks.

A ten-foot by ten-foot grid system was established throughout the Area II RA as the horizontal coordinate reference system for marking and locating objects in the field. The origin of the grid system was located in the northeast corner of the courtyard between buildings AH-1 and AH-2. The north-south grids were labeled with an "S" and numerically increased from "0" to "6". Similarly, the east-west grids were labeled with an "E" and increased from "0" to "10" from east to west. The grid system is shown in Figures 5-1 and 5-9.

A building stability analysis was initiated prior to commencing excavation activities. Survey brackets were installed on the exterior walls of AH-1 and AH-2 along the edges of the future excavation area. A builders level and leveling rod were used to establish baseline elevation measurements of the buildings surrounding the planned excavation area. Measurements taken during and after removal activities were identical to these baseline reference standards indicating there was no building deformation.

To decrease waste management and excavation operation costs, WA began using a soft-sided, 9.1-cu yd container (Lift Liner) system for storing contaminated soil and debris. These containers replaced the three-cubic yard, steel B-25 boxes and one-cubic yard SuperSacks used during the Area I RA. Steel loading and lifting frames were also used as part of this soft-sided container system. All construction crew members received training on the proper use and handling of these soft-sided containers and frames from the manufacturer's representative prior to the start of excavation activities.

2.2.2 Overburden Removal

The concrete walkway and slab located adjacent to AH-1 and AH-2 were sawcut, demolished, and stockpiled in the former Co-60 Field. The concrete slab from a former building east of the Sr-90 Tank was also demolished and removed. Approximately 30 cu yd of overburden soil and gravel were removed from the area above the Sr-90 Leach Field. Soil excavated from the ground surface to a maximum depth of 2.5 ft bgs was considered overburden because it was located above the Sr-90 Leach Field gravels. The overburden soil was transported to, and stockpiled in, the former Co-60 Field.

2.2.3 Demolition and Excavation Activities

The overall approach to excavation and transport of the contaminated soil and structures was to proceed from east to west, backing out of the courtyard confined by AH-1 and AH-2. Figure 2-5 presents the excavation boundaries and structures removed during the Area II RA. This allowed activities to start with the cleanest areas and progress to the most contaminated areas as the excavation proceeded. The limited access to Area II required careful planning and space management/optimization for efficient material handling activities.

Two hydraulic excavators, one equipped with a concrete crushing attachment, were used for demolition, excavation and loading activities. Contaminated soil and debris were loaded into Lift Liners and transported with a forklift to the waste storage areas shown on Figure 2-1. Water was used as a dust suppressant along the transport route during excavation activities.

2.2.3.1 Strontium-90 Leach Field and Radium-226 Influent Tank Lines

The Area II excavation began in the northeastern corner of Area II with removal of the Sr-90 Tank effluent leach lines. Four lines running west to east and two lines running north to south were removed. These leach lines were constructed of perforated, four-inch diameter Orangeburg pipe and were part of the Sr-90 Leach Field. One wooden effluent distribution box was also excavated from the leach field. The excavation width around these lines ranged from three to four ft, and excavation depth ranged from three to eight ft bgs.

Following removal of the Sr-90 Leach Field, the influent lines to the Ra-226 Tank were removed (Figure 2-5). These four-inch diameter cast iron pipes exited north through the foundation of AH-2 then turned west to the Ra-226 Tank. A parallel set of pipes connecting to the sanitary sewer west of Area II was also excavated and removed. All lead gaskets from the pipe sections were removed and segregated to minimize the amount of mixed waste generated. The excavation in this area was approximately five ft wide and four ft deep. All material excavated from the leach field and influent piping areas was handled as LLW. Most soil and debris were packaged in Lift Liners; however, some rebar and the iron pipe sections were packaged in B-25 boxes to avoid damaging the Lift Liners.

2.2.3.2 Radium-226 Tank

The Ra-226 Tank was exposed following removal of the tank's influent piping. The tank was constructed of concrete and heavily reinforced with steel rebar. The tank dimensions were 8 ft wide by 40 ft long by 8 ft deep. It was buried under approximately three ft of soil.

Upon removing the soil covering the Ra-226 Tank hatches, a black mastic thought to be an asbestos-containing material (ACM) was discovered on and around the hatches' upper surface. A certified asbestos consulting company, Anderson Consulting, was subcontracted to sample, analyze, monitor and recommend abatement measures. Analytic results indicated the mastic material was an ACM. A certified asbestos abatement company, Ecology Control Industries (ECI), was subcontracted to remove the ACM. Other Area II field activities were ceased during the ACM removal.

Following removal of the ACM, the Ra-226 Tank was rubblized using an excavator equipped with a universal processor. This material, as well as the surrounding soil and effluent piping, was packaged in Lift Liners and handled as LLW. The excavation depth ranged from 10 ft to 12 ft bgs.

2.2.3.3 Strontium-90 Tank

Prior to demolition of the Sr-90 Imhoff Tanks, samples from a coating on the tank cover were collected to determine if it was an ACM. The analytical results from these samples indicated that the

cover coating contained asbestos. ECI was again contracted to remove the ACM coating from the tank cover. Anderson Consulting provided air monitoring services, quality assurance/quality control (QA/QC) oversight during the ACM removal, and final verification that all ACM was removed and properly packaged for disposal.

Free liquid in the Sr-90 Tank was then pumped from Tanks B through I into 55-gallon steel drums equipped with plastic liners. A sump pump transported the water through a double-contained hose into the drums. During filling, the drums were placed on a secondary containment pallet and monitored with a liquid level sensing system to ensure no spillage of the contaminated water occurred. The drum filling activity was further protected by a containment berm system surrounding the area. The drums were sealed, strapped to a pallet and transported by forklift to the former Co-60 Field storage area. They were then unloaded from the pallets using drum lifting equipment mounted on a small excavator into a containment berm system for storage pending disposal. Approximately 3,000 gallons of water were pumped from the Sr-90 Tank.

The Sr-90 Tank and its cover were demolished starting in the south-east corner and proceeding north then west (Figure 2-5). Small amounts of free liquid remained in the tank after pumping. An absorbent manufactured by WaterWorks America, Inc. was added to this liquid to facilitate its removal.

All compartments of the tank were demolished prior to removing the sludge and debris from Tank A. Approximately 12 cu yd of sludge and debris were removed from Tank A prior to its demolition. This material was mixed with the same absorbent used previously and loaded into B-25 boxes equipped with plastic liners. The wooden tank cover and the concrete reinforced with rebar were packaged in Lift Liners and handled as LLW. The depth of the excavation in this area ranged from 8 ft to 12 ft bgs.

The influent piping to the Sr-90 Tank was removed from the area just north of the tank. The depth of the excavation in this area ranged from three to five ft bgs. Finally, all excavation equipment and tools were decontaminated prior to release from the contamination area.

2.2.4 Sampling, Backfill and Compaction

Prior to backfilling, confirmation samples were collected from the sidewalls and floors of the excavations and analyzed for a full suite of COCs. Sampling activities and analytical results are discussed in Section 5.

Approximately 1,600 cu yd of soil were required for backfilling the Area II excavation. Backfilling proceeded in eight-inch lifts while compacting with a double-drum sheepsfoot roller to an elevation of four ft bgs. From that elevation to finish grade, 8-in. lifts were placed and compacted to 90% relative compaction. One compaction test was conducted with a nuclear density gauge per 2,000 square feet (sq ft).

The backfill soil was from the same source discussed in Section 2.1.5. In addition to this soil, approximately 380 cu yd of overburden soil removed from zero to four ft bgs during the Area I excavation were also used as backfill. Prior to using the overburden soil as backfill, a comprehensive evaluation was conducted and presented to DOE and the RPMs for approval. The data used in this evaluation consisted of laboratory analytical results from 46 randomly selected composite soil samples collected from the overburden soil stockpile. Each sample represented a discrete 20-cu yd segment of the stockpile. In August 1999 and June 2000, WA collected overburden samples CWRSC025 through CWRSC047, and CWRSC061 through CWRSC083, respectively. Four of the overburden soil stockpile samples were field duplicates. Samples CWRSC025 through CWRSC047 were analyzed for radionuclides, VOCs, SVOCs, pesticides/PCBs, metals, hexavalent chromium, and nitrate. Samples CWRSC061 through CWRSC083 were additional samples analyzed for total lead. Appendix F presents the analytical data for the samples collected from the overburden soil. Sixty cu yd of soil associated with samples CWRSC029, CWRSC031, and CWRSC038 were segregated for re-sampling and off-site disposal.

WA evaluated the overburden soil data to determine:

1. Whether reuse of the overburden soil as backfill in the Ra/Sr Area II RA excavation poses unacceptable health risks.
2. Whether reuse of the overburden soil as backfill might impact ground water.
3. Whether the overburden soil contains radionuclides above background activities and is therefore classified as radiation-added material per DOE Order 5400.5.
4. Whether hazardous constituents as defined by the Resource Conservation and Recovery Act are present.

The overburden evaluation indicated that 380 of the 440 cu yd of overburden were suitable for backfill in the Area II excavation. The remaining 60 cu yd were segregated and disposed properly. Material used as backfill was placed between two and four ft below final grade.

2.2.5 Site Restoration and Demobilization

Site restoration activities consisted of paving, installing a chain-link fence and winterizing the excavation area. The area east of the excavation was repaved. A chain-link fence was replaced along the eastern edge of the excavation. Following backfill and compaction, high density polyethylene (HDPE) sheeting was placed over the Area II excavation and secured with sand bags to prevent infiltration of rainwater.

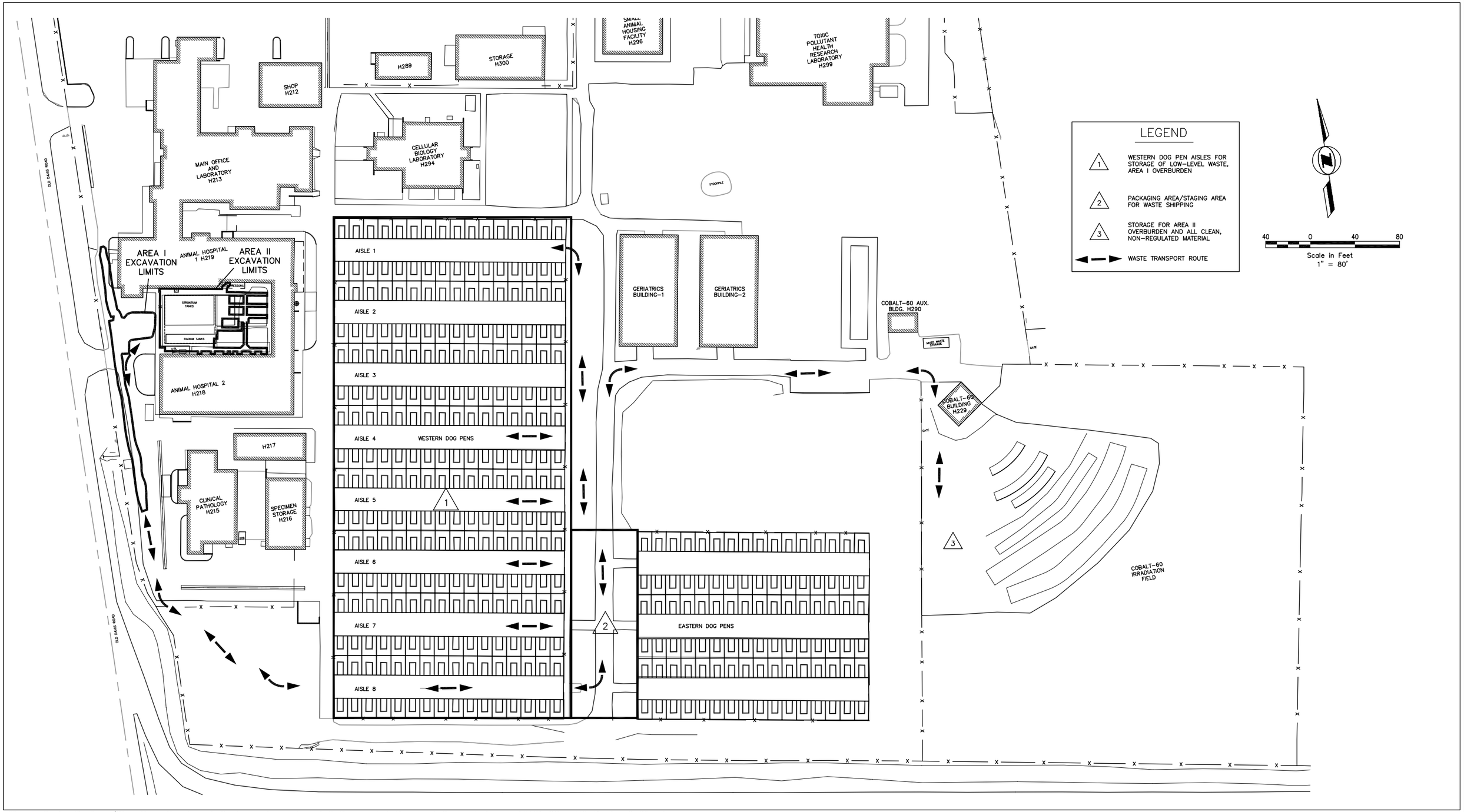

Figure 2-1. Radium/Strontium Treatment Systems Areas I and II Removal Action and Support Areas, LEHR Site, UC Davis, California

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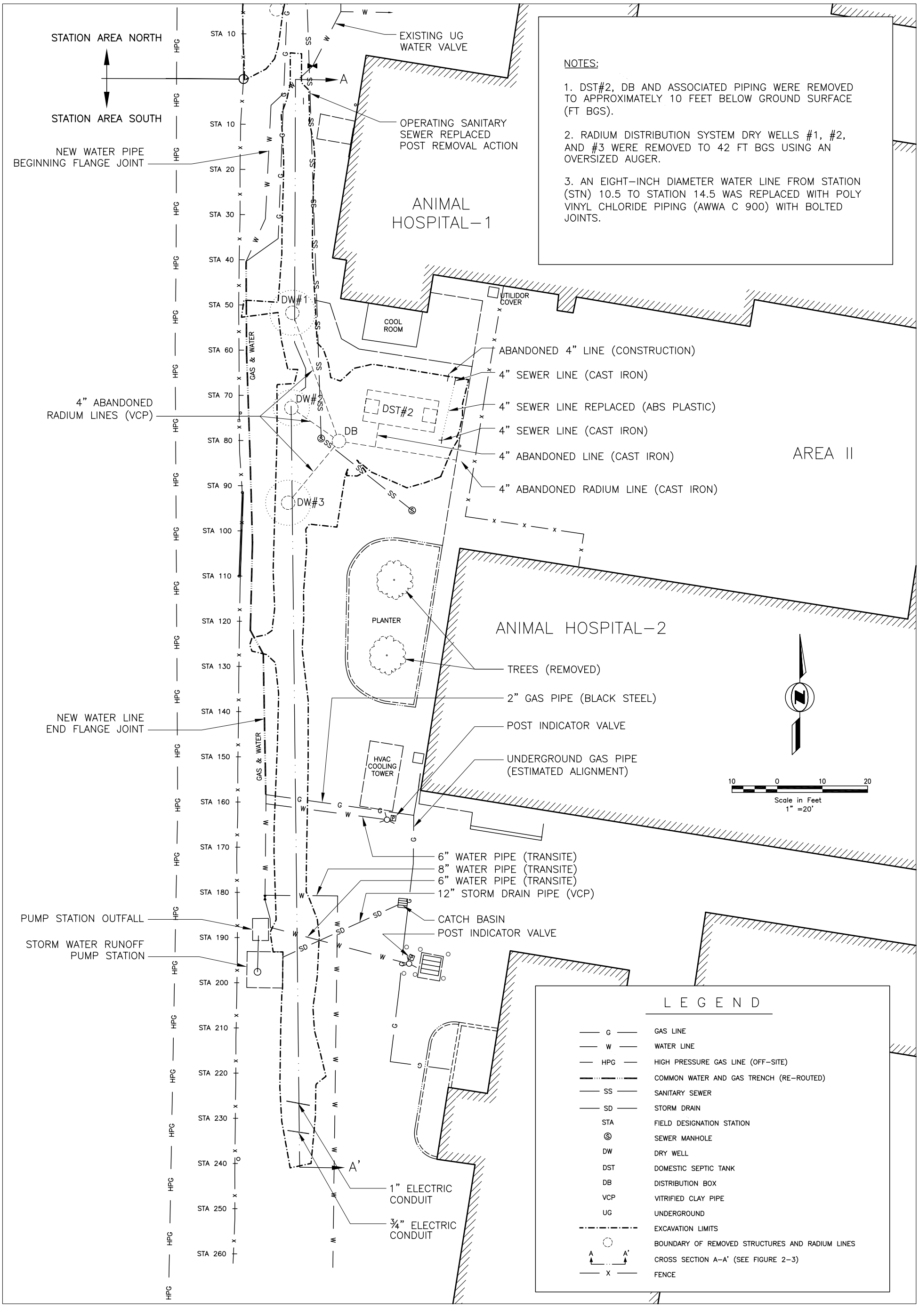

Figure 2-2. Radium/Strontium Treatment Systems Area I Site Features, Showing As-Built Underground Utilities, Radium Distribution System and Excavation Limits, LEHR Site, UC Davis, California

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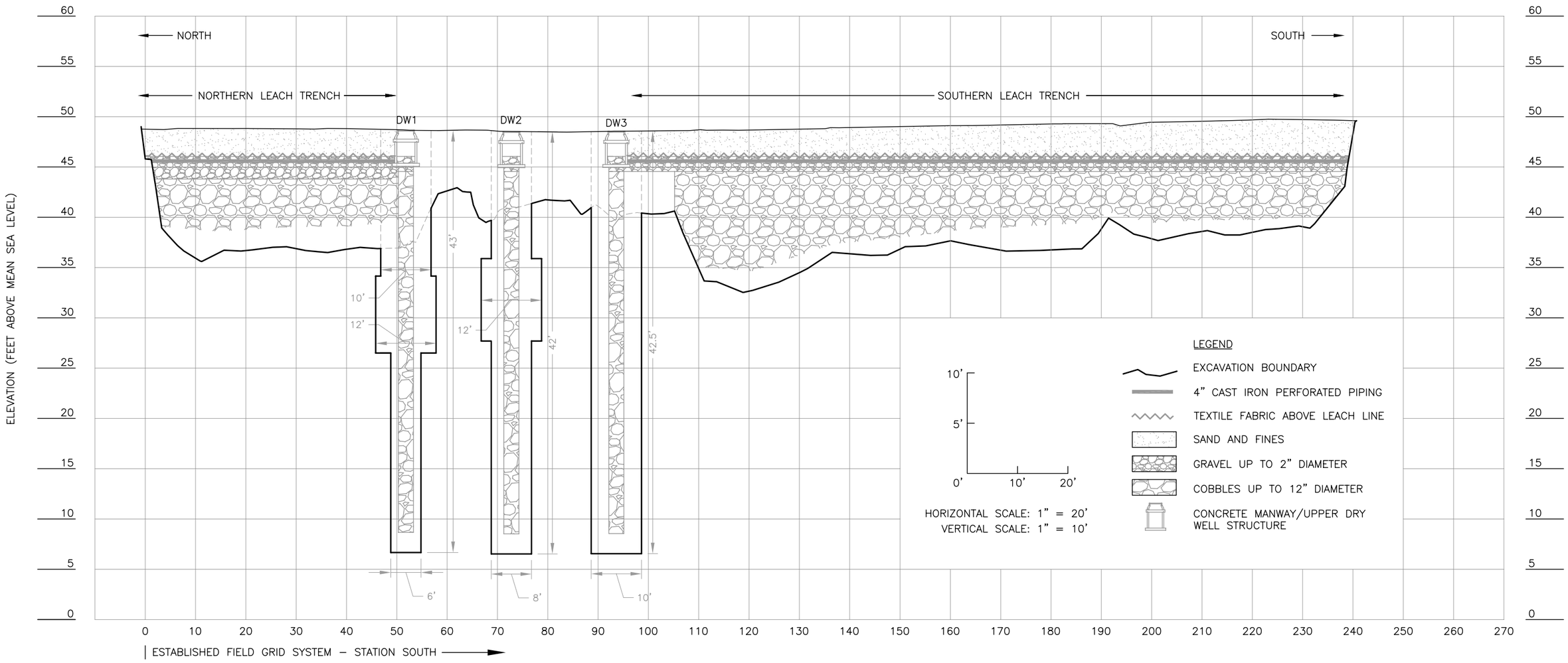

Figure 2–3. Cross Section A–A' Along Dry Wells and Leach Trenches, Radium/Strontium Treatment System Area I, LEHR Site, UC Davis, California

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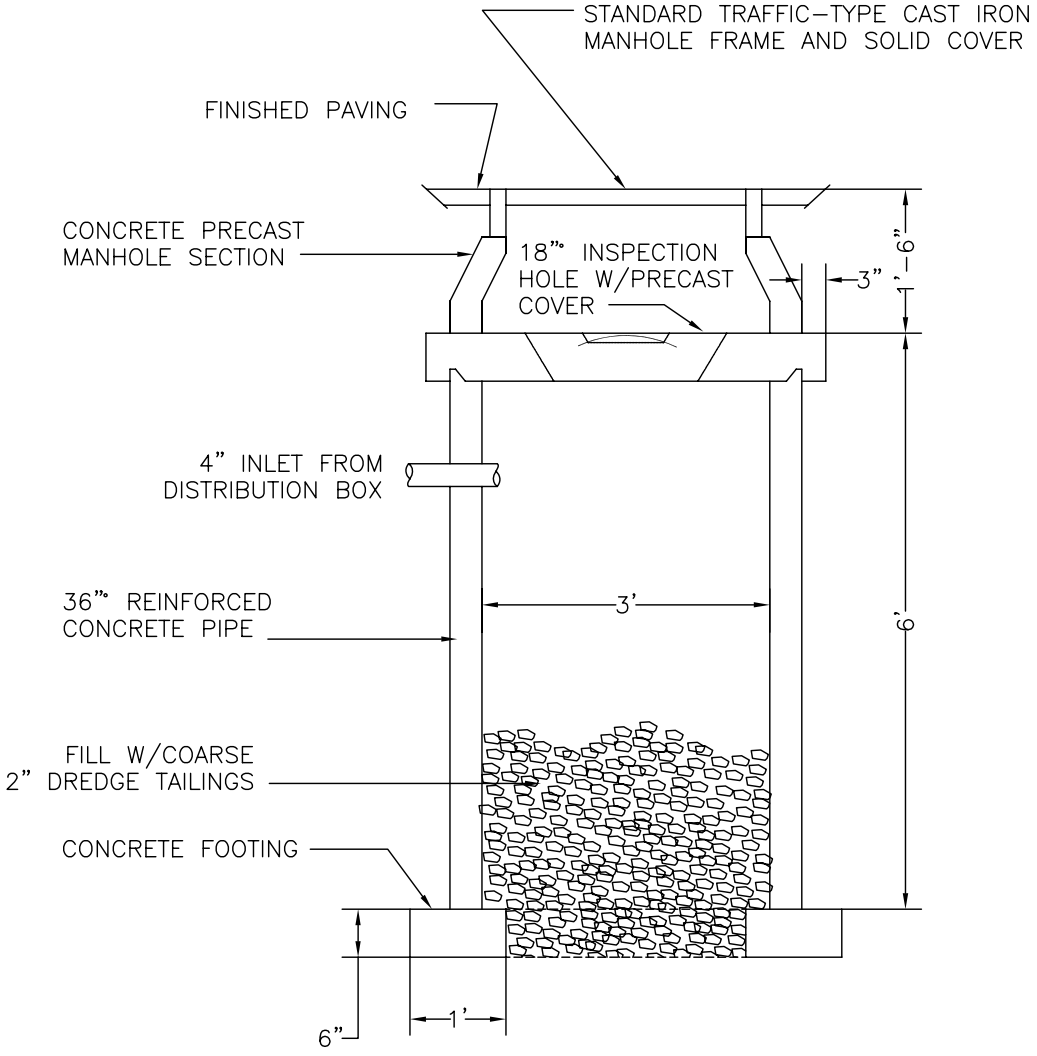

Figure 2-4. Upper Radium Drywell Structure, LEHR Site, UC Davis, California

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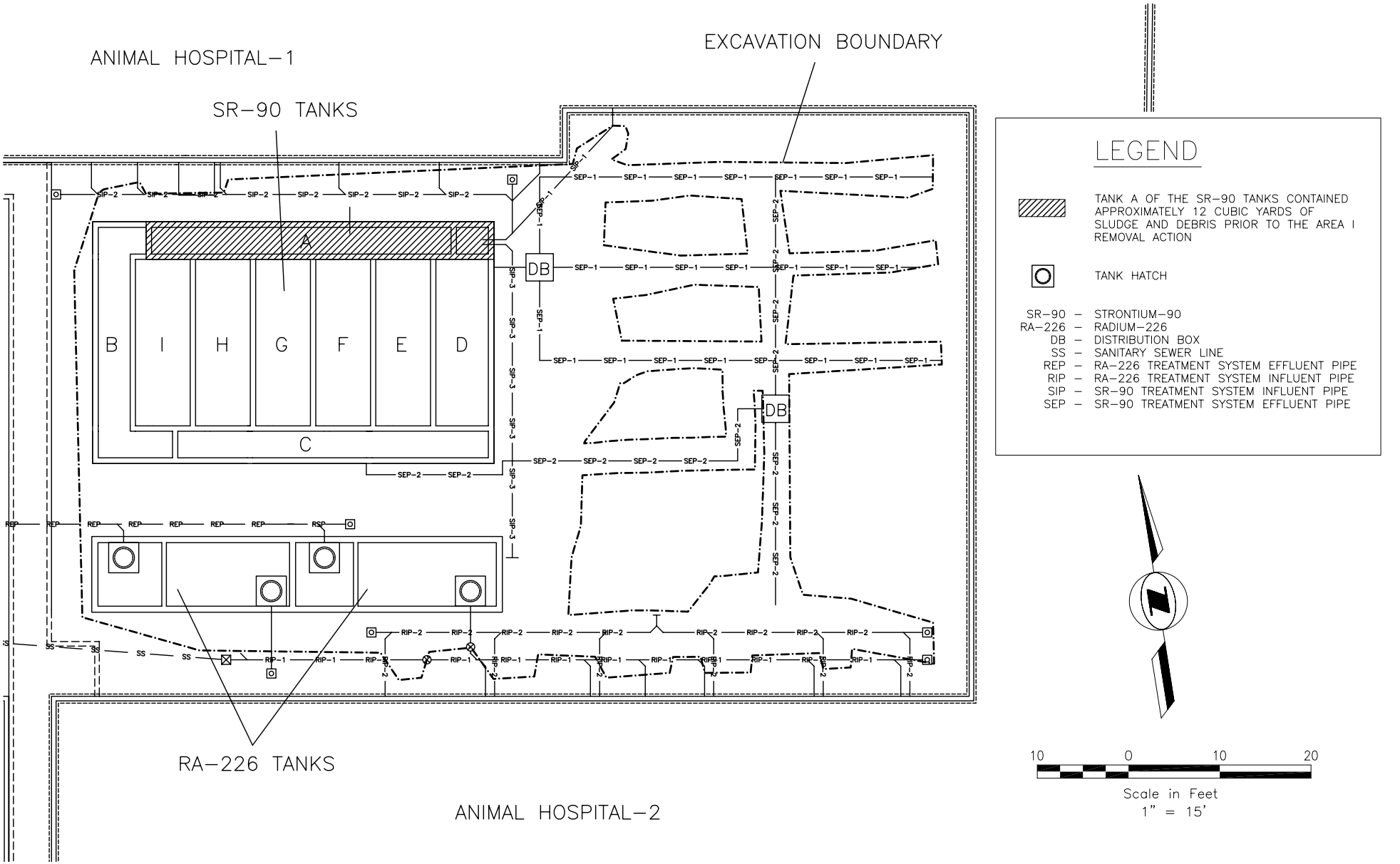

Figure 2-5. Radium/Strontium Treatment Systems Area II Excavation Boundary, LEHR Site, UC Davis, California

WEISS ASSOCIATES

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3. WASTE MANAGEMENT ACTIVITIES

This section describes the waste management activities performed at the Ra/Sr Treatment Systems Area during the RA. Waste management activities commenced with excavation and segregation of the waste and will conclude with disposal at appropriate facilities discussed in greater detail in this section. During the RA, waste consisting of soil, gravel, concrete, piping and miscellaneous solid waste, such as PPE and RA-related construction debris, was generated. Each waste stream was managed based on its origin, characteristics, and expected classification. The following section discusses the characterization, handling and packaging, and final disposition of each waste stream.

3.1 Area I Removal Action Waste

3.1.1 Asphalt and Overburden Soil

Approximately 150 cu yd of asphalt were pulverized and removed prior to and during the RA. The pulverized asphalt was transported to the former Co-60 Field for storage. Approximately 440 cu yd of overburden soil were excavated during waste removal activities. The top four ft of soil at the Ra/Sr Treatment Systems Area were removed from an area of approximately 3,200 sq ft. The soil was transported to Aisle C of the WDPs (Figure 2-1) and stockpiled in HDPE cells. Historical analytic data were used to segregate clean overburden from contaminated waste. The on-site laboratory was used to guide the limits of excavation to minimize excavation of clean native soils below or adjacent to contaminated waste.

3.1.1.1 Characterization

Eight four-point composite samples and one duplicate were collected from the asphalt stockpile. Twenty-three (including two field duplicates) four-point composite samples were collected from the overburden stockpile. Both the pulverized asphalt and overburden soil were sampled to determine if they were suitable for use as backfill following completion of excavation activities (WA, 1998d). The characterization results are presented in Appendix A.

3.1.1.2 Storage

The overburden soil was stored in a stockpile wrapped in 20-mil HDPE in Aisle C of the WDPs. The stockpiles were designed such that rainfall would not infiltrate the pile or pond on the piles. Lumber (two-inch by four-inch planks) and nails were used to secure the top and bottom liners against wind and rainfall. The storage area is secured and posted in accordance with LEHR SOP 34.2, Low-Level Radioactive Waste Storage; SOP 34.4, Clean Waste Handling; and applicable

regulatory standards. The asphalt was stored on HPDE in the former Co-60 Field while it was properly characterized prior to its reuse on site. Approximately 360 cu yd of the Area I overburden, characterized and designated as clean soil, were used as backfill following completion of the Ra/Sr Area II RA. The remaining 80 cu yd were rejected for on-site reuse following statistical analysis of post-removal action sampling data. This soil and double-bagged transite pipe (non-friable asbestos) were packaged in 9.1-cu yd Lift Liners.

3.1.1.3 Disposal

Disposal options for the 80 cu yd of overburden that were rejected for on-site reuse and the double-bagged transite pipe are being evaluated. The rejected overburden soil shall be shipped for disposal by December 31, 2001.

3.1.2 Radium/Strontium Treatment System Area I Waste

LLW excavated from the Ra/Sr Treatment System Area was placed in steel B-25 box containers or SuperSacks and transported to the WDPs aisles for temporary storage. All of the dry well waste removed using the oversized auger was placed into SuperSacks. All other waste removed during the Area I RA was placed in B-25 boxes, except for lead pipe joints and transite pipe. The lead joints were segregated from the pipe sections and other waste types to minimize the volume of mixed waste. The transite pipes were double-bagged and eventually packaged in Lift Liners for disposal as LLW.

The SuperSacks were manufactured by B.A.G. Corp. The SuperSacks have a volume of 27 cu ft and are made out of woven polypropylene. Dry well soil and debris removed using the auger were loaded into a steel bin which was transported and emptied into temporary stockpile. Compact excavators loaded SuperSacks from this stockpile.

The B-25 boxes were obtained from the Savannah River DOE facility, and were manufactured by Container Products Corporation. Because these surplus boxes were previously used, refurbishing activities included sanding, removing rust, removing old decals, and painting. The boxes were then transported to the paved aisles of the WDPs.

Two different types of B-25 boxes were utilized for packaging waste. Either a 14-gauge or a 12-gauge carbon steel-frame box was used for LLW packaging. The 14-gauge box design was called the “light box,” since its equivalent maximum payload capacity was up to 7,000 pounds (tare weight of 460 pounds). The 12-gauge box design was called the “heavy box,” since its equivalent maximum payload capacity was up to 11,000 pounds (tare weight of 575 pounds). Both B-25 box types have an approximate external volume of 96 cu ft.

Approximately 1,275 cu yd of waste were removed during the Ra/Sr Treatment Systems Area I RA. The Area I LLW package type, quantities, and anticipated disposition are listed in Table 3-1. If the container had 10% or more by volume of PPE, piping, concrete or cobbles, it was classified as debris based on the Envirocare of Utah Waste Acceptance Criteria (WAC).

3.1.2.1 Characterization

A minimum of one waste characterization sample was collected for each structure (i.e., distribution box, DW, etc.) and analyzed for a full suite of COCs.

3.1.2.2 Storage

Sealed B-25 boxes and SuperSacks were moved to the WDPs where they were properly labeled. The SuperSacks were covered by 20-mil HDPE. Lead pipe joints stored in three 55-gallon drums were housed in Geriatrics. Each waste package was logged into the LEHR Waste and Material Tracking System as described in SOP 34.5, Waste and Material Tracking System and in the Waste Management Plan (WA, 2000c).

The storage area is secured and posted in accordance with the Technical Guidance Document for Waste Management (WA, 1999a), the Radiological Protection Program (RPP) (WA, 1998a), SOP 34.2, Low-Level Radioactive Waste Storage and SOP 34.4, Clean Waste Handling.

3.1.2.3 Disposal

Between December 13, 2000 and March 23, 2001, 1,275 cu yd of soil and debris from Area I were transported by truck to Envirocare of Utah from for disposal as LLW.

3.1.3 Investigation-Derived Waste

During sampling activities, liquid from decontamination procedures was generated. Decontamination liquid was placed in four 55-gallon drums and stored in the former Co-60 Field. Each waste package was incorporated into the LEHR Waste and Material Tracking System as described in SOP 34.5, Waste and Material Tracking System, and the Waste Management Plan (WA, 2000c).

3.1.3.1 Characterization

No characterization samples were collected of the Area I decontamination water.

In order to minimize the generation of additional LLW, Area I decontamination liquid was reused as dust suppressant during the removal, processing and packaging of Ra/Sr Area II waste.

3.1.3.2 Storage

The four drums of decontamination water were sealed, assigned waste tracking numbers and transported to the Geriatrics I building and placed on spill containment pallets. Because the material was generated from a radioactive material management area, it was managed as a potential LLW. The storage area was secured and posted in accordance with the Technical Guidance Document for Waste Management at LEHR (WA, 1999a); the RPP; and LEHR SOPs 34.2, Low-Level Radioactive Waste Storage and 34.4, Clean Waste Handling.

3.1.3.3 Disposal

Decontamination liquids were re-used as dust suppressant during the removal, packaging and processing of Ra/Sr Area II waste and as such will be dispositioned at the Nevada Test site with the majority of Ra/Sr Area II waste.

3.2 Area II Removal Action Waste

3.2.1 Overburden Soil

Approximately 40 cu yd of overburden soil were segregated during the Ra/Sr Area II RA. Based on the detection of COCs above the RBAS, the soil was designated as LLW and was disposed at Envirocare of Utah.

3.2.2 Radium/Strontium Treatment System Area II Waste

LLW excavated from Area II was placed in Lift Liners and transported to the WDP aisles for temporary storage. The Lift Liners were manufactured by Transport Plastics and have a volume of 258 cu ft. The soft-sided waste packaging system includes a 25-mil woven outer polypropylene fabric shell with a 2-mil water resistant coating and a 45-mil double-layer polypropylene inner liner. These waste containers were selected because of their capacity relative low cost and loading efficiency.

The sludge removed from Tank A was solidified using an absorbent manufactured by WaterWorks America, Inc. and loaded into lined B-25 boxes.

The mastic and asbestos sections of the tank covers were removed and packaged by a licensed asbestos abatement contractor in accordance with applicable state and federal law. The LLW package types and intended disposition are listed in Table 3-2. This waste is currently being designated and may contain hazardous constituents. If the waste is designated as containing radioactive contaminants and chemical contaminants the waste will be dispositioned within 90 days of designation.

3.2.2.1 Characterization

Using process knowledge, previous investigation findings, and RA observations, waste characterization sampling was based on the Unique Domains Method (UDM). The UDM objective is to collect at least one sample for each continuous domain identified (e.g., a continuous disposal trench, leach field, distribution box) and for each media found within that domain (e.g., soil, concrete, wood, etc.). These samples are intentionally biased towards the most contaminated portion of the media. Process knowledge and field observations, including radiation surveys and

photoionization detector (PID) readings, were used to determine the sample locations. Because the UDM relies on real-time field observations, specific sample location decisions were the responsibility of the Waste Coordinator or his designee, and were documented in the Waste and Material Tracking System. It is necessary that all waste sampling meet the WAC of the disposal facility.

Specific structures and waste streams were targeted and any non-conforming waste items were sampled. In general, the waste was sampled at a rate of one sample per 100 cu yd. Sample results are contained in Appendix A.

3.2.2.2 Storage

Area II waste is currently stored in the Eastern Dog Pens, the former Co-60 Field and the Geriatrics building.

3.2.2.3 Disposal

The majority of the Ra/Sr Area II waste is expected to be classified as LLW and will be shipped to the Nevada Test Site and/or Envirocare of Utah for disposal.

Ninety drums of Sr-90 Tank storm water and equipment decontamination water will be solidified and sent to Envirocare of Utah as solid LLW.

Seventeen cubic yards of sludge and debris from the Sr-90 Tank will be shipped to Hanford for disposal as LLW. Free-liquids in the sludge were stabilized with an absorbent. A vibration test followed by US EPA's Paint Filter Test (SW-846, Method 9095) was completed and the sludge was determined to contain no free liquids. All void space was filled with wood chips per the Hanford WAC.

Table 3-1. Area I Waste, LEHR Site, Davis, California

Description	Package Type	Number of Packages	Anticipated Disposal Site
Soil	B-25	30	Envirocare
Debris	B-25	199	Envirocare
Soil	SuperSack	222	Envirocare
Debris	SuperSack	175	Envirocare
Tree	Stockpile	1	Envirocare
Overburden—Debris	Lift Liner	2	Envirocare
Overburden—Soil	Lift Liner	8	Envirocare
Debris (lead joints, pipes)	55-gallon drum	3	Envirocare

Table 3-2. Area II Waste, LEHR Site, Davis, California

Description	Package Type	Number of Packages	Anticipated Disposal Site
Soil	Lift Liner	104	Nevada Test Site
Debris	Lift Liner	50	Nevada Test Site
Soil	Lift Liner	10	Envirocare
Debris	Lift Liner	10	Envirocare
Rain Water	55-gallon drum	88	Envirocare
Asbestos-Containing Roofing Material	B-25 Box	2	Envirocare
Tank A Sludge	B-25 Box	4	Hanford
Debris	B-25 Box	2	Envirocare

4. HEALTH AND SAFETY ACTIVITIES

Health and safety for the Ra/Sr Treatment Systems Area RAs was conducted according to the following documents: the Integrated Safety Management Description (WA, 2000b) the Project Health and Safety Plan (PHSP) (WA, 2000d); Health and Safety Procedures (HSPs) (WA, 1999b) and SOPs (WA, 1999c); the Contingency Plan and General Emergency Response Procedures (WA, 1998c); the RPP (WA, 1998a) and the As-Low As-Reasonably-Achievable (ALARA) Program (WA, 1997a). The H&S activities described in this section, coupled with the foregoing listed documents, are the H&S program required by 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and 10 CFR 835, Occupational Radiation Protection, for the work activities at the Ra/Sr Treatment Systems Area.

4.1 Identified Potential Chemical Exposure

The following Ra/Sr Treatment Systems Areas RA activities were identified as presenting potential for chemical exposure to the workers through contact, ingestion and inhalation:

- Soil excavation;
- Concrete demolition;
- Soil stockpiling;
- Waste material (i.e., soil, concrete, etc.) sorting;
- Soil and concrete packaging;
- Soil sampling;
- Removal of an asbestos-containing water pipe; and
- Removal of an asbestos-containing Sr-90 Tank cover.

The constituents of potential occupational concern identified during pre-RA waste characterization were SVOCs. Asbestos exposure was identified as a potential hazard associated with the handling and packaging of asbestos-containing transite water pipe in Area I and the removal of the Sr-90 Tank cover in Area II. Respirable dust was considered a potential hazard during all soil handling activities.

Contaminated soil excavation, stockpiling, sorting, packaging and sampling presented potential exposure to radioactive materials through contact, ingestion and inhalation. The predominant radionuclides used during prior animal research activities were Ra-226 and Sr-90.

Based on previous investigations and RAs, the radionuclides of concern from an occupational exposure standpoint during the RA activities appeared to be limited to Ra-226 and Sr-90.

4.2 Exposure Control Methods

4.2.1 Personal Protective Equipment

During the RAs, contact with chemicals was evaluated and controlled by the proper use of PPE. At minimum, modified Level D PPE (Tyvek coveralls, gloves, booties, safety glasses and hard hats) was donned during all activities with the potential for contact with contamination described in Section 4.1. Ingestion of chemicals was minimized by use of proper personal hygiene (e.g., washing of hands and face).

Level C PPE, with full-face air-purifying respirators and asbestos cartridges, was used during the handling of asbestos-containing transite pipe. Respirators were donned when removing, cutting and packaging this material.

Respiratory protection was also used during the first day of the asbestos-containing Sr Tank cover removal in Area II. Based on air monitoring data collected on the first day of this activity, the PPE was downgraded to modified Level D PPE with no respiratory protection.

4.2.2 Engineering Controls

Engineering controls were the preferred method to reduce airborne radioactivity and chemical exposure and were utilized in lieu of respiratory protection. Dust suppression with water spray was used to reduce potential exposure to respirable dust and other soil contaminants and to reduce the potential for internal and external radiation exposure to ALARA levels. Water spray was applied during excavation activities and to wet traffic routes.

Wetting of the asbestos-containing transite pipe with a water mist was used as an engineering control during the cutting and packaging of this material. Wetting to control airborne asbestos was also employed during removal of the Sr Tank cover.

Lock out and tag out procedures were used to control any potential release of natural gas and/or water during excavation activities in Area I around the natural gas pipeline and the water line. The lock out and tag out equipment on the gas and water shut-offs were inspected daily during this activity.

4.3 Chemical Air Monitoring

Air monitoring was essential to ensure that all field personnel were adequately protected from airborne contaminants. Air monitoring was conducted in accordance with HSP 6.1, Air Monitoring; HSP 14.1, Airborne Radioactivity Monitoring; and Section 11 of the PHSP and the RPP. All equipment was maintained and calibrated according to the manufacturer recommendations; SOP 25.1, Radiological Surveys and Instrumentation; and HSP 14, Airborne Radioactivity Monitoring.

All personal, integrated air monitoring samples and direct instrumentation readings taken for the purpose of determining appropriate H&S precautions were collected/taken in the approximate "breathing zone" of site personnel and integrated over an appropriate time interval. As appropriate, selective monitoring of high-risk workers (i.e., those closest to the source of contamination) was also conducted.

4.3.1 Direct Reading Instruments

During excavation, stockpiling, sorting and sampling activities, direct-read instrumentation was used to detect the presence and concentration of hazardous chemicals. The following monitoring equipment were used to obtain real-time field data:

- PID for organic vapors;
- Lower Explosive Limit/Oxygen detector for explosive gases and oxygen-deficient atmospheres; and
- Dust monitor for total nuisance dust.

Although no VOC exposure was expected, PID monitoring was conducted during RA activities as a precautionary measure to reduce the likelihood of potential exposure to unanticipated chemicals. The PID was also used to monitor potential VOC exposure during the removal of roofing material from the Sr-90 Tank cover. No VOCs were detected above the action limits specified in Section 6 of the PHSP and no PPE modification or additional control measures were necessary.

Monitoring was also conducted for explosive/flammable gases and oxygen-deficient atmospheres in areas near sewer piping and a natural gas line in Areas I and II. This monitoring was conducted to ensure that the natural gas line and sewer line were not breached during the RA activities, thereby posing a fire/explosion hazard to field staff. On one occasion during excavation activities in Area I, a natural gas leak was detected immediately after an operator accidentally breached the natural gas line. Immediate action was taken to secure the area, turn off the source of gas and repair the broken pipe. Monitoring was performed to ensure the area was free of hazards and work was allowed to resume.

Real-time continuous airborne dust monitoring was conducted periodically during the RAs using a hand-held dust monitoring device (DataRAM). The airborne dust levels remained below action limits set in Section 6 of the PHSP and never required PPE modifications.

4.4 Personnel Air Monitoring

Air samples were collected using air sampling pumps worn by workers likely to have the highest exposure. Time-weighted average (TWA) air samples were collected on polyvinyl chloride filters for analysis of dust exposures. Both nuisance respirable dust and total dust samples were collected and sent off site for analysis. The analyses indicated respirable or total dust levels were far below the prescribed action levels in Section 6 of the PHSP, confirming the accuracy of the real-time monitoring instruments. No additional control measures or PPE modifications were required.

4.5 Radiological Monitoring

General area radiological air monitoring was conducted daily as required by the Radiological Safety Officer (RSO) in locations near/in the work area having the highest potential for generating airborne radioactive contaminants. General area air samples were compared to airborne radioactive contaminants and their derived air concentrations (DACs) listed in 10 CFR 835, Appendix A. If the general air samples indicated that workers were exposed to airborne radiation contaminants greater than 10% of their respective DAC, then personal air samples (eight-hour TWA) would additionally be used to monitor worker exposure, and the RSO would take steps to reduce exposure through engineering controls. General area air samples did not indicate workers were exposed to airborne radioactive contaminants at any time. Therefore, personal air sampling for radionuclides was not conducted during the RAs.

Exposure to radionuclides was evaluated and controlled by the Radiological Control Technicians (RCTs) in accordance with SOPs and HSPs established as part of the RPP. Gross alpha, gross beta, and gross gamma readings were collected by RCTs using field procedures/analyses (Geiger-Mueller probe, scintillation detector) and utilized as indicators of the presence of radionuclides above background levels that may pose an occupational hazard. Ingestion of radionuclides was minimized by use of proper PPE and personal hygiene (e.g., washing of hands and face). The dosage limits for radiation exposure listed in Table 1 of HSP 15.1, External Radiation Exposure Control, were not exceeded at any time during the RAs.

The applicable ALARA procedures and principles presented in the ALARA Program were followed while conducting the RAs.

4.6 Physiological Monitoring

The RAs were conducted between May and October 1999 and July and September of 2000 when temperatures in Davis are typically between 90 and 110 degrees Fahrenheit. Wearing PPE in this elevated temperature period put workers at risk of heat stress. All workers had medical clearance prior to working on site and there was an acclimation period of one to three days for most workers. Daily measurements of weather conditions using a Wet-Bulb-Globe-Temperature instrument were collected and working conditions were evaluated to minimize heat stress. Based on weather

conditions and the PPE used, a work regime was established each day in accordance with Section 5 of the PHSP and HSP 3.1, Working in Hot Environments.

Heat stress prevention included the following mitigation measures: review of signs and symptoms of heat stress in daily tailgate safety meetings (TSMs); required proper rest prior to work; scheduled breaks; provision of Gatorade and water for field staff to ensure appropriate fluid intake; use of an air-conditioned room for short breaks in PPE; use of portable shade tarps, and rotation of heavy work tasks. The physiological monitoring included body temperature and heart rate measurements and visual observations of workers as discussed in Section 5 of the PHSP and HSP 3.1. During extremely hot days (temperatures in excess of 100 degrees Fahrenheit), work hours were adjusted to start at 5 A.M. to prevent work during the hottest hours.

4.7 Noise Monitoring

Noise surveys were conducted during RA activities using a noise level meter to determine the need for hearing protection. If noise levels exceeded the action limits stated in Section 5 of the PSHP, hearing protection was provided to field personnel and training was conducted during the TSM. Noise levels above 85 decibels were encountered during drilling and roller compaction activities, and consequently hearing protection was required for these activities. Signs were posted in areas of excessive noise, indicating the need for hearing protection.

4.8 Light Monitoring

Activities during the Area II RA were conducted through October 2000. In the early morning hours, between 5 A.M. and 6 A.M., light measurements were collected to ensure that sufficient lighting was available for work activities as defined in Section 5.4.2.10 of the PHSP.

4.9 Conclusion

Based on all the H&S monitoring conducted during the RAs, no action levels were exceeded that would have required PPE modifications and no additional engineering controls were implemented other than dust suppression. Workers were not exposed to any form of contamination. By extrapolation, other on-site personnel, off-site neighbors, and off-site receptors were not exposed to any contaminants during the Ra/Sr Treatment Systems Area RAs.

5. SAMPLING ACTIVITIES AND ANALYTICAL RESULTS

This section describes sampling activities and presents the analytical results associated with the Ra/Sr Treatment Systems Areas I and II RAs. Area I sampling activities commenced on May 19, 1999 and were completed by December 1999. Area II sampling activities commenced on August 2, 2000 and were completed by November 2000. All samples activities were conducted in accordance with the WP and project SOPs. Deviations from or modifications to the WP that resulted from field conditions have been incorporated into the discussion of sampling activities and analytical results.

5.1 Excavation Screening Sampling

Following the waste removal described in Section 2, soil samples were collected from the Area I and II excavations and analyzed to help guide removal activities and determine whether the screening criteria (SC) for the driver COCs were attained. SC represent the higher value of background or RBAS for each COC. Samples were collected from the sidewalls and bottoms of the excavation and analyzed for the three driver COCs: Ra-226, Sr-90 and nitrate. Ra-226 and Sr-90 analyses were conducted using the on-site laboratory and the nitrate analyses were conducted by an off-site laboratory.

The screening analytical results were compared to the SC defined in the RA WP:

- Nitrate = 36 milligrams per kilogram (mg/kg) (background value);
- Ra-226 = 0.75 picoCuries per gram (pCi/g) (background value); and,
- Sr-90 = 10 pCi/g (RBAS value).

5.1.1 Sampling

The screening samples were collected at approximate ten-foot intervals along the length of the excavation. Visual observation and field monitoring instruments were also used to select screening sample locations. Sidewall samples were collected at one or two depths based on the excavation depth. Sidewall samples were collected at five-foot depth intervals. If the excavation depth was less than ten ft, one sidewall sample was collected. Sidewall samples were collected 6 to 12 in. into the sidewall soil. Samples from the bottom of the excavation were collected approximately 12 in. below the excavation floor. Figure 5-1 shows the Area I and II excavation screening sample locations.

5.1.2 Area I Analytical Results

In the Area I excavation, 178 screening samples (including 15 field duplicates) were collected and analyzed for Ra-226, 166 samples (including 15 field duplicates) were analyzed for Sr-90, and 162 samples (including 15 field duplicates) were analyzed for nitrate. Screening sample results from the Area I excavation are shown in Table 5-1.

Of the 178 samples analyzed for Ra-226, 7 samples were above the SC of 0.75 pCi/g (4%). Four of these seven came from the areas directly surrounding the dry wells and were later removed using an oversized auger. The other three were just above background at 0.76, 0.76 and 0.82 pCi/g, respectively. Additional excavation was conducted in the areas where the samples with above-background concentrations were detected. Additional sampling in these areas confirmed that Ra-226 concentrations were below the SC. All 166 Sr-90 samples were below the SC of 10 pCi/g.

Fifty-seven (35%) of the 162 nitrate samples were above the 36 mg/kg SC. Nitrate isoconcentration contours are presented in Figure 5-2. Potential sources of the nitrate in soil are the sanitary sewer line, DW 2 and DW 3. The screening and DL analysis associated with these nitrate concentrations are discussed in Section 6.

5.1.3 Area II Analytical Results

A total of 116 Area II screening samples were analyzed for Sr-90, 113 samples were analyzed for Ra-226, and 98 samples were analyzed for nitrate. The total number of samples collected for each analysis varies because additional samples were collected from certain areas to determine if hot spots were present. A total of ten field duplicates were collected. The Area II screening sample results are presented in Table 5-2. All of the Area II screening sample analytical results were below the SC.

5.2 Dry Well Delineation

5.2.1 Sampling

Prior to excavating and removing the three dry wells, the extent of contamination in their vicinity was defined. To delineate the lateral and vertical extent of contamination from each dry well, soil samples were collected in all four directions in each dry well to the water table. Dry well delineation samples were collected between August 10 and August 21, 1999 using a direct-push drill rig and were analyzed for nitrate, Ra-226 and Sr-90. Ra-226 and Sr-90 analyses were performed by the on-site laboratory using a gamma spectrometer and a beta scintillation detector (BetaScint device), respectively. Nitrate samples were analyzed by an off-site laboratory.

A minimum of four borings were drilled around each dry well. When on-site laboratory analysis indicated a Ra-226 concentration above the screening criteria, additional borings were drilled. Sample locations were in a spiral pattern around the dry wells in one-foot contour intervals. The first sample location was placed approximately three to four ft from the center of the dry well in the eastern direction. Starting at the first sample location, samples generally spiraled outward in a clockwise fashion. Samples were collected at approximately 5-ft intervals at depths ranging from 10 to 41 ft bgs. The first ten ft were not sampled because soil in this area had already been removed and consisted of clean import fill. Figures 5-3 through 5-8 show dry well delineation sample locations and Ra-226 and nitrate concentrations that exceeded the SCs.

5.2.2 Analytical Results

The dry well delineation analytical results are presented in Table 5-3. One hundred thirty-four samples were collected, including 12 field duplicates. Field duplicates results indicated that the on-site laboratory instruments were functioning properly.

There were no DW 1 samples with Sr-90 concentrations that exceeded the SC. Seven samples east, west and south of DW 1 had Ra-226 concentrations that exceeded the SC. Additional borings were drilled in each of these directions, one to two ft further away from the DW center. All of the samples collected from the additional borings showed a reduction in concentrations of Ra-226. The DW 1 sample with the maximum Ra-226 concentration was Sample SSRSF230 at 1.55 pCi/g, collected 15 ft bgs. Ten samples including one field duplicate collected around DW 1 had nitrate concentrations that exceeded the SC, ranging from 55.7 to 452 mg/kg. These samples were located in all four directions from DW 1.

Three samples including one field duplicate located south of DW 2 had Ra-226 concentrations that exceeded the SC, and therefore an additional boring was drilled to the south. All samples collected from this boring were below the SC. The DW 2 sample with the maximum Ra-226 concentration was Sample SSRSF265 at 1.88 pCi/g, collected at 15 ft bgs. Five samples collected around DW 2 had nitrate concentrations that exceeded the SC, ranging from 40.8 to 57.8 mg/kg. These samples were located to the north, south and east of DW 2.

Six samples located east and north of DW 3 had Ra-226 concentrations that exceeded the SC. Four of the six detections above the SC were collected from the boring four ft east of DW 3, and therefore an additional boring was drilled six ft to the east. All of the samples collected from this boring were below the SC. The DW 3 sample with the maximum Ra-226 concentration was Sample SSRSF296 at 3.47 pCi/g, collected 14 ft bgs. Eleven samples, including two field duplicates, collected around DW 3 had nitrate concentrations that exceeded the SC. Nitrate concentrations that exceeded the SC ranged from 39.7 to 383 mg/kg. These samples were located in all four directions from DW 3.

5.3 Nitrate Delineation

Since 35% of the Area I screening samples had nitrate concentrations greater than the SC, delineation sampling was conducted to further define the lateral and vertical extent of nitrate in Area I.

5.3.1 Sampling

Area I nitrate delineation sampling was conducted between July 12 and July 16, 1999 using a hand auger. Twenty-nine samples were collected including two field duplicates. The majority of the delineation samples were collected between Station 3 and Station 12 (Figure 5-1).

5.3.2 Analytical Results

Results of the Area I nitrate analyses are presented in Table 5-4. The results indicate that nitrate was detected in several locations and depths above SC levels. Nineteen of 27 samples exceeded the SC to a maximum depth of 19 ft. The highest nitrate concentrations were located along the DW 3 eastern sidewall between 4 and 5 ft bgs at 181, 194 and 216 mg/kg.

5.4 Heating, Ventilating and Air Conditioning Water Sampling

The objective of HVAC water sampling was to assess whether potential dust generated during the RA resulted in contamination of the cooling tower water. The HVAC cooling tower has direct air-to-water contact, and pre-cools water-filled pipes inside AH-1, AH-2 and accompanying rooms. To determine the exposure levels, representative samples were collected and tested for Ra-226.

5.4.1 Sampling

HVAC cooling tower water samples were collected via the water discharge outlet. To ensure that a representative sample was collected, the water discharge outlet was purged of approximately two to three liters of water before collecting the one-liter sample. Two reference samples were collected prior to the start of the RA to establish a baseline. HVAC water samples were collected one to two times per week during RA activities. A total of 22 water samples were collected including 2 field duplicates.

5.4.2 Analytical Results

The two pre-RA Ra-226 cooling water samples had activities below 0.6 picoCuries per liter (pCi/L). The HVAC water sample with the maximum concentration, 2.62 pCi/L, was collected on May 25, 1999. This sample was collected during the demolition of DST 2, when there was the highest potential for airborne contamination. The remaining samples had Ra-226 concentrations ranging from 0.08 to 2.47 pCi/L, well below the combined Ra-226 and Ra-228 maximum contaminant level (MCL) of 5 pCi/L. Results of the HVAC water sample analyses are presented in Table 5-5.

5.5 Air Sampling

Air samples were collected during the RAs from three stations around the perimeter of the site and one distant background station. These ambient air stations were strategically placed to monitor every area of the site. The locations of the air stations are listed below and shown on Figure 5-11.

- AM-2 is located at the upper northeast corner of the Toxic Pollutant Health Research Laboratory;
- AM-3, the current background station, is located east of the LEHR site;
- AM-5 is situated near the southwest corner of the WDPs; and,
- AM-7, a mobile monitoring station, was placed adjacent to the Area I and Area II excavations in 1999 and 2000, respectively.

5.5.1 Air Sampling Schedule

Air sampling was conducted to monitor for potential releases of radionuclides, VOCs, metals, and particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) into ambient air that may have been associated with the RAs. Collection of air samples was based on an established schedule that corresponded with the 1999 and 2000 RAs. Pre- and post- Area I RA samples were collected and analyzed for $PM_{10,}$ metals, VOCs, chlordane, tritium, gross alpha, gross beta and gamma-emitting isotopes. During the Area I RA, monthly samples were collected and analyzed for alpha, gross beta, metals and PM_{10}. During the Area II RA, pre-RA, post-RA and monthly samples were collected and analyzed for PM_{10}; metals; Sr-90; and gross alpha, beta, and gamma. All LEHR air samples were analyzed by either California State-certified or CLP laboratories. The analytical results from the air sampling will be presented in the Radionuclide Air Emission Annual Report, scheduled for submission to DOE in the fall of 2001.

5.6 Excavation Confirmation Sampling

The excavation screening sample data for Areas I and II were presented to the RPMs on July 27, 1999 and October 29, 2000, respectively, as part of the Phase I Data Evaluation. The RPMs approved collection of the recommended confirmation samples. Both random-based and discretionary hot-spot confirmation samples were collected to ensure attainment of cleanup goals using a statistically-based sampling design. The statistical approach used to determine the required number of confirmation samples, and the sampling grid size was selected according to US EPA guidance (US EPA, 1994).

5.6.1 Area I Sampling

The Area I confirmation samples were collected between July 13 and October 5, 1999. A total of 38 confirmation samples and four field duplicates were collected between 1 and 42.5 ft bgs using a hand auger advanced from a extendable boom. Samples were placed directly into pre-sterilized glass jars, packaged and shipped to an off-site laboratory, and analyzed for a full set of COCs consisting of radionuclides, pesticides/PCBs, metals, VOCs, SVOCs and nitrate. The Area I confirmation samples were collected from the locations listed on Table 5-6 and shown on Figures 5-9 and 5-10.

5.6.2 Area II Sampling

The Area II confirmation samples were collected between October 25 and November 9, 2000. A total of 32 confirmation samples and 4 field duplicates were collected between 1.5 and 12 ft bgs. The sampling method and suite of analyses were the same as for Area I. The Area II confirmation samples were collected from the locations listed on Table 5-6 and shown on Figure 5-9.

5.6.3 Analytical Results

The confirmation sample analytical results are included in Appendix B and are summarized in Table 5-7. All 78 confirmation samples were analyzed for 28 pesticides and PCBs, 68 SVOCs and 33 VOCs. Of the 28 pesticides and PCBs, four constituents, 4,4'- dichlordiphenyl trichlor (DDT), alpha-chlordane, gamma-chlordane and heptachlor, were reported above the detection limit. The maximum detected concentrations for these four constituents were all found in Sample SSRSC066, collected from the excavation surrounding the influent piping to the Ra-226 Tank. The maximum detected concentrations for 4,4'DDT, alpha-chlordane, gamma-chlordane and heptachlor were 133, 277, 346 and 52.2 µg/kg (micrograms per kilogram), respectively. Of the 68 SVOCs, di-n-butylphthalate was detected at 380 µg/kg in one sample, SSRSC065, collected from the excavation surrounding the influent piping to the Ra-226 Tank. Of the 33 VOCs, three constituents, 2-butanone (methyl ethyl ketone), acetone and toluene, were reported above the detection limit.

Sample SSRSC005 had the maximum concentration of 2-butanone at 132 µg/kg. This sample was collected near the DST 2 excavation at ten ft bgs. Sample SSRSC041 had the maximum acetone concentration at 44.8 µg/kg. This sample was collected from DW 3 at 42.5 ft bgs. Sample SSRSC059 had the maximum toluene concentration at 263 µg/kg. This sample was collected from the location of the former Sr-90 Tank at ten ft bgs.

The maximum Ra-226 activity was detected in Sample SSRSC035, collected 42.5 ft bgs near the bottom of DW 2. The sample with the maximum Sr-90 activity, SSRSC043, was collected five ft bgs near the former location of the influent piping for the Sr-90 Tank. The maximum mercury concentrations were detected in Samples SSRSC010 and SSRSC024, collected at 1 and 5.5 ft bgs, respectively, from the Southern Leach Trench, approximately 20 ft and 140 ft south of DW 3, respectively. The sample with the maximum hexavalent chromium concentration, Sample SSRSC070, was collected seven ft bgs from the Sr-90 Leach Field under the former location of the Strontium Effluent Pipe. The maximum nitrate concentration was detected in Sample SSRSC040, located 20 ft bgs in the sidewall of the DW 2 excavation.

Twelve of the 22 maximum detected radionuclide activities were measured in Sample SSRSC035 near the bottom of DW 2. Sample SSRSC035 was reanalyzed to further evaluate these results. Eleven of the 12 radionuclide reanalyses were below the original results. The reanalysis results are summarized in Table 5-7.

The confirmation sample data suggest that all of the Sr-90 contamination above the SC has been removed. With the exception of Samples SSRSC035 and SSRSC039, the confirmation data also suggest that the Ra-226 contamination has been removed. As Section 6 details later in this report, the Ra-226 confirmation data set is statistically indistinguishable from the LEHR site background data set (WRS test), and therefore Ra-226 does not appear to be present above background in the RA area. All of the Area II nitrate confirmation data were below the SC. Nine Area I confirmation samples, including one field duplicate, contained nitrate above the SC, suggesting that residual nitrate contamination remains in that area. The risk evaluation and DL modeling associated with the data are discussed in Section 6 of this report.

5.7 Designated-Level Analysis—Data Gaps Investigations

5.7.1 Sampling

As described in *Designated-Level Sampling and Analysis Plan Addendum for the Radium/Strontium Treatment Systems Area* (WA, 2001), thirteen soil borings were advanced and samples were collected in the Ra/Sr Treatment Systems Area on May 2 through May 7, 2001 to provide additional information on the vertical distribution of Cs-137, carbon-14 (C-14), hexavalent chromium, mercury and nitrate in soil. The two confirmation sample locations with the highest and second highest activities/concentrations for Cs-137, C-14 and nitrate (as indicated by the confirmation sample analytical data) were used to select boring locations (Figure 5-12). The

confirmation sample locations with the three highest concentrations for hexavalent chromium and mercury were selected as boring locations. Soil samples were collected at each DL boring location on five-foot intervals, with the first sample collected five ft below the depth of the original confirmation sample. The deepest samples collected in the C-14, Cs-137, hexavalent chromium, mercury and nitrate boreholes were at 33, 32, 47.5, 32.5 and 34.5 ft bgs, respectively. The samples were analyzed for the COC associated with each sampling location.

In addition to the five DL COCs listed above, Ra-226 was detected at greater than twice background in a confirmation sample collected at the bottom of DW 2 (Sample SSRSC035). Based on a discussion with the RPMs at the April 11, 2001 RPM meeting, WA agreed to re-sample SSRSC035 at 42.5 ft bgs and at greater depths to further evaluate the presence of Ra-226. However, during DL sampling on May 7, 2001, the drill rig was unable to penetrate the CLSM layer above Sample SSRSC035's original location. Therefore, a boring (DL-13) was drilled four ft northeast and downgradient of the original sample location, and DL samples were collected.

5.7.2 Analytical Results

The analytical results of these samples are presented in Table 5-9. As shown, C-14 results are below the LEHR background level of 0.13 pCi/g in all samples from both borings, with no obvious activity trend with depth. Cs-137 activities in boring DL-11 are above the LEHR background level of 0.00695 pCi/g at 11, 16 and 21 ft bgs; the maximum activity was measured at 0.664 pCi/g in the sample collected at 16 ft bgs. In boring DL-12, two samples had slightly elevated Cs-137 activities. Hexavalent chromium concentrations were detected above the background concentration of 0.054 mg/kg in all of the samples from all of the borings, with no obvious concentration trend with depth. Mercury was detected above the background concentration of 0.248 mg/kg in borings DL-7 and DL-8 at 31 ft and 7.5 ft, respectively. Nitrate was detected above background in borings DL-4 and DL-5, with no obvious concentration trend with depth. All of the Ra-226 results from boring DL-13 were below the background level of 0.75 pCi/g. The Ra-226 activities in boring DL-13 decreased with depth. Section 6.3 discusses the DL analysis and provides a COC-specific description of potential future impacts to ground water.

These analytical results were used to set the COC impact depth intervals for the refined DL modeling described in Section 6.3.4. A typical soil profile for the Ra/Sr Treatment Systems Area, based on lithologies encountered in these thirteen new borings as well as the RA excavation, is presented in Table 5-10. This soil profile was also used in the refined DL modeling described in Section 6.3.4.

Table 5-1. Radium/Strontium Treatment Systems Area I—Excavation Screening Sampling Analytical Results

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type/ Sample Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF003	5.0/ 5.9	5	Clayey Silt/ DST 2 North Sidewall	5/19/99, 5/26/99	0.38	0.43	1.14
SSRSF004	4.1/ 5.9	5	Clayey Silt/ DST 2 North Sidewall	5/19/99, 5/26/99	0.36	0.42	3.34
SSRSF005	4.5/ 5.9	8	Clayey Silt/ DST 2 North Sidewall	5/19/99	0.27	-0.24	N/A
SSRSF006	3.7/ 7.3	6	Clayey Silt/ DST 2 Pipe, South	5/20/99	0.38	0.44	N/A
SSRSF007	5.0/ 7.4	6	Clayey Silt/ DST 2 South Slope	5/20/99, 5/26/99	0.37	0.31	**43.40**
SSRSF008	4.1/ 7.4	6	Clayey Silt/ DST 2 South Slope	5/20/99, 5/26/99	0.41	0.65	17.80
SSRSF009	3.6/ 6.6	4	Clayey Silt/ DST 2 West Sidewall	5/26/99	0.36	0.93	20.10
SSRSF010	3.6/ 6.5	8	Clayey Silt/ ST 2 West Sidewall	5/26/99	0.36	0.94	10.80
SSRSF012	5.4/ 6.5	4	Clayey Silt/ DST 2 East Sidewall	5/26/99	0.38	0.82	16.90
SSRSF013	4.1/ 5.8	8	Clayey Silt/ DST 2 North Sidewall	5/26/99	0.38	0.77	2.77
SSRSF014	5.0/ 5.8	8	Clayey Silt/ DST 2 North Sidewall	5/26/99	0.33	0.53	0.30
SSRSF015	5.0/ 7.3	8	Clayey Silt/ DST 2 South Sidewall	5/26/99	0.39	-0.09	30.20
SSRSF016	4.1/ 7.3	8	Clayey Silt/ DST 2 South Sidewall	5/26/99	0.38	1.41	12.70
SSRSF017	4.2/ 6.5	9	Clayey Silt/ DST 2 Trench Floor	5/26/99	0.30	-0.12	15.10
SSRSF018	4.2/ 6.5	9	***Field Duplicate of SSRSF017***	5/26/99	0.31	0.37	16.10
SSRSF019	5.1/ 6.5	9	Clayey Silt/ DST 2 Trench Floor	5/26/99	0.35	0.65	15.50
SSRSF027	1.8/ 4.4	8	Clayey Silt/ DW 1 North Sidewall	6/2/99	0.90	1.32	**161.00**
SSRSF028	1.9/ 4.7	10	Clayey Silt/ DW 1 Floor	6/2/99	**2.48**	2.49	**130.00**
SSRSF029	1.8/ 5.3	8	Clayey Silt/ DW 1 South Wall	6/2/99	0.37	0.82	**65.50**
SSRSF030	1.6/ 5.0	8	Clayey Silt/ DW 1 West Wall	6/2/99	**1.04**	1.99	**166.00**
SSRSF031	2.0/ 5.0	8	Clayey Silt/ DW 1 East Sidewall	6/2/99	**3.49**	4.62	**187.00**
SSRSF032	2.1/ 5.4	6.5	Clayey Silt/ DW 1 Beneath DB Pipe	6/2/99	0.40	0.92	**101.00**
SSRSF033	2.1/ 5.4	6.5	***Field Duplicate of SSRSF032***	6/2/99	0.35	0.55	**108.00**
SSRSF034	2.3/ 5.3	8.5	Clayey Silt/ DW 1 East Sidewall	6/2/99	0.43	0.54	**113.00**
SSRSF035	2.2/ 4.6	8.5	Clayey Silt/ DW 1 East Sidewall	6/2/99	0.51	0.68	**70.90**
SSRSF036	2.2/ 4.7	3	Silty Sand/ DW 1 East Sidewall	6/2/99	0.25	0.39	N/A
SSRSF037	2.3/ 5.3	3	Silty Sand/ DW 1 East Sidewall	6/2/99	0.35	0.45	N/A

Table 5-1. Radium/Strontium Treatment Systems Area I—Excavation Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type/ Sample Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF038	1.5/ 1.8	8	Clayey Silt/ DW 1 West Sidewall	6/2/99	0.40	1.12	**98.00**
SSRSF039	2.3/ 4.9	8	Clayey Silt/ DW 1 Under Sewer Pipe West Sidewall	6/3/99	0.43	1.06	**96.20**
SSRSF040	2.3/ 5.6	8	Clayey Silt/ DW 1 Under Pipe Fill West Sidewall	6/3/99	0.36	1.18	**81.00**
SSRSF041	3.4/ 7.9	1	Clayey Silt/ DB Trench West Sidewall	6/4/99	0.33	N/A	N/A
SSRSF042	1.8/4.0	3	Clayey Silt/ DW 1, North. Trench Floor	6/4/99	0.32	N/A	N/A
SSRSF043	1.8/ 6.9	4	Clayey Silt/ DW 2 West Sidewall	6/8/99	0.66	1.87	12.50
SSRSF044	2.0/ 6.0	4	Clayey Silt/ DB Pipe West Sidewall	6/8/99	0.38	0.72	12.30
SSRSF045	2.7/ 6.0	4	Clayey Silt/ DB Pipe East Sidewall	6/8/99	0.35	1.16	9.43
SSRSF046	3.0/ 6.1	6	Clayey Silt/ North of DB Pipe	6/8/99	0.43	1.05	23.00
SSRSF047	2.4/ 6.0	8.5	Clayey Silt/ Trench Floor	6/8/99	0.36	1.23	1.62
SSRSF048	2.7/ 6.0	8	Clayey Silt/ DB Pipe East Sidewall	6/8/99	0.40	1.01	**39.30**
SSRSF049	1.8/ 6.3	8	Clayey Silt/ West Sidewall North of DW 2	6/8/99	0.38	0.97	17.40
SSRSF050	3.2/ 7.5	9	Clayey Silt/ DB Floor	6/9/99	0.47	0.61	1.46
SSRSF051	3.2/ 7.5	9	***Field Duplicate of SSRSF050***	6/9/99	0.40	0.88	1.66
SSRSF052	2.8/ 6.7	9.5	Clayey Silt/ DB Beneath Pipe	6/10/99	0.37	0.81	5.64
SSRSF053	3.0/ 6.1	9	Clayey Silt/ DB Pipe, North Sidewall	6/10/99	0.44	0.77	**44.70**
SSRSF054	3.2/ 7.2	9.5	Clayey Silt/ DB Beneath Pipe	6/10/99	0.31	0.30	12.00
SSRSF055	2.2/ 7.0	9.5	Clayey Silt/ DW 2 West Sidewall, Under Pipe	6/10/99	0.48	0.75	11.20
SSRSF056	2.0/ 6.1	8	Clayey Silt/ DB Pipe WEST Sidewall	6/10/99	0.43	1.01	5.57
SSRSF057	2.8/ 7.6	7	Clayey Silt/ Beneath Sewer Vault	6/10/99	0.36	0.90	1.08
SSRSF058	2.1/ 7.4	8	Clayey Silt/ DW 2 South Sidewall	6/10/99	0.39	1.06	3.24
SSRSF059	1.8/ 7.0	8.5	Soil Sandy Clay/ DW 2 West Sidewall	6/10/99	0.50	0.89	**42.80**
SSRSF060	3.2/ 7.7	7	Soil/ Beneath Sewer Pipe	6/10/99	0.40	0.30	0.85
SSRSF061	2.7/8.3	7	Clayey Silt/ DB Beneath Pipe	6/14/99	0.45	0.46	6.00
SSRSF062	2.7/8.3	7	***Field Duplicate of SSRSF061***	6/14/99	0.37	0.74	6.25
SSRSF063	1.9/ 8.0	4	Clayey Silt/ Excavation West Sidewall	6/15/99	0.32	1.02	1.61

Table 5-1. Radium/Strontium Treatment Systems Area I—Excavation Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type/ Sample Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF064	1.9/ 8.0	8	Clayey Silt/ Excavation West Sidewall	6/15/99	0.45	0.82	2.78
SSRSF065	2.1/ 9.0	8	Clayey Silt/ West Sidewall	6/15/99	0.40	0.96	**48.80**
SSRSF066	2.1/ 9.0	4	***Field Duplicate of SSRSF065***	6/15/99	0.36	1.36	**48.20**
SSRSF067	2.7/ 9.0	8	Clayey Silt/ DW3 East sidewall	6/15/99	0.40	0.90	**182.00**
SSRSF068	2.1/ 9.0	4	Clayey Silt/ DW3 East sidewall	6/15/99	0.37	0.47	**80.30**
SSRSF069	2.5/ 8.5	8	Clayey Silt/ DW 3, North Floor	6/15/99	0.40	0.79	1.10
SSRSF070	2.2/ 9.8	4	Clayey Silt/ NLT West Sidewall	6/16/99	0.42	0.88	2.22
SSRSF071	2.2/ 9.8	8	Clayey Silt/ NLT West Sidewall	6/16/99	0.36	1.03	4.54
SSRSF072	2.8/ 9.8	4	Clayey Silt/ NLT Eest Sidewall	6/16/99	0.42	0.56	**153.00**
SSRSF073	2.8/ 9.8	8	Clayey Silt/ NLT East Sidewall	6/16/99	0.43	0.95	**148.00**
SSRSF074	2.5/ 9.8	9	Clayey Silt/ NLT trench floor	6/16/99	0.46	0.99	**102.00**
SSRSF075	3.0/ 11	5	Clayey Silt/ SLT East Sidewall	6/17/99	0.48	1.12	**91.40**
SSRSF076	2.4/ 11	5	Clayey Silt/ SLT West Sidewall	6/17/99	0.48	0.53	4.54
SSRSF077	2.7/ 11	16	Clayey Silt/ SLT Trench Floor	6/17/99	0.60	1.50	**54.80**
SSRSF078	2.7/ 11	16	***Field Duplicate of SSRSF077***	6/17/99	0.53	1.07	**54.60**
SSRSF079	3.0/ 11	14	Clayey Silt/ SLT East Sidewall	6/18/99	0.60	1.24	**59.10**
SSRSF080	2.4/ 11	14	Clayey Silt/ SLT West Sidewall	6/18/99	0.42	1.16	35.00
SSRSF081	2.8/ 12.2	18.5	Clayey Silt/ SLT Trench Floor	6/22/99	0.56	1.15	**137.00**
SSRSF082	2.8/ 12.2	18.5	***Field Duplicate of SSRSF081***	6/22/99	0.51	1.42	**136.00**
SSRSF083	3.1/ 12.2	16.5	Clayey Silt/ SLT East Sidewall	6/22/99	0.58	1.41	**90.40**
SSRSF084	2.5/ 12.2	16.5	Clayey Silt/ SLT West Sidewall	6/22/99	0.57	1.24	26.00
SSRSF085	3.1/ 12.2	12	Clayey Silt/ SLT East Sidewall	6/22/99	0.50	1.12	**37.90**
SSRSF086	2.5/ 12.2	12	Clayey Silt/ SLT West Sidewall	6/22/99	**0.76**	0.86	3.50
SSRSF087	3.1/ 12.2	6	Clayey Silt/ SLT East Sidewall	6/22/99	0.49	0.95	**96.70**
SSRSF088	2.5/ 12.2	6	Clayey Silt/ SLT West Sidewall	6/22/99	0.47	0.72	5.57
SSRSF089	3.0/ 13.5	14.5	Clayey Silt/ SLT Floor	6/23/99	0.51	1.47	3.53
SSRSF090	3.0/ 13.5	14.5	***Field Duplicate of SSRSF089***	6/23/99	0.56	1.31	3.99

Table 5-1. Radium/Strontium Treatment Systems Area I—Excavation Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type/ Sample Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF091	3.3/ 13.5	12	Clayey Silt/ SLT East Sidewall	6/23/99	0.37	1.12	5.37
SSRSF092	3.3/ 13.5	6	Clayey Silt/ SLT EAST Sidewall	6/23/99	0.46	0.81	22.30
SSRSF093	2.7/ 13.5	12	Clayey Silt/ SLT WEST Sidewall	6/23/99	0.64	1.13	5.28
SSRSF094	2.7/ 13.5	6	Clayey Silt/ SLT WEST Sidewall	6/23/99	0.45	0.93	10.10
SSRSF095	3.3/ 14.7	13.5	Clayey Silt/ SLT Trench Floor	6/24/99	0.49	1.05	0.33
SSRSF096	3.3/ 14.7	13.5	***Field Duplicate of SSRSF095***	6/24/99	0.52	0.71	0.34
SSRSF097	3.0/ 14.7	11.5	Clayey Silt/ SLT West Sidewall	6/24/99	0.50	1.22	0.54
SSRSF098	3.6/ 14.7	11.5	Clayey Silt/ SLT East Sidewall	6/24/99	0.45	0.96	4.74
SSRSF099	3.6/ 14.7	6.5	Clayey Silt/ SLT East Sidewall	6/24/99	0.42	0.53	10.20
SSRSF100	3.0/ 14.7	6.5	Clayey Silt/ SLT West Sidewall	6/24/99	0.50	0.52	2.41
SSRSF101	3.0/ 11.0	10	Clayey Silt/ SLT East Sidewall	6/24/99	0.44	0.63	**140.00**
SSRSF102	2.8/ 11.6	18	Clayey Silt/ SLT Trench Floor	6/28/99	0.51	0.95	**89.00**
SSRSF103	3.0/ 12.8	16	Clayey Silt/ SLT Trench Floor	6/28/99	0.49	0.88	14.60
SSRSF104	3.5/ 15.7	13.5	Clayey Silt/ SLT Trench Floor	6/28/99	0.42	1.65	**76.10**
SSRSF105	3.2/ 15.7	6	Clayey Silt/ SLT West Sidewall	6/28/99	0.42	1.14	1.24
SSRSF106	3.2/ 15.7	11	Clayey Silt/ SLT West Sidewall	6/28/99	0.40	0.96	0.79
SSRSF107	3.8/ 15.7	6	Clayey Silt/ SLT East Sidewall	6/28/99	0.38	0.74	3.97
SSRSF108	3.8/ 15.7	11	Clayey Silt/ SLT East Sidewall	6/28/99	0.39	0.75	5.04
SSRSF109	2.5/ 10.4	12	Clayey Silt/ SLT Trench Floor	6/29/99	0.41	0.81	**85.40**
SSRSF110	2.3/ 11	10	Clayey Silt/ SLT West Sidewall	6/29/99	0.36	0.94	3.25
SSRSF111	3.2/ 14.1	16	Clayey Silt/ SLT Trench Floor	6/29/99	0.49	1.09	1.05
SSRSF112	3.6/ 16.7	13.5	Clayey Silt/ SLT Trench Floor	6/30/99	0.53	1.03	**153.00**
SSRSF113	3.6/ 16.7	13.5	***Field Duplicate of SSRSF112***	6/30/99	0.47	1.04	**139.00**
SSRSF114	3.3/ 16.7	6	Clayey Silt/ SLT East Sidewall	6/30/99	0.46	0.99	**38.00**
SSRSF115	3.9/ 16.7	11.5	Clayey Silt/ SLT East Sidewall	6/30/99	0.42	0.95	**184.00**
SSRSF116	3.9/ 16.7	6	Clayey Silt/ SLT West Sidewall	6/30/99	0.35	0.78	0.51
SSRSF117	3.3/ 16.7	11.5	Clayey Silt/ SLT West Sidewall	6/30/99	0.47	1.29	**148.00**

Table 5-1. Radium/Strontium Treatment Systems Area I—Excavation Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type/ Sample Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF118	3.7/ 17.7	13.5	Clayey Silt/ SLT Trench Floor	7/1/99	0.49	1.21	**69.90**
SSRSF119	3.4/ 17.7	12	Clayey Silt/ SLT West Sidewall	7/1/99	0.50	1.36	17.40
SSRSF120	3.4/ 17.7	6	Clayey Silt/ SLT West Sidewall	7/1/99	0.42	1.27	3.50
SSRSF121	4.0/ 17.7	12	Clayey Silt/ SLT East Sidewall	7/1/99	0.39	0.81	**36.10**
SSRSF122	4.0/ 17.7	6	Clayey Silt/ SLT East Sidewall	7/1/99	0.34	1.04	29.40
SSRSF123	3.8/ 18.7	12.5	Clayey Silt/ SLT Trench Floor	7/2/99	0.46	1.15	0.35
SSRSF124	3.5/ 18.7	6	Clayey Silt/ SLT West Sidewall	7/2/99	0.44	1.58	0.66
SSRSF125	3.5/ 18.7	10	Clayey Silt/ SLT West Sidewall	7/2/99	0.35	1.18	0.62
SSRSF126	4.2/ 18.7	6	Clayey Silt/ SLT East Sidewall	7/2/99	0.36	1.26	0.25
SSRSF127	4.2/ 18.7	10	Clayey Silt/ SLT East Sidewall	7/2/99	0.41	0.99	0.90
SSRSF128	4.1/ 19.7	12.5	Clayey Silt/ SLT Trench Floor	7/7/99	0.44	0.87	1.20
SSRSF129	4.1/ 19.7	12.5	***Field Duplicate of SSRSF128***	7/7/99	0.39	1.01	1.48
SSRSF130	4.5/ 19.7	6	SANDY SILT/ SLT East Sidewall	7/7/99	0.32	0.89	10.70
SSRSF131	4.5/ 19.7	11	Clayey Silt/ SLT East Sidewall	7/7/99	0.41	1.13	1.94
SSRSF132	3.7/ 19.7	11	Clayey Silt/ SLT West Sidewall	7/7/99	0.37	1.16	0.08
SSRSF133	3.7/ 19.7	6	Clayey Silt/ SLT West Sidewall	7/7/99	0.48	0.55	4.08
SSRSF134	4.2/20.7	12.5	Clayey Silt/ SLT Trench Floor	7/7/99	0.42	1.09	1.56
SSRSF135	4.2/ 20.7	12.5	***Field Duplicate of SSRSF134***	7/7/99	0.42	1.12	1.39
SSRSF136	4.5/ 20.7	6	Clayey Silt/ SLT East Sidewall	7/7/99	0.44	0.51	**69.00**
SSRSF137	4.5/ 20.7	11	Clayey Silt/ SLT East Sidewall	7/7/99	0.39	0.52	2.36
SSRSF138	20.7/ 3.8	6	Clayey Silt/ SLT West Sidewall	7/7/99	0.38	0.67	6.02
SSRSF139	3.8/ 20.7	11	Clayey Silt/ SLT West Sidewall	7/7/99	0.39	0.82	0.72
SSRSF140	4.4/ 21.7	12.5	Clayey Silt/ SLT Trench Floor	7/8/99	0.42	0.88	10.80
SSRSF141	4.4/ 21.7	12.5	***Field Duplicate of SSRSF140***	7/8/99	0.38	0.61	11.40
SSRSF142	4.8/ 21.7	5.5	Clayey Silt/ SLT East Sidewall	7/8/99	0.37	0.40	33.30
SSRSF143	4.8/ 21.7	11	Clayey Silt/ SLT East Sidewall	7/8/99	0.37	0.63	13.20
SSRSF144	4.0/ 21.7	5.5	Clayey Silt/ SLT West Sidewall	7/8/99	0.40	0.34	**41.20**

Table 5-1. Radium/Strontium Treatment Systems Area I—Excavation Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type/ Sample Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF145	4.0/ 21.7	11	Clayey Silt/ SLT West Sidewall	7/8/99	0.42	0.34	30.30
SSRSF146	4.7/ 23.5	12	Clayey Silt/ SLT Trench Floor	7/12/99	0.43	0.70	**47.40**
SSRSF147	4.7/ 23.5	12	Clayey Silt/ SLT Trench Floor	7/12/99	0.36	0.74	**42.00**
SSRSF148	5.0/ 23.5	6	Clayey Silt/ SLT East Sidewall	7/12/99	0.40	0.50	**84.60**
SSRSF149	5.0/23.5	10.5	Clayey Silt/ SLT East Sidewall	7/12/99	0.33	0.78	23.40
SSRSF150	5.0/23.5	6	Clayey Silt/ South Sidewall	7/12/99	0.37	0.44	19.20
SSRSF151	5.0/23.5	10.5	Clayey Silt, Angular Fines/ SLT South Sidewall	7/12/99	0.37	0.50	9.30
SSRSF152	4.3/ 23.5	6	Clayey Silt/ SLT West Sidewall	7/12/99	0.43	1.04	10.70
SSRSF153	4.3/ 23.5	10.5	Clayey Silt/ SLT West Sidewall	7/12/99	0.36	0.98	19.10
SSRSF178	1.6/4.4	10	Clayey Silt/ NLT Floor	7/15/99	0.47	0.98	**67.10** / 34.80
SSRSF179	1.5/4.0	11	Clayey Silt/ NLT Floor	7/16/99	0.58	1.16	**68.10** / 3.65
SSRSF186	1.4/3.0	12	Clayey Silt/ NLT FLoor	7/19/99	0.55	0.88	18.20
SSRSF187	1.1/3.0	8	Clayey Silt/ NLT West Sidewall	7/19/99	0.48	0.76	6.56
SSRSF188	1.2/4.0	4	Clayey Silt/ NLT West Sidewall	7/19/99	0.71	0.86	**77.30**
SSRSF189	1.2/4.0	4	***Field Duplicate of SSRSF188***	7/19/99	**0.76**	1.39	**82.60**
SSRSF190	1.2/4.0	8	Clayey Silt/ NLT West Sidewall	7/19/99	0.44	1.16	4.79
SSRSF191	1.1/3.0	4	Clayey Silt/ NLT West Sidewall	7/19/99	0.45	0.68	**85.60**
SSRSF192	1.7/3.0	4	Clayey Silt/ NLT East Sidewall	7/19/99	0.36	0.44	2.66
SSRSF193	1.8/4.0	4	Clayey Silt/ NLT East Sidewall	7/19/99	0.38	-5.56	0.66
SSRSF195	1.8/4.0	8	Clayey Silt/ NLT East Sidewall	7/19/99	0.40	0.63	0.75
SSRSF196	1.7/3.0	8	Clayey Silt/ NLT East Sidewall	7/19/99	0.40	0.81	2.40
SSRSF197	1.3/2.0	10	Clayey Silt/ NLT Floor	7/19/99	0.52	1.18	28.40
SSRSF198	1.6/2.0	8	Clayey Silt/ NLT East Sidewall	7/20/99	0.43	0.59	**74.50**
SSRSF199	1.6/2.0	4	Clayey Silt/ NLT East Sidewall	7/20/99	0.37	1.18	5.09
SSRSF200	1.5/1.0	8	Clayey Silt/ NLT East Sidewall	7/20/99	0.45	1.45	**54.80**
SSRSF201	1.5/1.0	4	Clayey Silt/ NLT East Sidewall	7/20/99	0.45	0.84	**285.00**
SSRSF202	1.2/1.0	10	Clayey Silt/ NLT Floor	7/20/99	0.58	1.55	24.30

Table 5-1. Radium/Strontium Treatment Systems Area I—Excavation Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type/ Sample Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF203	1.2/1.0	10	***Field Duplicate of SSRSF202***	7/20/99	0.54	1.91	24.90
SSRSF204	1.0/2.0	8	Clayey Silt/ NLT West Sidewall	7/20/99	0.53	1.14	**41.00**
SSRSF205	1.1/2.0	4	Clayey Silt/ NLT West Sidewall	7/20/99	0.41	1.40	12.10
SSRSF206	1.0/1.0	8	Clayey Silt/ NLT West Sidewall	7/20/99	**0.82**	1.43	**163.00**
SSRSF207	1.3/1.0	4	Clayey Silt/ NLT West Sidewall	7/20/99	0.46	1.15	7.68
SSRSF208	1.3/0.0	8	Clayey Silt/ NLT North Sidewall	7/20/99	0.42	0.75	5.62
SSRSF209	1.3/0.0	4	Clayey Silt/ NLT North Sidewall	7/20/99	0.33	0.40	1.57
SSRSF210	1.0 / 1.5	8	Clayey Silt/ NLT East Sidewall	7/21/99	0.47	N/A	N/A
SSRSF211	1 / 1	8	Clayey Silt/ NLT East Sidewall	7/21/99	**0.81**	N/A	N/A
SSRSF212	1 / 0.5	8	Clayey Silt/ NLT East Sidewall	7/21/99	0.51	N/A	N/A
SSRSF213	1 / 0.0	8	Clayey Silt/ NLT East Sidewall	7/21/99	0.49	N/A	N/A
SSRSF214	1.3 / 1.0	10	Clayey Silt/ NLT Floor	7/21/99	0.46	N/A	N/A
SSRSF215	1.0 / 1.3	8	Clayey Silt/ NLT West Sidewall	7/22/99	0.46	N/A	N/A
SSRSF216	1.0 / 1.0	10	Clayey Silt/ NLT West Sidewall	7/22/99	0.47	N/A	N/A
SSRSF217	1.0 / 0.7	8	Clayey Silt/ NLT West Sidewall	7/22/99	0.47	N/A	N/A
SSRSF218	1.0 / 1.0	8	Clayey Silt/ NLT West Sidewall	7/22/99	0.42	N/A	N/A
SSRSF219	1.0 / 1.0	6	Clayey Silt/ NLT West Sidewall	7/22/99	0.50	N/A	N/A

Notes
[1]Estimated in the field.
[2]Analyzed by an on-site gamma spectrometer. The average Minimum Detectable Activity (MDA) for the instrument was 0.3 pCi/g. Ra-226 activity and error were calculated by averaging the Pb-214 and Bi-214 activities measured by the gamma spectrometer.
[3]Analyzed by an on-site beta scintillation detector. Concentrations were judged qualitatively not quantitatively due to low concentrations.
[4]Laboratory analysis for nitrate performed using EPA Method 300.0.

Abbreviations

bgs	below ground surface	ID	identification	Ra-226	radium-226
DB	distribution box	N/A	not analyzed or not applicable	SLT	Southern Leach Trench
DST	Domestic Septic Tank	NLT	Northern Leach Trench	Sr-90	strontium-90
DW	Dry Well	NO_3	nitrate	**Boldface** Identifies data points exceeding the screening criteria.	

Table 5-2. Radium/Strontium Treatment Systems Area II—Screening Sampling Analytical Results

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type	Sampling Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF354 [5]	4.0/1.0	6	Clayey Silt	SEP 1, LL1	8/11/00	0.39	5.825	3.01
SSRSF355	3.0/1.0	6	Clayey Silt	SEP 1, LL1	8/11/00	0.398	3.1	3.59
SSRSF356	1.0/1.0	6	Clayey Silt	SEP 1, LL1	8/11/00	0.405	1.48	4.77
SSRSF357	2.0/1.0	6	Clayey Silt	SEP 1, LL1	8/11/00	0.422	1.17	2.86
SSRSF358	3.5/1.0	6	Clayey Silt	SEP 1, LL1	8/14/00	0.472	6.88	1.08
SSRSF359	4.0/1.0	7	Clayey Silt	SEP 1, LL1	8/14/00	0.462	6.275	2.15
SSRSF360	2.25/1.5	7	Clayey Silt	SEP 2, LL N	8/14/00	0.397	2.83	1.77
SSRSF361	1.0/2.0	6	Clayey Silt	SEP 1, LL 2	8/14/00	0.353	1.61	1.48
SSRSF362	4.0/2.0	7	Clayey Silt	SEP 1, LL 2	8/15/00	0.41	0.65	2.46
SSRSF363	4.5/1.0	7	Clayey Silt	SEP 1, LL 1	8/15/00	NA	3.75	NA
SSRSF364	0.25/2.0	6	Clayey Silt	SEP 1, LL 2	8/15/00	0.533	2.02	2.00
SSRSF365	0.25/1.0	6	Clayey Silt	SEP 1, LL 1	8/15/00	0.648	1.51	4.19
SSRSF366	4.0/1.0	8	Clayey Silt	SEP 1, LL 1	8/15/00	NA	3.245	NA
SSRSF367	3.5/1.0	5	Clayey Silt	SEP 1, LL 1, SSW	8/15/00	NA	4.81	NA
SSRSF368	3.0/2.0	7	Clayey Silt	SEP 1, LL 2	8/16/00	0.563	0.9	3.30
SSRSF369	1.0/2.0	8	Clayey Silt	SEP 1, LL 2	8/16/00	0.539	1.64	3.02
SSRSF370	1.0/2.0	8	Clayey Silt	SEP 1, LL 2	8/16/00	0.43	1.83	NA
SSRSF371	4.0/1.0	9	Clayey Silt	SEP 1, LL 1	8/17/00	NA	2.57	NA
SSRSF372	4.0/1.0	10	Clayey Silt	SEP 1, LL 1	8/17/00	NA	1.23	NA
SSRSF373	4.0/1.0	11	Clayey Silt	SEP 1, LL 1	8/17/00	NA	0.97	NA
SSRSF374	4.0/1.0	12	Clayey Silt	SEP 1, LL 1	8/17/00	NA	0.76	NA
SSRSF375	4.75/1.5	7.5	Clayey Silt	SEP 1, DB	8/21/00	0.486	0.64	2.27
SSRSF376	4.75/1.75	8	Clayey Silt	SEP 1, DB	8/21/00	0.51	1.44	1.53
SSRSF377	4.75/2.0	8	Clayey Silt	SEP 1, DB	8/21/00	0.4	0.58	4.71
SSRSF378	1.0/ 3.0	6	Clayey Silt	SEP 1, LL 3	8/21/00	0.421	1.24	1.07
SSRSF379	2.0/ 3.0	7	Clayey Silt	SEP 1, LL 3	8/21/00	0.487	1.89	1.26
SSRSF380	2.75/3.25	7.5	Clayey Silt	SEP 2, LL W	8/22/00	0.447	2.49	NA

Table 5-2. Radium/Strontium Treatment Systems Area II—Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type	Sampling Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF381	3.0/3.0	7.5	Clayey Silt	SEP 1, LL 3	8/22/00	0.443	0.79	1.03
SSRSF382	4.75/2.5	9	Clayey Silt	SEP 1, LL 3	8/22/00	0.526	0.84	NA
SSRSF383	4.75/2.5	9	Clayey Silt	SEP 1, LL 3	8/22/00	NA	0.81	NA
SSRSF384	4.75/2.5	10	Clayey Silt	SEP , LL 3	8/22/00	0.451	0.68	NA
SSRSF385	4.75/1.0	5	Clayey Silt	SEP 1, LL 1	8/22/00	NA	7.87	NA
SSRSF386	4.75/1.0	7	Clayey Silt	SEP 1, LL 1	8/22/00	NA	3.81	NA
SSRSF387	2.5/1.0	5	Clayey Silt	SEP 1, LL 1	8/22/00	0.55	1.64	1.47
SSRSF388	4.0/3.0	8	Clayey Silt	SEP 1, LL 3	8/22/00	0.425	-0.02	18.7
SSRSF389	5.0/3.0	8	Clayey Silt	SEP 1, LL 3	8/22/00	0.407	1.21	3.22
SSRSF390	2.25/2.5	8	Clayey Silt	SIP 3	8/23/00	0.506	0.84	NA
SSRSF391	2.25/3.25	8	Clayey Silt	SEP 2	8/23/00	0.427	2.29	1.26
SSRSF392	2.25/4.0	8	Clayey Silt	SEP 2, DB	8/23/00	0.352	2.4	0.91
SSRSF393	2.25/5.0	7	Clayey Silt	SEP 2, LL S	8/24/00	0.387	2.775	0.87
SSRSF394	2.0/5.0	6	Clayey Silt	SEP 2, LL S	8/24/00	0.402	2.52	3.94
SSRSF395	3.0/4.25	3.5	Sandy Silt	SEP 2, LL W	8/24/00	0.385	0.17	0.79
SSRSF396	1.75/6.0	4	Sandy Silt	RIP 1, 2	8/28/00	0.434	0.37	0.721
SSRSF397	1.75/6.0	4	Sandy Silt	RIP 1, 2	8/28/00	0.427	0.59	0.512
SSRSF398	0.75/6.0	4	Sandy Silt	RIP 1, 2	8/28/00	0.462	0.34	0.436
SSRSF399	2.75/6.0	4	Sandy Silt	RIP 1, 2	8/28/00	0.41	0.08	0.777
SSRSF400	2.25/5.5	5	Sandy Silt	SEP 2 , LL S	8/29/00	0.455	1.68	2.21
SSRSF401	0.25/3.0	6	Clayey Silt	SEP 1, LL 3	8/29/00	0.386	0.63	4.39
SSRSF402	2.0/2.0	6	Clayey Silt	SEP 1, LL 2	8/29/00	0.367	1.86	0.705
SSRSF403	3.75/1.5	5	Clayey Silt	SEP 1, ESW	8/29/00	NC	0.63	NC
SSRSF404	4.0/4.0	3.5	Clayey Silt	SEP 2, LL W	8/29/00	0.45	0.94	0.765
SSRSF405	5.0/4.0	4	Clayey Silt	SEP 2, LL W	8/29/00	0.36	0.625	0.539
SSRSF406	3.75/6.0	4	Sandy Silt	RIP 1, 2	8/30/00	0.448	0.65	1.3
SSRSF407	4.0/6.0	4	Sandy Silt	RIP 1, 2	8/30/00	0.343	0.56	1.88

Table 5-2. Radium/Strontium Treatment Systems Area II—Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type	Sampling Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF408	5.0/5.0	7	Clayey Silt	SIP 3	8/30/00	0.445	1.08	2.37
SSRSF409	5.0/6.0	4.5	Clayey Silt	RIP 1, 2	8/31/00	0.63	0.93	0.6
SSRSF410	5.0/6.0	4.5	Clayey Silt	RIP 1, 2	8/31/00	0.368	0.36	0.6
SSRSF411	3.5/1.0	4.5	Clayey Silt	SEP 1, LL 1, NSW	9/6/00	0.547	4.39	1.77
SSRSF412	4.0/2.5	5	Clayey Silt	SEP 1, ESW	9/6/00	0.508	0.72	7.7
SSRSF413	4.5/3.5	5	Clayey Silt	SEP 1, ESW	9/6/00	0.556	0.55	2.41
SSRSF414	5.25/5.25	6	Clayey Silt	Ra Tank	9/6/00	0.506	0.08	0.99
SSRSF415	5.25/5.25	6	Clayey Silt	SIP 3	9/6/00	0.489	0.41	0.94
SSRSF416	6.4/6.0	4.5	Clayey Silt / Sand	RIP 1, 2	9/7/00	0.606	0.75	
SSRSF417	5/1.0	10	Clayey Silt	Sr Tank	10/17/00	0.372	2.82	1.50
SSRSF418	6/1.0	10	Clayey Silt	Sr Tank	10/17/00	0.409	0.85	2.00
SSRSF419	5.1/1.4	10	Clayey Silt	Sr Tank, IP	10/17/00	0.417	1.62	1.24
SSRSF420	5.1/ 1.8	10	Clayey Silt	Sr Tank, EP	10/17/00	0.384	1.96	1.66
SSRSF421	5/1.0	10	Clayey Silt	Sr Tank	10/17/00	0.406	1.13	1.72
SSRSF422	6/2.0	10	Clayey Silt	Sr Tank	10/17/00	0.408	0.57	1.58
SSRSF423	6/2.0	10	Clayey Silt	Sr Tank	10/17/00	0.403	1.02	1.71
SSRSF424	6/3.0	10	Clayey Silt	Sr Tank	10/17/00	0.476	0.84	4.89
SSRSF425	5.8/0.7	4	Clayey Silt	SIP 2	10/17/00	0.438	0.8	1.42
SSRSF426	8.2/0.8	4	Clayey Silt	SIP 2	10/17/00	0.416	0.67	3.27
SSRSF427	9.1/0.7	4	Clayey Silt	SIP 2	10/17/00	0.374	0.475	3.04
SSRSF428	7.0/1.0	10	Clayey Silt	Sr Tank	10/18/00	0.433	0.96	2.24
SSRSF429	7.0/2.0	10	Clayey Silt	Sr Tank	10/18/00	0.381	0.83	11.2
SSRSF430	7.0/3.0	10.5	Clayey Silt	Sr Tank	10/18/00	0.362	1.64	12.4
SSRSF431	5.0/3.0	10	Clayey Silt	Sr Tank	10/18/00	0.329	0.94	4.05
SSRSF432	6.0/4.0	11	Clayey Silt	Sr Tank	10/18/00	0.384	0.97	3.24
SSRSF433	6.0/5.0	12	Clayey Silt	Ra Tank	10/18/00	0.442	0.41	5.75
SSRSF434	5.8/5.5	12	Clayey Silt	Ra Tank	10/18/00	0.427	0.9	1.63

Table 5-2. Radium/Strontium Treatment Systems Area II—Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type	Sampling Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF435	5.8/5.5	12	Clayey Silt	Ra Tank	10/18/00	0.389	0.78	1.52
SSRSF436	6.8/0.7	3.5	Clayey Silt	SIP 2	10/18/00	0.382	0.53	1.20
SSRSF437	4.0/0.3	3.5	Clayey Silt	SIP 1	10/18/00	0.383	3.45	1.05
SSRSF438	8.0/1.0	10	Clayey Silt	Sr Tank	10/18/00	0.47	2.3	4.76
SSRSF439	9.0/1.0	10	Clayey Silt	Sr Tank	10/19/00	0.488	0.47	1.78
SSRSF440	9.0/2.0	10	Clayey Silt	Sr Tank	10/19/00	0.456	0.495	10.4
SSRSF441	8.0/2.0	10	Clayey Silt	Sr Tank	10/19/00	0.445	0.7	10.7
SSRSF442	8.0/2.0	10	Clayey Silt	Sr Tank	10/19/00	0.469	0.67	10.7
SSRSF443	8.0/3.0	10	Clayey Silt	Sr Tank	10/19/00	0.48	0.8	10.6
SSRSF444	10.0/1.0	7	Clayey Silt	Sr Tank	10/19/00	0.418	0.27	2.58
SSRSF445	10.0/2.0	7	Clayey Silt	Sr Tank	10/19/00	0.446	0.54	2.62
SSRSF446	5.0/1.0	10	Clayey Silt	Sr Tank	10/19/00	0.47	0.83	1.37
SSRSF447	5.0/2.0	10	Clayey Silt	Sr Tank	10/19/00	0.489	1	1.21
SSRSF448	5.0/2.0	10	Clayey Silt	Sr Tank	10/19/00	0.452	1.11	1.46
SSRSF449	7.0/4.0	11	Clayey Silt	Sr Tank	10/19/00	0.431	0.16	3.37
SSRSF450	6.8/4.2	11.5	Clayey Silt	Sr Tank	10/19/00	0.422	0.15	2.32
SSRSF451	7.5/4.5	12	Clayey Silt	Ra Tank	10/19/00	0.408	0.26	28.4
SSRSF452	7.0/5.0	12	Clayey Silt	Ra Tank	10/19/00	0.437	0.47	24.5
SSRSF453	7.0/6.0	7	Clayey Silt	Ra Tank	10/19/00	0.418	0.84	5.32
SSRSF454	9.7/0.7	3.5	Clayey Silt	SIP 2	10/20/00	0.434	1.04	1.85
SSRSF455	8.0/6.0	5.5	Clayey Silt	Ra Tank	10/20/00	0.477	0.62	4.29
SSRSF456	9.0/6.0	6	Clayey Silt	Ra Tank	10/20/00	0.394	1.15	6.56
SSRSF457	8.0/5.5	12	Clayey Silt	Ra Tank	10/21/00	0.421	0.93	14.7
SSRSF458	8.0/5.0	12	Clayey Silt	Ra Tank	10/21/00	0.43	0.78	8.49
SSRSF459	9.0/5.0	12	Clayey Silt	Ra Tank	10/21/00	0.416	0.85	2.18
SSRSF460	9.0/5.0	12	Clayey Silt	Ra Tank	10/21/00	0.495	0.62	1.97
SSRSF461	10.0/5.0	7	Clayey Silt	Ra Tank	10/21/00	0.272	0.25	1.37

Table 5-2. Radium/Strontium Treatment Systems Area II—Screening Sampling Analytical Results (continued)

Sample ID	Grid Location [1] (East/South)	Sample Depth (ft bgs)	Soil Type	Sampling Location	Date Sampled	Ra-226 [2] (pCi/g)	Sr-90 [3] (pCi/g)	$N0_3$ [4] (mg/kg)
SSRSF462	8.0/4.0	11	Clayey Silt	Sr Tank	10/21/00	0.495	0.89	11
SSRSF463	8.0/4.0	11	Clayey Silt	Sr Tank	10/21/00	0.531	0.9	11.1
SSRSF464	9.0/3.0	10	Clayey Silt	Sr Tank	10/21/00	0.52	0.95	12.3
SSRSF465	10.0/3.0	7	Clayey Silt	Sr Tank	10/21/00	0.435	2.26	6.01
SSRSF466	9.0/4.0	10	Clayey Silt	Sr Tank	10/21/00	0.497	0.72	10.3
SSRSF467	9.0/4.0	10	Clayey Silt	Sr Tank	10/21/00	0.42	0.24	9.56
SSRSF468	10.0/4.0	7	Clayey Silt	Sr Tank	10/21/00	0.4	0.6	3.58
SSRSF469	9.5/4.5	11	Clayey Silt	Ra Tank	10/21/00	0.41	0.36	7.89

Notes

[1]Estimated in the field.

[2]Analyzed by an on-site gamma spectrometer. The average minimum detectable activity for the instrument was 0.3 pCi/g. Ra-226 activity and error were calculated by averaging the lead-214 and bismuth-214 activities measured by the gamma spectrometer.

[3]Analyzed by an on-site beta scintillation detector. Concentrations were judged qualitatively, not quantitatively, due to low concentrations.

[4]Laboratory analysis for nitrate performed using EPA Method 300.0.

[5]Previous samples were collected at other locations.

Abbreviations

DB	distribution box	NSW	northern sidewall
EP	effluent piping	pCi/g	picoCuries per gram
ESW	eastern sidewall	Ra	radium
ft bgs	feet below ground surface	Ra-226	radium-226
ID	identification	RIP	radium influent piping
IP	influent piping	S	south
LL	leach line	SEP	Strontium Effluent Piping
LL W	leach line west	SIP	Strontium Influent Piping
N	north	Sr	strontium
NA	not analyzed or not applicable	Sr-90	strontium-90
NC	not collected	SSW	southern sidewall
NO_3	nitrate	**Boldface** identifies data points exceeding the screening criteria	

Table 5-3. Radium/Strontium Treatment Systems Area I Removal Action—Radium-226 Dry Well Delineation Analytical Results

Sample ID	Direction-Distance from DW Center (ft)	Depth (ft bgs)	Ra-226 Activity (pCi/g)	Sr-90 Activity (pCi/g)	NO_3 Concentration (mg/kg)
Screening Criteria			**0.75**	**10**	**36**
Dry Well 1 (Most Northern)					
SSRSF220	E-3	10	**1.4**	1.85	**180**
SSRSF221	E-3	14	0.7	2.43	**452**
SSRSF222	E-3	18	0.54	1.03	**288**
SSRSF223	E-3	22	0.44	0.82	1.32
SSRSF224	E-3	26	0.43	0.57	23.9
SSRSF225	E-3	30	0.41	0.11	**55.7**
SSRSF226	E-3	34	0.35	0.26	4.17
SSRSF227	E-3	38	0.55	0.71	9.6
SSRSF228	S-4	11	**1.54**	2.37	**96.2**
SSRSF229 (FD)	S-4	11	**1.38**	2.34	**109**
SSRSF230	S-4	15	**1.55**	3.04	**100**
SSRSF231	S-4	19	0.58	1.04	0.951
SSRSF232	S-4	23	0.46	0.63	0.353
SSRSF233	S-4	27	0.42	0.87	0.425
SSRSF234	S-4	31	0.48	0.84	0.492
SSRSF235	S-4	35	0.34	0.31	17.5
SSRSF236	S-4	39	0.41	0.33	21.6
SSRSF237	W-5	12	0.48	1.27	7.58
SSRSF238	W-5	16	**1.42**	3.27	11.1
SSRSF239	W-5	20	0.38	0.95	0.418
SSRSF240	W-5	24	0.58	1.22	10.3
SSRSF241 (FD)	W-5	24	0.51	0.61	10.2
SSRSF242	W-5	28	0.51	0.72	**78.2**
SSRSF243	W-5	32	0.41	0.16	13.1
SSRSF244	W-5	36	0.3	0.05	1.5
SSRSF245	W-5	40	0.39	0.35	19.3
SSRSF246	N-6	13	0.54	1.04	**112**
SSRSF247	N-6	17	0.68	1.51	**95.8**
SSRSF248	N-6	21	0.4	0.74	0.702
SSRSF249	N-6	25	0.43	0.61	10.8

Table 5-3. Radium/Strontium Treatment Systems Area I Removal Action—Radium-226 Dry Well Delineation Analytical Results (continued)

Sample ID	Direction-Distance from DW Center (ft)	Depth (ft bgs)	Ra-226 Activity (pCi/g)	Sr-90 Activity (pCi/g)	NO_3 Concentration (mg/kg)
Screening Criteria			**0.75**	**10**	**36**
SSRSF250	N-6	29	0.26	0.08	7.33
SSRSF251 (FD)	N-6	29	0.2	0.28	NA
SSRSF252	N-6	33	0.13	0.44	0.988
SSRSF253	N-6	39	0.38	1.16	5.85
SSRSF254	N-6	41	0.34	0.37	13.6
SSRSF291	W-7	11	0.57	0.12	1.45
SSRSF292	W-7	14	0.71	0.35	1.91
SSRSF293	W-7	17	0.61	0.57	14.3
SSRSF294	W-7	20	0.37	0.5	2.11
SSRSF332	E-6	11	0.47	0.82	NA
SSRSF333	E-6	14	**0.87**	1.27	NA
SSRSF334	E-6	17	0.66	0.74	NA
SSRSF335	E-6	20	0.51	0.55	NA
SSRSF336	S-6	11	0.71	1.29	NA
SSRSF337	S-6	14	**0.82**	0.52	NA
SSRSF338	S-6	17	**0.95**	1.01	NA
SSRSF339	S-6	20	0.45	0.56	NA
Dry Well 2 (Central)					
SSRSF255	E-4	10	0.57	0.74	8.51
SSRSF256	E-4	14	0.7	1.55	16.9
SSRSF257	E-4	18	0.53	0.8	**40.8**
SSRSF258	E-4	22	0.46	0.83	0.304
SSRSF259	E-4	26	0.45	0.86	0.315
SSRSF260	E-4	30	0.52	0.41	0.436
SSRSF261	E-4	34	0.71	1.4	0.106
SSRSF262 (FD)	E-4	34	**0.77**	1.28	0.216
SSRSF263	E-4	38	0.73	0.82	0.471
SSRSF264	S-3	11	**0.94**	1.7	**52.1**
SSRSF265	S-3	15	**1.88**	2.21	**39.4**
SSRSF266	S-3	19	0.51	0.57	**38.1**
SSRSF267	S-3	23	0.47	0.88	0.521

Table 5-3. Radium/Strontium Treatment Systems Area I Removal Action—Radium-226 Dry Well Delineation Analytical Results (continued)

Sample ID	Direction-Distance from DW Center (ft)	Depth (ft bgs)	Ra-226 Activity (pCi/g)	Sr-90 Activity (pCi/g)	NO_3 Concentration (mg/kg)
Screening Criteria			**0.75**	**10**	**36**
SSRSF268	S-3	27	0.5	0.54	0.232
SSRSF269	S-3	31	**0.79**	0.74	0.32
SSRSF270	S-3	35	0.56	1.12	0.195
SSRSF271	S-3	39	0.54	0.58	0.254
SSRSF272	W-4	8	0.44	0.38	28.3
SSRSF273	W-4	12	0.61	1.15	35.3
SSRSF274	W-4	16	0.61	1.03	10
SSRSF275	W-4	20	0.48	0.23	0.823
SSRSF276	W-4	24	0.49	0.9	0.41
SSRSF277	W-4	28	0.56	0.81	0.202
SSRSF278 (FD)	W-4	28	0.6	0.12	NA
SSRSF279	W-4	32	0.53	0.88	0.13
SSRSF280	W-4	36	0.52	0.75	0.198
SSRSF281	W-4	40	0.36	0.3	2.84
SSRSF282	N-4	13	0.63	0.18	**57.8**
SSRSF283	N-4	17	0.67	0.72	13.7
SSRSF284	N-4	21	0.45	0.64	0.595
SSRSF285	N-4	5	0.52	0.34	0.035
SSRSF286 (FD)	N-4	5	0.5	0.71	NA
SSRSF287	N-4	29	0.53	0.39	0.276
SSRSF288	N-4	33	0.7	1.33	ND
SSRSF289	N-4	37	0.45	0.71	ND
SSRSF290	N-4	40	0.27	0.31	16.4
SSRSF340	S-6	14	0.56	0.41	NA
SSRSF341	S-6	18	0.55	0.56	NA
SSRSF342	S-6	22	0.43	0.71	NA
SSRSF343 (FD)	S-6	22	0.36	0.62	NA
SSRSF344	S-6	26	0.32	0.16	NA
SSRSF345	S-6	30	0.21	-0.08	NA
SSRSF346	S-6	34	0.55	0.47	NA

Table 5-3. Radium/Strontium Treatment Systems Area I Removal Action—Radium-226 Dry Well Delineation Analytical Results (continued)

Sample ID	Direction-Distance from DW Center (ft)	Depth (ft bgs)	Ra-226 Activity (pCi/g)	Sr-90 Activity (pCi/g)	NO_3 Concentration (mg/kg)
Screening Criteria			**0.75**	**10**	**36**
Dry Well 3 (Most Southern)					
SSRSF295	E-4	10	**3.03**	3.1	**50.5**
SSRSF296	E-4	14	**3.47**	3.65	**115**
SSRSF297 (FD)	E-4	14	**3.09**	3.89	**105**
SSRSF298	E-4	18	**0.93**	0.87	**383**
SSRSF299	E-4	22	**0.91**	1.48	0.52
SSRSF300	E-4	26	0.58	0.22	0.08
SSRSF301	E-4	30	**1.00**	1.50	0.07
SSRSF302	E-4	34	0.41	1.17	0.07
SSRSF303	E-4	38	0.42	0.7	0.17
SSRSF304	S-5	11	0.69	1	**43.2**
SSRSF305	S-5	15	0.53	1.13	**161**
SSRSF306	S-5	19	0.56	0.63	**310**
SSRSF307	S-5	23	0.57	0.35	0.2
SSRSF308	S-5	27	0.40	0.77	0.24
SSRSF309 (FD)	S-5	27	0.42	0.25	0.1
SSRSF310	S-5	31	0.50	0.26	ND
SSRSF311	S-5	35	0.43	0.59	0.09
SSRSF312	S-5	39	0.40	0.44	0.17
SSRSF313	N-5	13	0.61	0.58	6.69
SSRSF314	N-5	17	0.67	1.01	**107**
SSRSF315 (FD)	N-5	17	0.62	0.41	**39.7**
SSRSF316	N-5	21	0.50	0.63	0.03
SSRSF317	N-5	25	0.47	0.06	ND
SSRSF318	N-5	29	0.57	0.94	0.05
SSRSF319	N-5	33	**0.80**	0.87	0.22
SSRSF320	N-5	37	0.61	0.78	0.14
SSRSF321	N-5	41	0.57	0.66	ND
SSRSF322	W-6	8	0.5	0.29	3.97
SSRSF323	W-6	12	0.2	0.46	5.88
SSRSF324	W-6	16	0.43	1.14	**86**

Table 5-3. Radium/Strontium Treatment Systems Area I Removal Action—Radium-226 Dry Well Delineation Analytical Results (continued)

Sample ID	Direction-Distance from DW Center (ft)	Depth (ft bgs)	Ra-226 Activity (pCi/g)	Sr-90 Activity (pCi/g)	NO_3 Concentration (mg/kg)
Screening Criteria			**0.75**	**10**	**36**
SSRSF325	W-6	20	0.37	0.66	**49.3**
SSRSF326	W-6	24	0.43	0.62	0.12
SSRSF327 (FD)	W-6	24	0.36	0.25	0.23
SSRSF328	W-6	28	0.44	0.55	ND
SSRSF329	W-6	32	0.43	0.59	0.22
SSRSF330	W-6	36	0.44	0.66	0.17
SSRSF331	W-6	40	0.41	0.92	0.21
SSRSF347	E-6	14	0.38	0.65	NA
SSRSF348	E-6	18	0.75	0.62	NA
SSRSF349	E-6	22	0.18	0.76	NA
SSRSF350	E-6	26	0.42	0.33	NA
SSRSF351	E-6	30	0.38	0.12	NA
SSRSF352 (FD)	E-6	30	0.38	0.58	NA
SSRSF353	E-6	34	0.53	0.51	NA

Notes

Boldface indicates exceedance above the screening criteria.

Abbreviations

DW	dry well
E-, S-, W-, N-	east, south, west, and north
FD	field duplicate
ft	feet
ft bgs	feet below ground surface
ID	identification
mg/kg	milligrams per kilogram
NA	not analyzed
ND	not detected
NO_3	nitrate
pCi/g	picoCuries per gram
Ra-226	radium-226
Sr-90	strontium-90

Table 5-4. Radium/Strontium Systems Area I Removal Action—Nitrate Delineation Analytical Results

Sample ID	Grid Location[1] (East/South)	Sample Depth (ft bgs)	Soil Type/Sampling Location	Date	$N0_3$[2] (mg/kg)
Screening Criterion					**36 mg/kg**
SSRSF154	2.5/ 5.5	5	Clayey Silt/DW 1 East Sidewall	7/12/99	**47.4**
SSRSF155	2.5/ 5.6	5.5	Clayey Silt/DW 1 East Sidewall	7/12/99	**42.8**
SSRSF156	2.5/ 5.7	6	Clayey Silt/DW 1 East Sidewall	7/12/99	**72.1**
SSRSF158	2.8/ 9.8	4	Clayey Silt/DW 3 East Sidewall	7/12/99	**181**
SSRSF159	2.8/ 9.9	4.5	Clayey Silt/DW 3 East Sidewall	7/12/99	**194**
SSRSF160	2.8/ 10	5	Clayey Silt/DW 3 East Sidewall	7/12/99	**216**
SSRSF161	2.7/11.7	18	Clayey Silt/SLT Trench Floor	7/12/99	18.9
SSRSF162	2.7/11.7	19	Clayey Silt/SLT Trench Floor	7/12/99	**48.2**
SSRSF163	2.7/11.7	20	Clayey Silt/SLT Trench Floor	7/12/99	24.1
SSRSF164	2.7/11.7	21	Clayey Silt/SLT Trench Floor	7/12/99	25.6
SSRSF165	2.7/11.7	22	Clayey Silt/SLT Trench Floor	7/12/99	32.3
SSRSF166	2.3/ 5.4	8	Clayey Silt/DW 1 Floor	7/12/99	22.3
SSRSF167	2.3/ 5.4	9	Clayey Silt/DW 1 Floor	7/12/99	**51.7**
SSRSF168	2.3/ 5.4	10	Clayey Silt/DW 1 Floor	7/12/99	**61.3**
SSRSF169	2.3/ 5.4	10	**Field duplicate for SSRSF168**	7/12/99	**61.7**
SSRSF170	2.3/ 5.4	11	Clayey Silt/DW 1 Floor	7/12/99	**56.4**
SSRSF171	2.3/ 5.4	12	Clayey Silt/DW 1 Floor	7/12/99	**84.8**
SSRSF172	2.6/ 9.8	10	Clayey Silt/DW 3 Floor	7/12/99	**53**
SSRSF173	2.6/ 9.8	11	Clayey Silt/DW 3 Floor	7/12/99	**51.6**
SSRSF174	2.6/ 9.8	11	**Field duplicate for SSRSF173**	7/12/99	**45.9**
SSRSF175	2.6/ 9.8	12	Clayey Silt/DW 3 Floor	7/12/99	**46.2**
SSRSF176	2.6/ 9.8	13	Clayey Silt/DW 3 Floor	7/12/99	**54**
SSRSF177	2.6/ 9.8	14	Clayey Silt/DW 3 Floor	7/12/99	**66.1**
SSRSF180	4.0/8.9	5	Clayey Silt/East of SLT	7/16/99	29.1
SSRSF181	3.9/9.9	5	Clayey Silt/East of SLT	7/16/99	26.9
SSRSF182	3.8/10.9	5	Clayey Silt/East of SLT	7/16/99	**88.2**
SSRSF183	3.3/10.9	5	Clayey Silt/East of SLT	7/16/99	**36.1**

Table 5-4. Radium/Strontium Systems Area I Removal Action—Nitrate Delineation Analytical Results (continued)

Sample ID	Grid Location[1] (East/South)	Sample Depth (ft bgs)	Soil Type/Sampling Location	Date	$N0_3$[2] (mg/kg)
Screening Criterion					**36 mg/kg**
SSRSF184	3.7/11.9	5	Clayey Silt/East of SLT	7/16/99	11.2
SSRSF185	3.2/11.9	5	Clayey Silt/East of SLT	7/16/99	**42.7**

Notes

[1]Estimated in the field.

[2]Laboratory analysis for nitrate performed using EPA Method 300.0.

Boldface identifies data points exceeding the Screening Criterion.

Abbreviations

DW Dry Well
ft bgs feet below ground surface
ID identification
mg/kg milligrams per kilogram
NO_3 nitrate
SLT Southern Leach Trench

Table 5-5. Radium/Strontium Treatment Systems Area I Removal Action—Heating, Ventilating, and Air Conditioning Sample Analytical Results

Sample ID	Matrix/Sampling Location	Date	Ra-226[1] (pCi/L)
WSRSH001	Water/HVAC	5/12/99	0.45
WSRSH002	Water/HVAC	5/17/99	0.55
WSRSH003	Water/HVAC	5/25/99	2.62
WSRSH004	Water/HVAC	5/27/99	0.89
WSRSH005	Water/HVAC	6/3/99	1.23
WSRSH006	Water/HVAC	6/8/99	1.2
WSRSH007	Water/HVAC	6/10/99	1.72
WSRSH008	Water/HVAC	6/15/99	2.47
WSRSH009	Water/HVAC	6/17/99	0.67
WSRSH010	Water/HVAC	6/22/99	0.63
WSRSH011	Water/HVAC	6/24/99	1.29
WSRSH012	Water/HVAC	6/29/99	2.04
WSRSH013	Water/HVAC	7/1/99	0.43
WSRSH014	Water/HVAC	7/7/99	0.93
WSRSH015	Field Duplicate of WRSH014	7/7/99	0.54
WSRSH016	Water/HVAC	7/14/99	0.54
WSRSH017	Water/HVAC	9/22/99	0.4
WSRSH018	Water/HVAC	9/27/99	0.79
WSRSH019	Water/HVAC	9/30/99	0.8
WSRSH020	Water/HVAC	10/5/99	1.36
WSRSH021	Water/HVAC	10/12/99	0.24
WSRSH022	Field Duplicate of WRSH022	10/12/99	0.08

Notes

[1] The California Maximum contaminant level for Radium-226 is 5 pCi/L.

Abbreviations

HVAC heating, ventilating and air conditioning
ID identification
pCi/L picoCuries per liter
Ra-226 radium-226

Table 5-6. Radium/Strontium Treatment Systems Areas I and II Removal Actions Confirmation Sample Collection Locations

Sample Identification	Sample Location
SSRSC001 to -006	Domestic Septic Tank 2 and Distribution Box Excavation
SSRSC007, 008, 034 and 037	Dry Well 1 Area
SSRSC035, -036	Dry Well 2 Area
SSRSC038 to -042	Dry Well 3 Area
SSRSC009 to -029, 033	Southern Leach Trench
SSRSC030 to -032	Northern Leach Trench
SSRSC067 to -070; SSRSC072 to -078	Former Sr-90 Leach Field
SSRSC044 to -050; SSRSC053 to -055, SSRSC057 to -059	Former location of the Sr-90 Tank
SSRSC056; SSRSC060 to -062	Former location of the Ra-226 Tank
SSRSC043, SSRSC051, SSRSC052 and SSRSC071	Excavation surrounding the Sr-90 Influent Piping
SSRSC063 to SSRSC066	Excavation surrounding the Ra-226 Influent Piping

Abbreviations

Ra-226 radium-226
Sr-90 strontium-90

Table 5-7. Radium/Strontium Treatment Systems Areas I and II Removal Actions, Confirmation Sampling and Analytical Results Summary

Constituent	Number of Samples > Reporting Limit 1	Range of Detections	Maximum Concentrations Sample ID	Depth (ft bgs)	Structure Near Maximum Location
General Chemistry		**mg/kg**			
Hexavalent Chromium	55	0.0749-0.841	SSRSC070	7	Sr-90 Leach Field
Nitrate	68	0.496-304	SSRSC040	20	DW 3
Metals		**mg/kg**			
Antimony	1	0.92	SSRSC039	15	DW 3
Arsenic	38	3.6-10.2	SSRSC020	13.5	SLT-ESW
Barium	38	84.7-251	SSRSC009	9	SLT-WSW
Beryllium	38	0.23-0.57	SSRSC014 and 025	13.5, 7	SLT-Trench Floor/ SLT-ESW
Cadmium	4	0.13-0.23	SSRSC038	10	DW 3
Chromium	38	47.8-146	SSRSC020	13.5	SLT-ESW
Cobalt	38	10.6-26.1	SSRSC032	4.5	NLT-ESW
Copper	38	19.9-50.8	SSRSC014	13.5	SLT-Trench Floor
Iron	38	16500-42000	SSRSC025	7	SLT-ESW
Lead	38	3.8-15.1	SSRSC008	9	DW 1-ESW
Manganese	38	276-882	SSRSC032	4.5	NLT-ESW
Mercury	38	0.1-2	SSRSC010 and 024	1, 5.5	SLT-ESW
Molybdenum	33	0.2-0.46	SSRSC029	4	SLT-WSW
Nickel	38	78.5-293	SSRSC022	5	SLT-WSW
Selenium	34	0.73-1.8	SSRSC025	7	SLT-ESW
Silver	20	0.48-0.81	SSRSC018	11	SLT-WSW
Vanadium	38	30.3-77.3	SSRSC025	7	SLT-ESW
Zinc	38	36.4-89.6	SSRSC020	13.5	SLT-ESW
Pesticides		**µg/kg**			
4,4'-DDT	1	133	SSRSC066	3	RIP I and II
alpha-Chlordane	8	2.4-277	SSRSC066	3	RIP I and II
gamma-Chlordane	8	3.2-346	SSRSC066	3	RIP I and II
Heptachlor	2	18-52.2	SSRSC066	3	RIP I and II
Radionuclides		**pCi/g**			
Actinium-228	71	0.382-0.949	SSRSC035	42.5	DW 2
Americium-241	18	0.00243-0.0847	SSRSC053	8	Sr-90 Tank
Bismuth-212	71	0.241-0.662	SSRSC035	42.5	DW 2
Bismuth-214	71	0.32-2.5	SSRSC035	42.5	DW 2
Carbon-14	15	0.0871-2.41	SSRSC020	13.5	SLT-ESW
Cesium-137	20	0.00418-0.612	SSRSC072	6	Sr-90 Leach Field
Lead-210	19	0.47-3.74	SSRSC035	42.5	DW 2
Lead-212	71	0.449-1.4	SSRSC035	42.5	DW 2

Table 5-7. Radium/Strontium Treatment Systems Areas I and II Removal Actions, Confirmation Sampling and Analytical Results Summary (continued)

Constituent	Number of Samples > Reporting Limit 1	Range of Detections	Maximum Concentrations Sample ID	Depth (ft bgs)	Structure Near Maximum Location
Radionuclides		**pCi/g**			
Lead-214	71	0.396-3.14	SSRSC035	42.5	DW 2
Plutonium-241	12	0.335-33.2	SSRSC035	42.5	DW 2
Potassium-40	71	9.32-16.7	SSRSC035	42.5	DW 2
Radium-226	71	0.395-1.81	SSRSC035	42.5	DW 2
Radium-228	71	0.382-0.949	SSRSC035	42.5	DW 2
Strontium-90	43	0.0185-2.18	SSRSC043	5	SIP 1,2
Thallium-208	71	0.138-0.368	SSRSC035	42.5	DW 2
Thorium-228	70	0.342-1.12	SSRSC070	7	Sr-90 Leach Field
Thorium-230	70	0.338-1.09	SSRSC070	7	Sr-90 Leach Field
Thorium-232	70	0.288-0.807	SSRSC032	4.5	NLT-ESW
Thorium-234	70	0.398-2.36	SSRSC035	42.5	DW 2
Uranium-233/234	71	0.394-0.849	SSRSC023	13.5	SLT-Trench Floor
Uranium-235/236	71	0.0135-0.0843	SSRSC023	13.5	SLT-Trench Floor
Uranium-238	71	0.368-0.842	SSRSC023	13.5	SLT-Trench Floor
Semi-Volatile Organic Compounds		**µg/kg**			
Di-n-butylphthalate	1	380	SSRSC065	1.5	RIP I and II
Volatile Organic Compounds		**µg/kg**			
2-Butanone	14	26.4-132	SSRSC005	10	DST NSW
Acetone	2	36.3-44.8	SSRSC041	42.5	DW 3
Toluene	38	18-263	SSRSC059	10	Sr-90 Tank

Abbreviations
[1]The number above the reporting limit represents the number of samples greater than the "detection limit" for volatile and semi-volatile organic compounds, pesticides and radionuclides, the instrument detection limit for metals and the method detection limit for general chemistry.

Abbreviations

µg/kg	micrograms per kilogram
DST	Domestic Septic Tank
DW	Dry Well
ESW	eastern sidewall
ft bgs	feet below ground surface
ID	identification
mg/kg	milligrams per kilogram
NLT	Northern Leach Trench
pCi/g	picoCuries per gram
RIP	Radium Influent Piping
SLT	Southern Leach Trench
WSW	western sidewall

Table 5-8. Radium/Strontium Treatment Systems Areas I and II Removal Actions—Confirmation Sample SSRSC035 Reanalysis Summary

Constituent	Background Concentration [1]	Original Analysis Results [2]	Re-Analysis Results [2]	Sample Identification
Actinium-228	0.633/0.642	0.95	0.62	SSRSC035
Bismuth-212	0.388/0.434	0.66	0.57	SSRSC035
Bismuth-214	0.54	2.50	1.76	SSRSC035
Cesium-137	0.102/0.00695	0.02	0.002	SSRSC035
Lead-210	1.60	3.74	2.02	SSRSC035
Lead-212	0.691/0.684	1.40	0.77	SSRSC035
Lead-214	0.55/0.581	3.14	1.9	SSRSC035
Plutonium-241	0.50	33.20	0.79/0.48	SSRSC034
Potassium-40	14	16.70	12.8	SSRSC035
Radium-226	0.75	1.63	1.81	SSRSC035
Radium-228	0.63/0.655	0.95	0.62	SSRSC035
Thallium-208	0.204/0.223	0.37	0.19	SSRSC035
Thorium-234	0.78	2.36	0.74	SSRSC035

Note

[1]Background activities (in picoCuries per gram) represent stratified concentration by depth: zero to four feet and less than four feet.

[2]All units are picoCuries per gram.

SSRSC034 and SSRSC035 sample were collected 42.5 feet below ground surface.

Table 5-9. Designated-Level Sample Analytical Results, Radium/Strontium Treatment System Area, LEHR Site, Davis, California

Carbon-14 Results			
Sample ID	Concentration (pCi/g)	Confirmation Sample Location	Depth (ft bgs)
SSRSDL39	0.0763	SSRSC020	18.5
SSRSDL40	-0.0162	SSRSC020	23.5
SSRSDL41	-0.0106	SSRSC020	28.5
SSRSDL42	-0.0215	SSRSC020	33.5
SSRSDL43	0.0118	SSRSC019	13
SSRSDL44	-0.0277	SSRSC019	18
SSRSDL45 (FD)	-0.00468	SSRSC019	18
SSRSDL46	-0.0184	SSRSC019	23
SSRSDL47	0.0193	SSRSC019	28
SSRSDL48 (FD)	-0.0121	SSRSC019	28
SSRSDL49	0.00253	SSRSC019	33
Cesium-137 Results			
Sample ID	Concentration (pCi/g)	Confirmation Sample Location	Depth (ft bgs)
SSRSDL29	0.0386	SSRSC072	11
SSRSDL30	0.664	SSRSC072	16
SSRSDL31	0.00717	SSRSC072	21
SSRSDL32	-0.00215	SSRSC072	26
SSRSDL50	0.00713	SSRSC074	12
SSRSDL51	0.0037	SSRSC074	17
SSRSDL52	0.00853	SSRSC074	22
SSRSDL53	-0.00497	SSRSC074	27
SSRSDL54	0.00695	SSRSC074	32
Hexavalent Chromium Results			
Sample ID	Concentration (mg/kg)	Confirmation Sample Location	Depth (ft bgs)
SSRSDL33	0.287	SSRSC070	12
SSRSDL34	0.264	SSRSC070	17
SSRSDL35 (FD)	0.289	SSRSC070	17
SSRSDL36	0.216	SSRSC070	22
SSRSDL37	0.295	SSRSC070	27
SSRSDL38	0.252	SSRSC070	32
SSRSDL55	0.564	SSRSC078	7
SSRSDL56	0.614	SSRSC078	12
SSRSDL57 (FD)	0.373	SSRSC078	12
SSRSDL58	0.422	SSRSC078	17
SSRSDL59	0.323	SSRSC078	22
SSRSDL60	0.213	SSRSC078	27
SSRSDL61	0.21	SSRSC078	32
SSRSDL66	0.139	SSRSC042	42.5
SSRSDL67	0.341	SSRSC042	45
SSRSDL68 (FD)	0.148	SSRSC042	45
SSRSDL69	0.32	SSRSC042	47.5

Table 5-9. Designated-Level Sample Analytical Results, Radium/Strontium Treatment System Area, LEHR Site, Davis, California (continued)

Mercury Results			
Sample ID	Concentration (mg/kg)	Confirmation Sample Location	Depth (ft bgs)
SSRSDL10	0.11	SSRSC024	10.5
SSRSDL11	0.059	SSRSC024	15.5
SSRSDL12	0.037	SSRSC024	20.5
SSRSDL13	0.037	SSRSC024	25.5
SSRSDL14	0.095	SSRSC024	30.5
SSRSDL15	0.24	SSRSC010	6
SSRSDL16	0.11	SSRSC010	11
SSRSDL17 (FD)	0.23	SSRSC010	11
SSRSDL18	0.056	SSRSC010	16
SSRSDL19	0.069	SSRSC010	21
SSRSDL20	0.1	SSRSC010	26
SSRSDL21	0.56	SSRSC010	31
SSRSDL22	1.2	SSRSC051	7.5
SSRSDL23	0.17	SSRSC051	12.5
SSRSDL24	0.086	SSRSC051	17.5
SSRSDL25 (FD)	0.056	SSRSC051	17.5
SSRSDL26	0.033	SSRSC051	22.5
SSRSDL27	0.19	SSRSC051	27.5
SSRSDL28	0.07	SSRSC051	32.5
Nitrate Results			
Sample ID	Concentration (mg/kg)	Confirmation Sample Location	Depth (ft bgs)
SSRSDL01	0.956	SSRSC040	25
SSRSDL02	41.5	SSRSC040	30
SSRSDL03	<0.117	SSRSC040	35
SSRSDL04	39.5	SSRSC032	9.5
SSRSDL05	19.6	SSRSC032	14.5
SSRSDL06	102	SSRSC032	19.5
SSRSDL07	89.1	SSRSC032	24.5
SSRSDL08	132	SSRSC032	29.5
SSRSDL09	116	SSRSC032	34.5
SSRSC035 Re-Sampling for Radium-226			
Sample ID	Concentration (pCi/g)	Confirmation Sample Location	Depth (ft bgs)
SSRSDL62	0.609	SSRSC035	42.5
SSRSDL63	0.545	SSRSC035	45
SSRSDL64	0.543	SSRSC035	47.5
SSRSDL65 (FD)	0.5	SSRSC035	47.5

Abbreviations

ft bgs	feet below ground surface
FD	field duplicate
ID	identification
mg/kg	milligram per kilogram
pCi/g	picocurie per gram

Table 5-10. Generalized Lithology, Radium/Strontium Treatment Systems Area Removal Action, LEHR Site, UC Davis, California

Approximate Depths (ft bgs)	Modifier and Main Constituent	Density, Plasticity, Sorting	Estimated Permeability
0.0 – 14.0	Clayey Silt	Medium Stiff, Low Plasticity	Low
14.0 – 29.5	Silty Clay	Stiff, Low Plasticity – Medium Plasticity	Very Low
29.5. – 32.5	Silty Sand	Medium Dense, Non-Plastic, Well-Sorted	Moderate-High
32.5 – 45.0	Silty Clay	Stiff, Low Plasticity – Medium Plasticity	Very Low

Abbreviation
ft bgs feet below ground surface

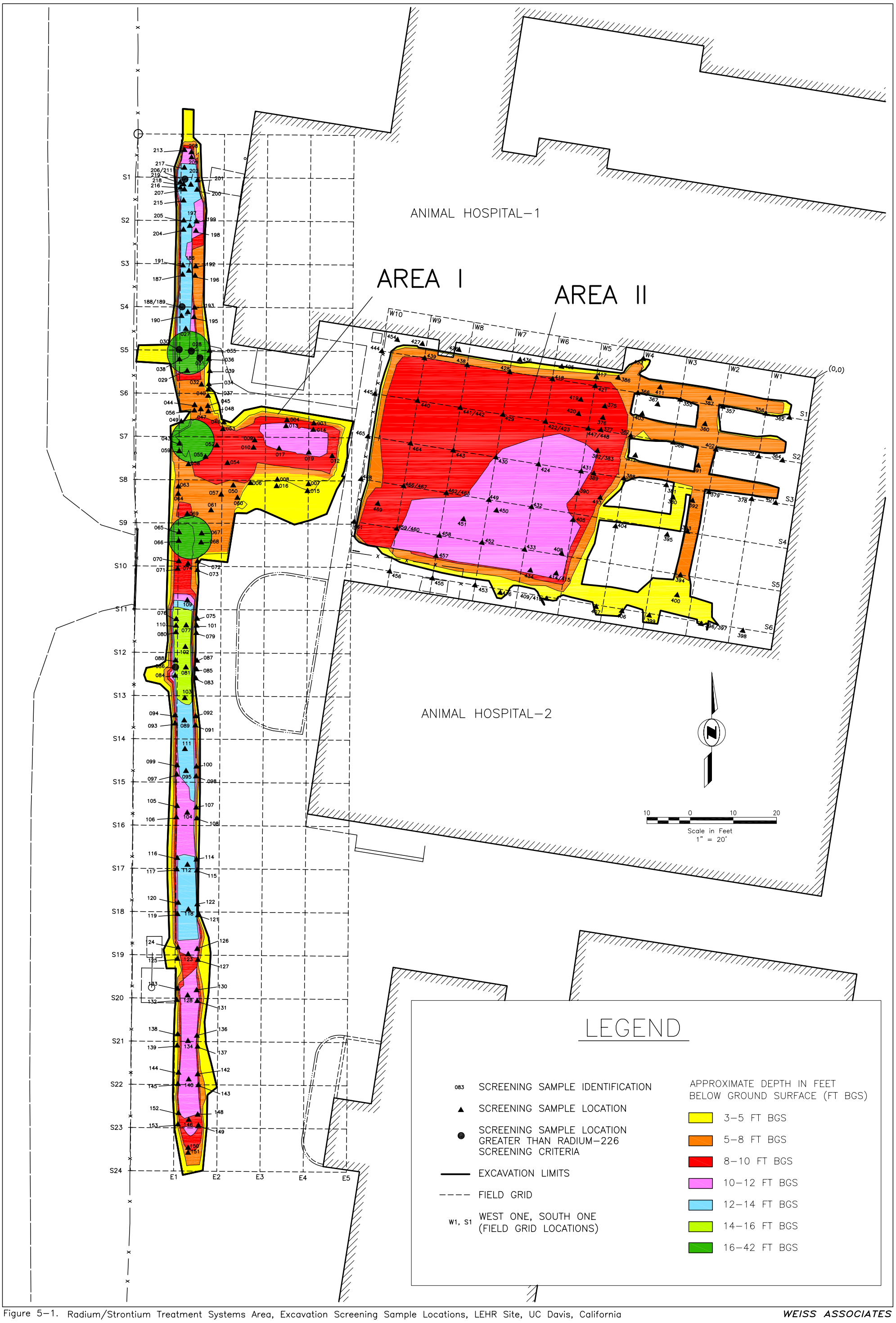

Figure 5-1. Radium/Strontium Treatment Systems Area, Excavation Screening Sample Locations, LEHR Site, UC Davis, California

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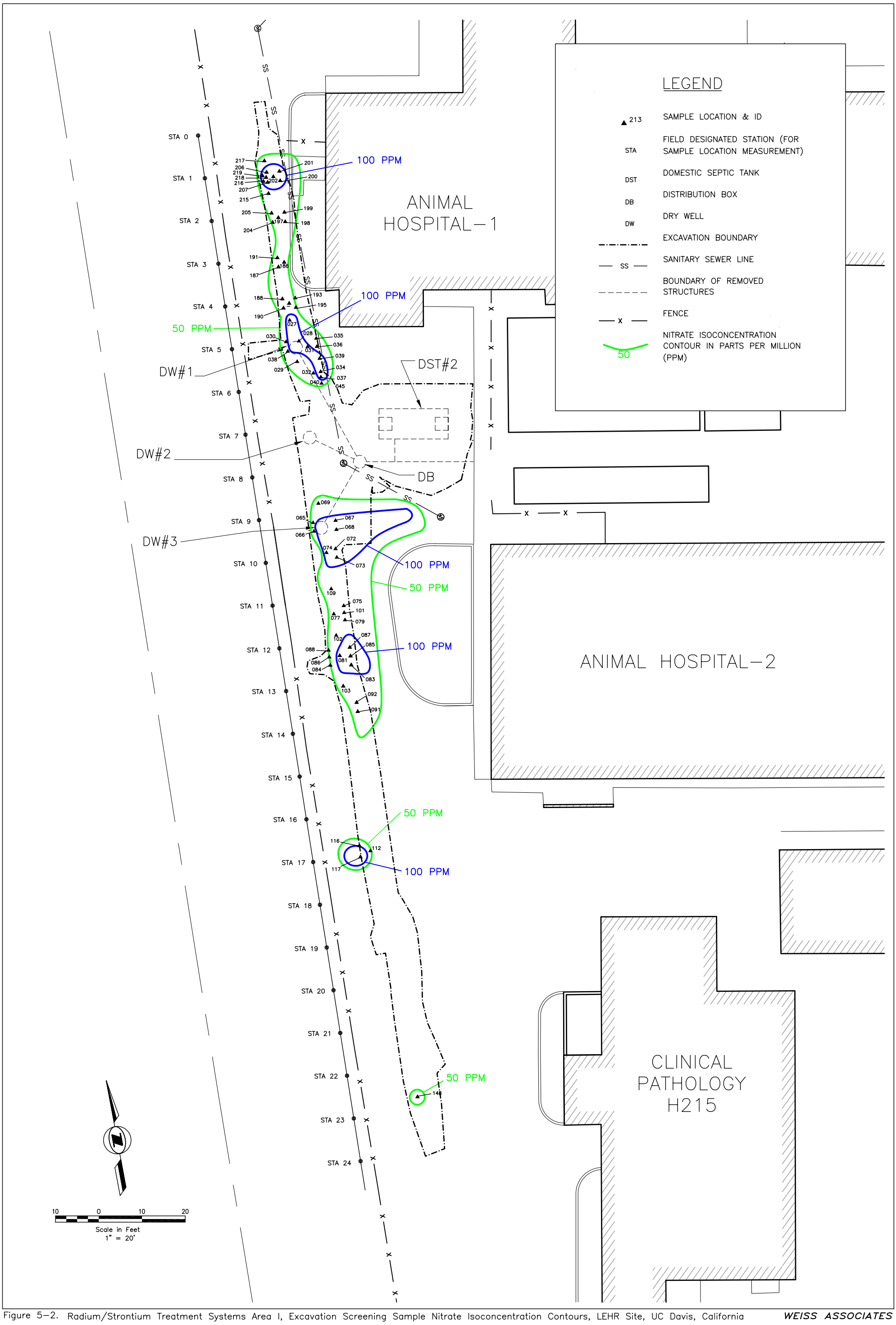

Figure 5-2. Radium/Strontium Treatment Systems Area I, Excavation Screening Sample Nitrate Isoconcentration Contours, LEHR Site, UC Davis, California

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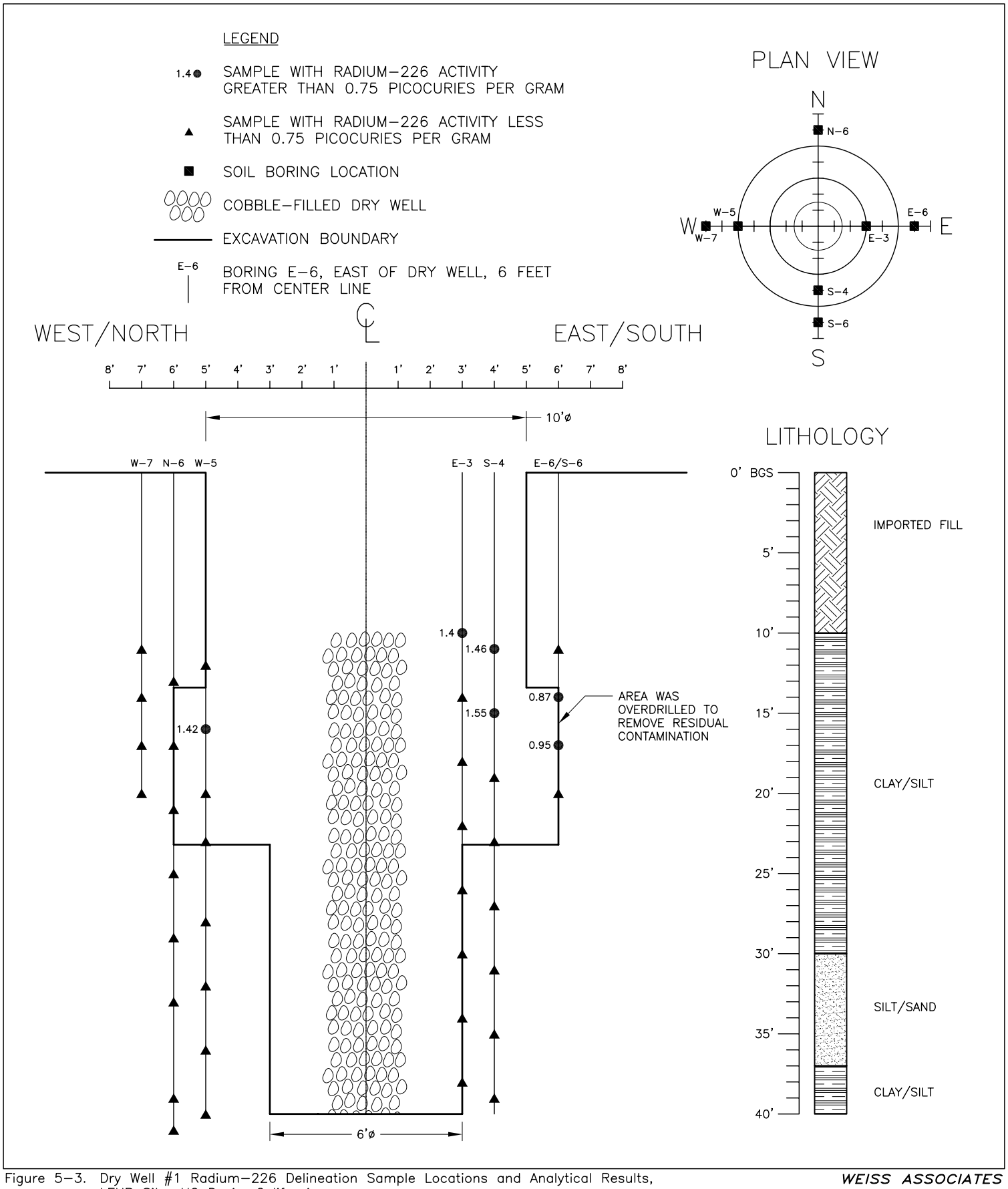

Figure 5-3. Dry Well #1 Radium-226 Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

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4006\226_CON_RPRT\4006-053.DWG | 06/27/01

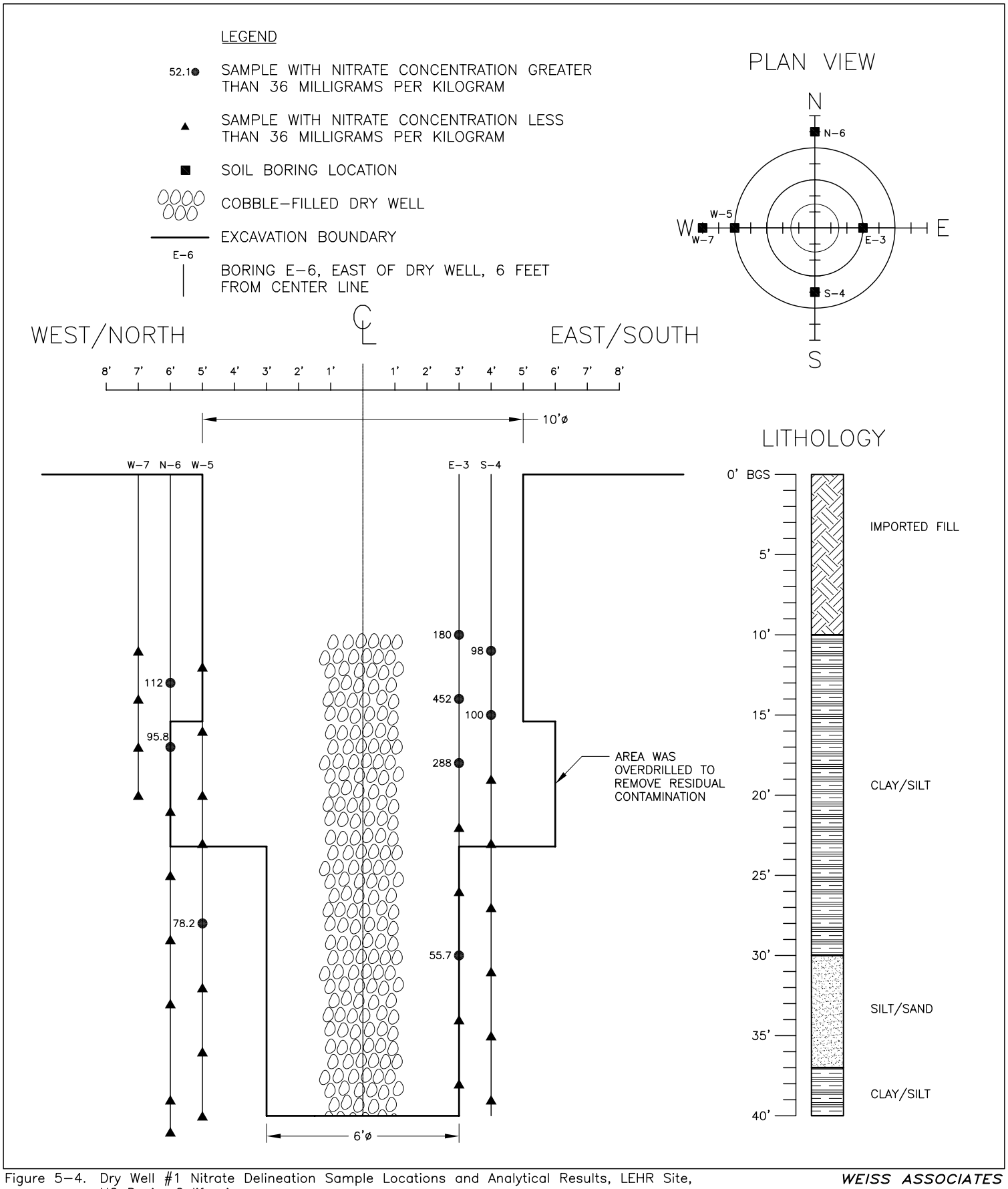

Figure 5-4. Dry Well #1 Nitrate Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

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4006\226_CON_RPRT\4006-055.DWG | 06/27/01

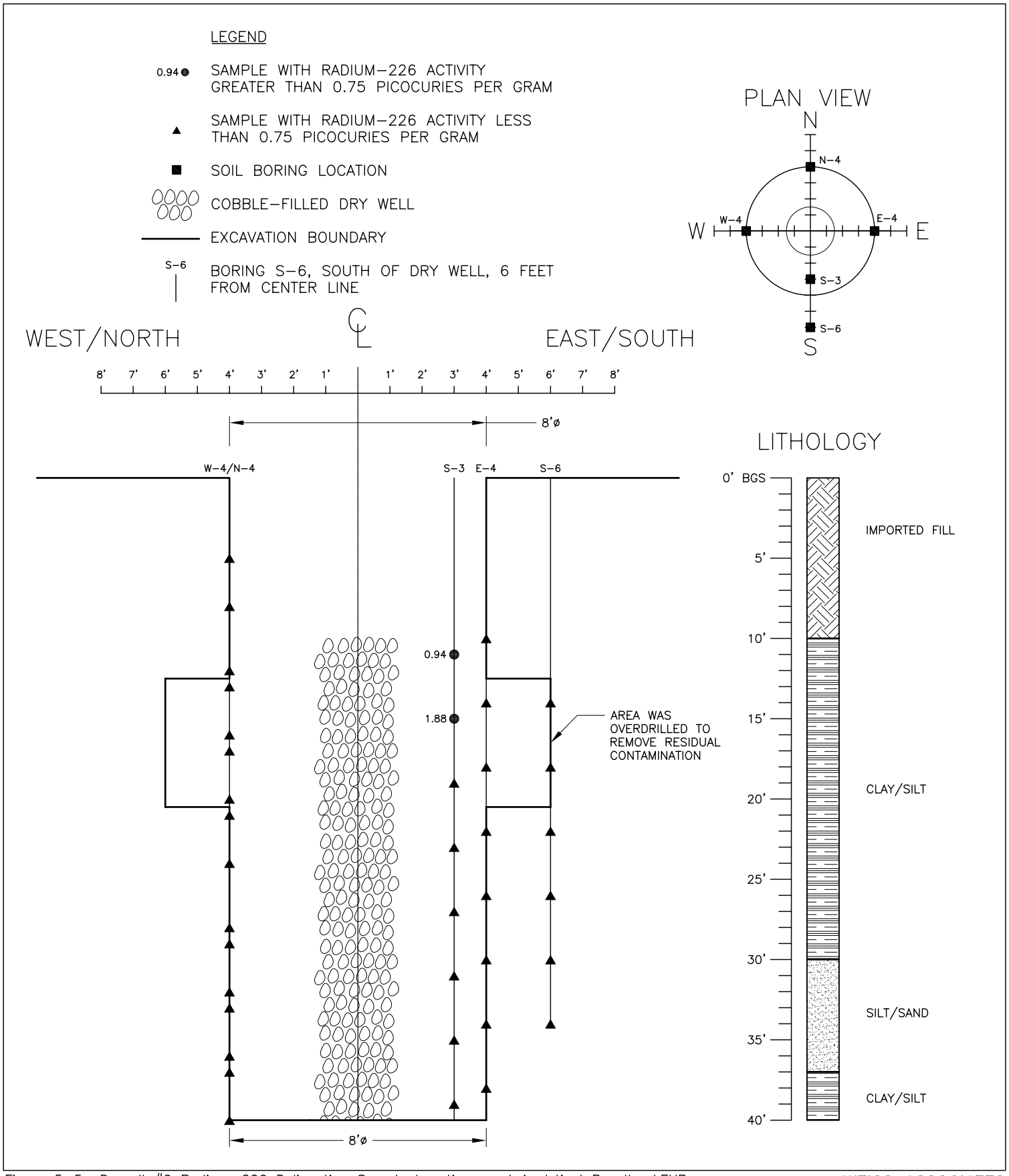

Figure 5-5. Drywell #2 Radium-226 Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

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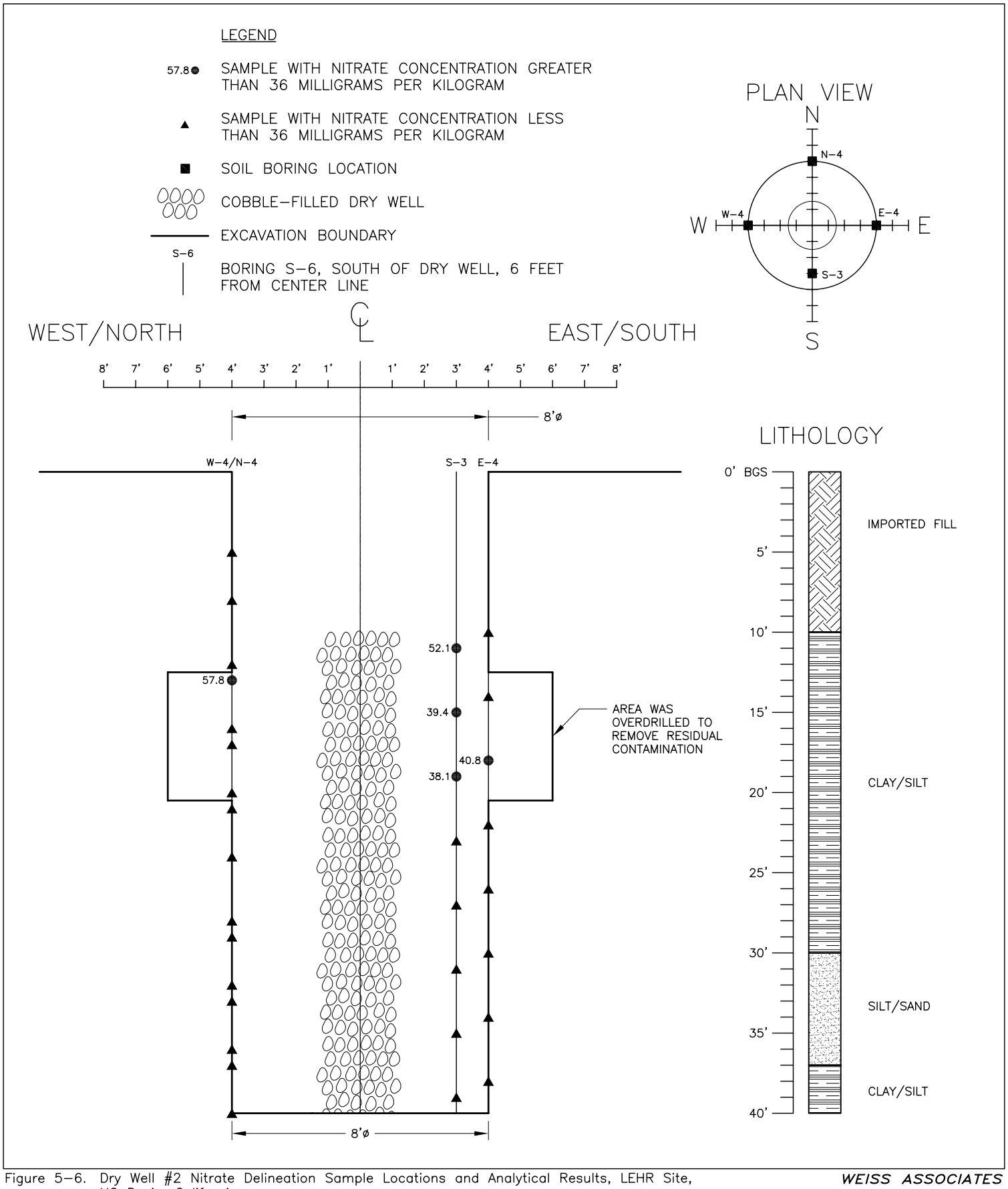

Figure 5-6. Dry Well #2 Nitrate Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

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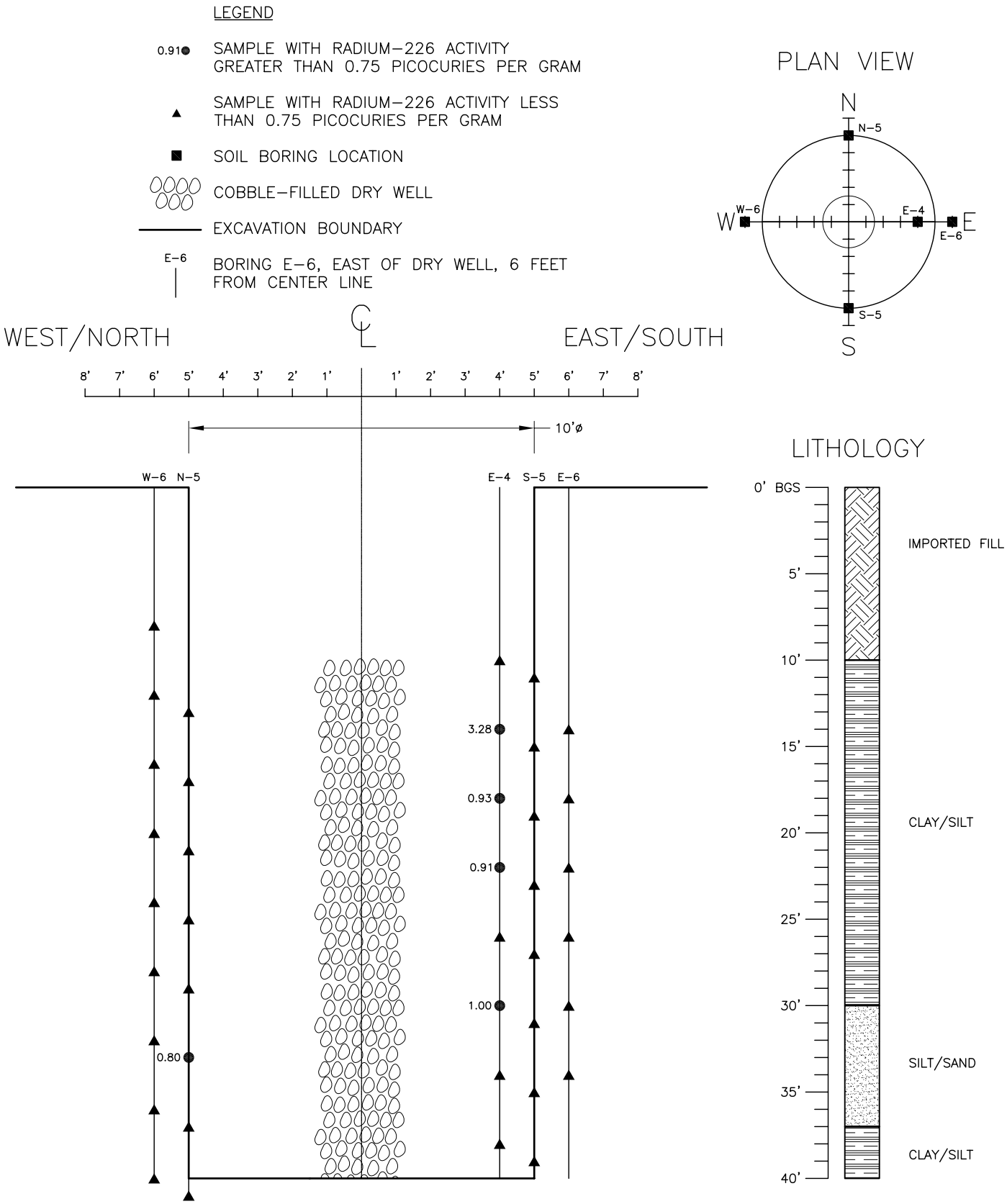

Figure 5-7. Dry Well #3 Radium-226 Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

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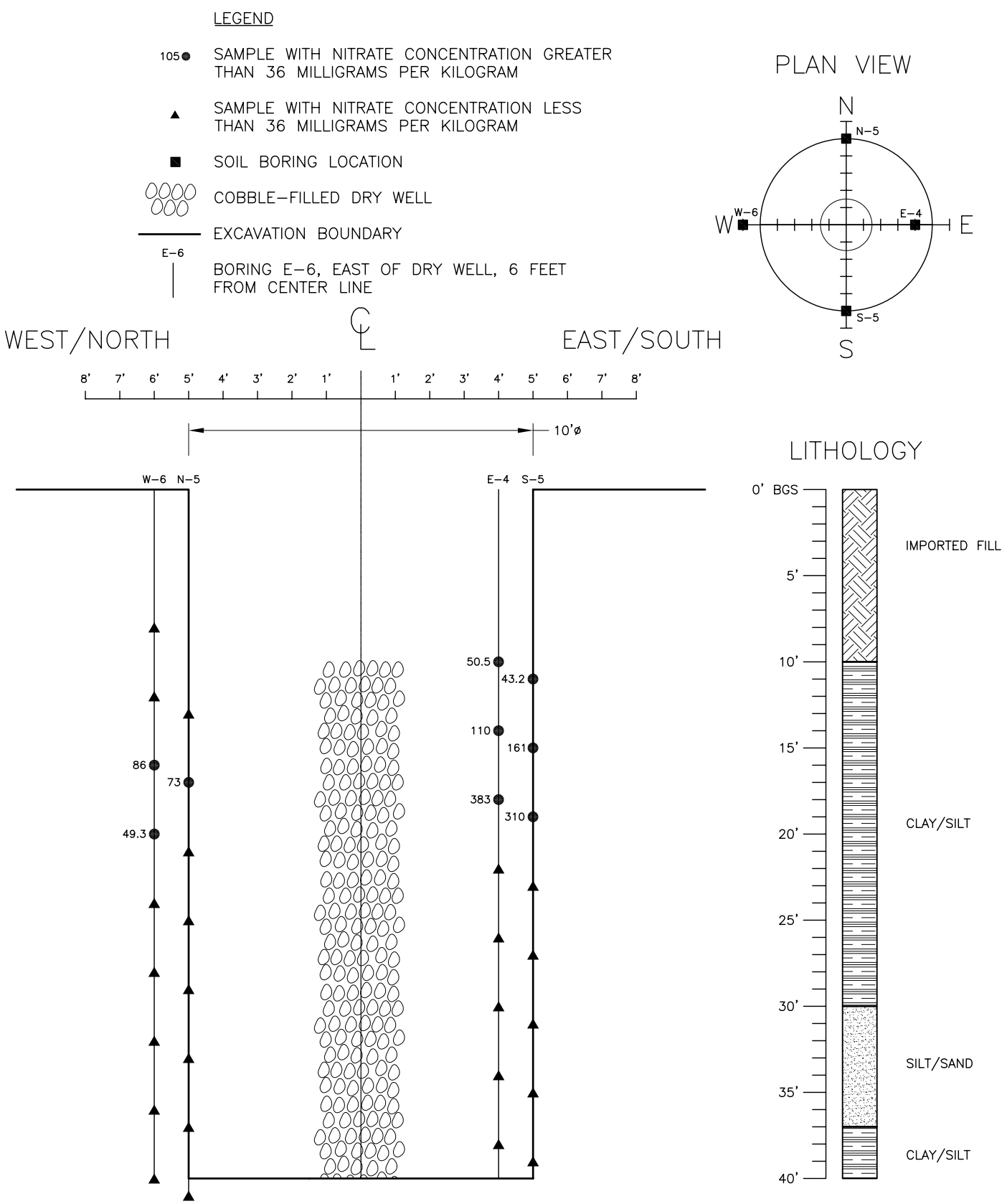

Figure 5-8. Dry Well #3 Nitrate Delineation Sample Locations and Analytical Results, LEHR Site, UC Davis, California

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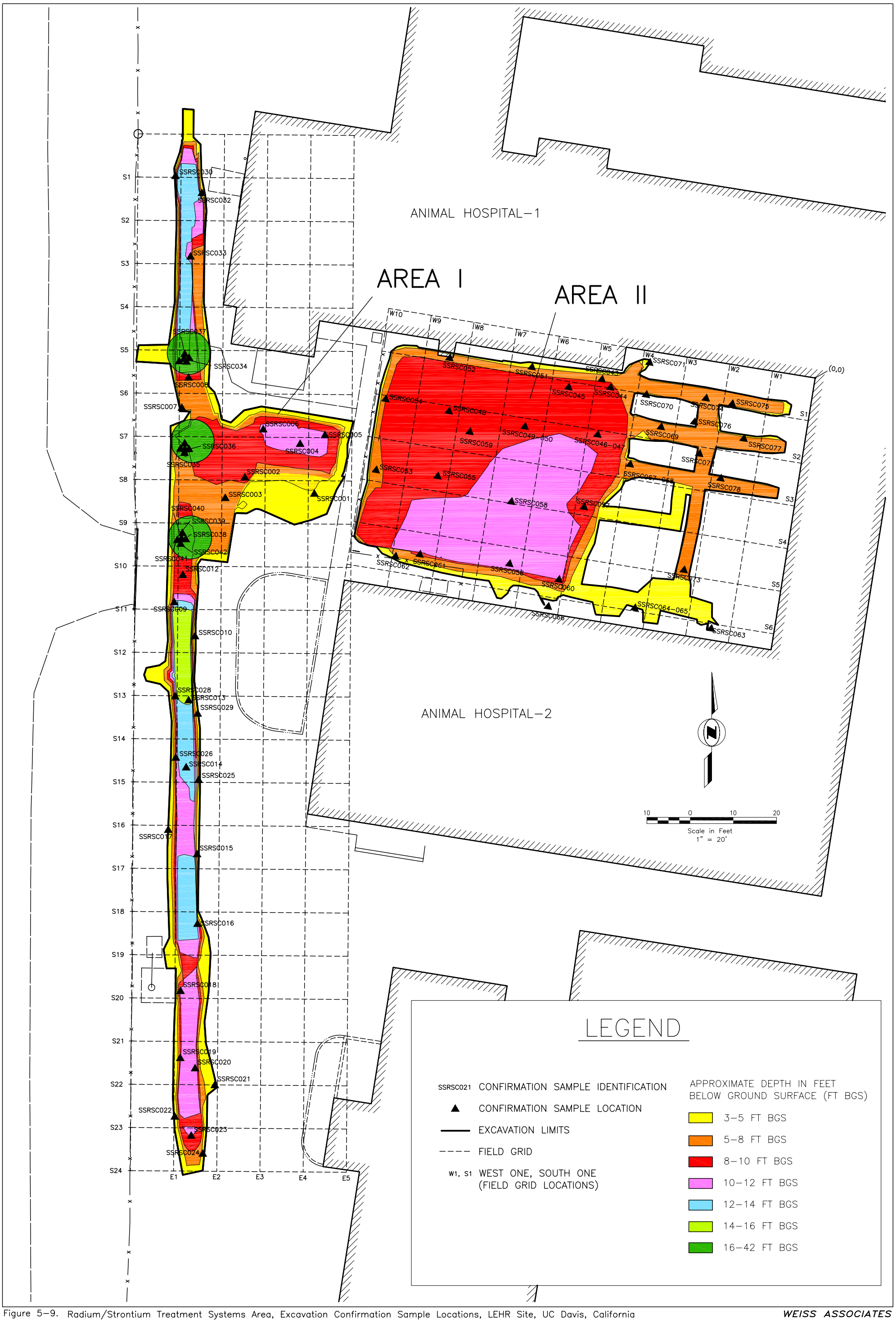

Figure 5-9. Radium/Strontium Treatment Systems Area, Excavation Confirmation Sample Locations, LEHR Site, UC Davis, California

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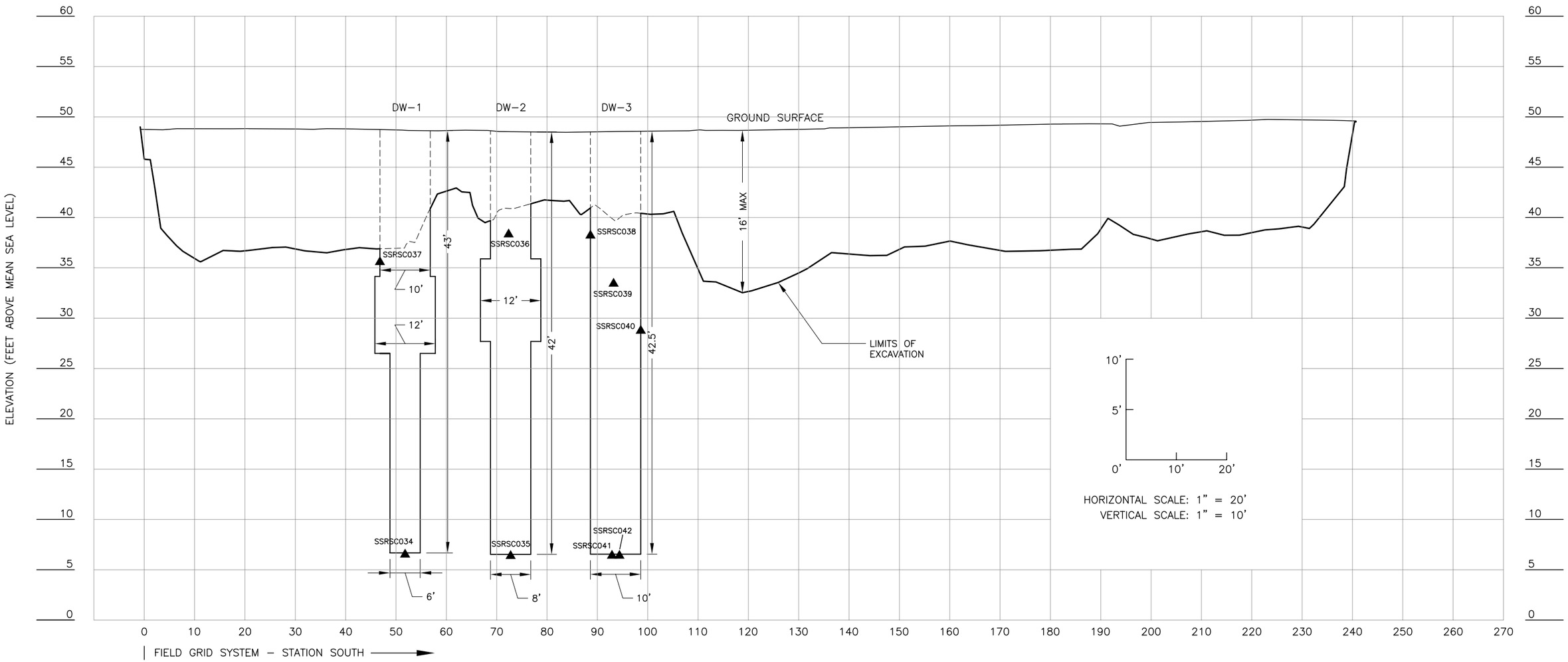

Figure 5-10. Vertical Excavation Limits Showing Dry Well Removal and Confirmation Sample Locations, LEHR Site, UC Davis, California

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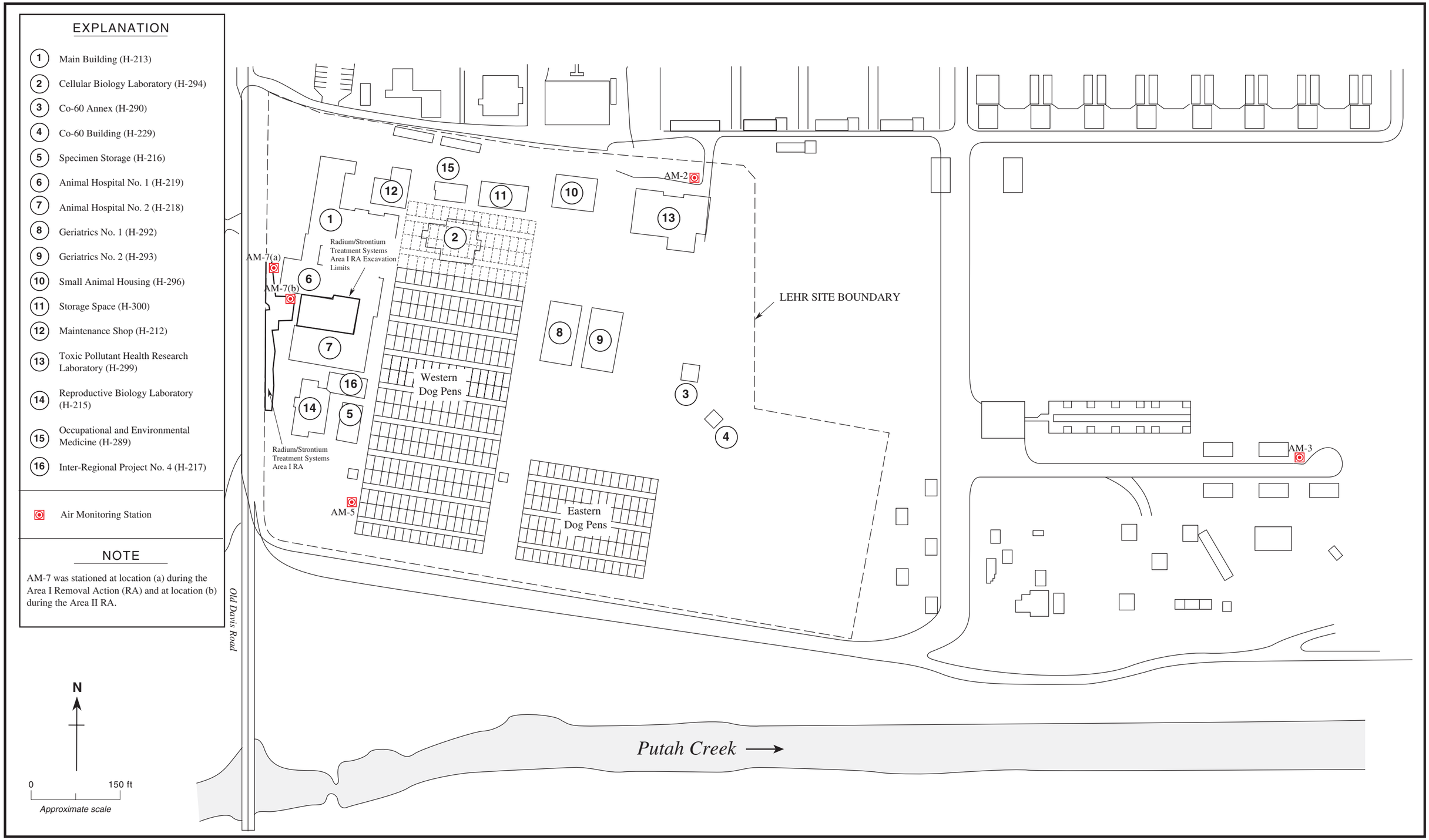

Figure 5-11. Air Monitoring Station Locations, LEHR Site, UC Davis, California

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4006\226_CON_RPRT\4006-028.ai

07/17/01

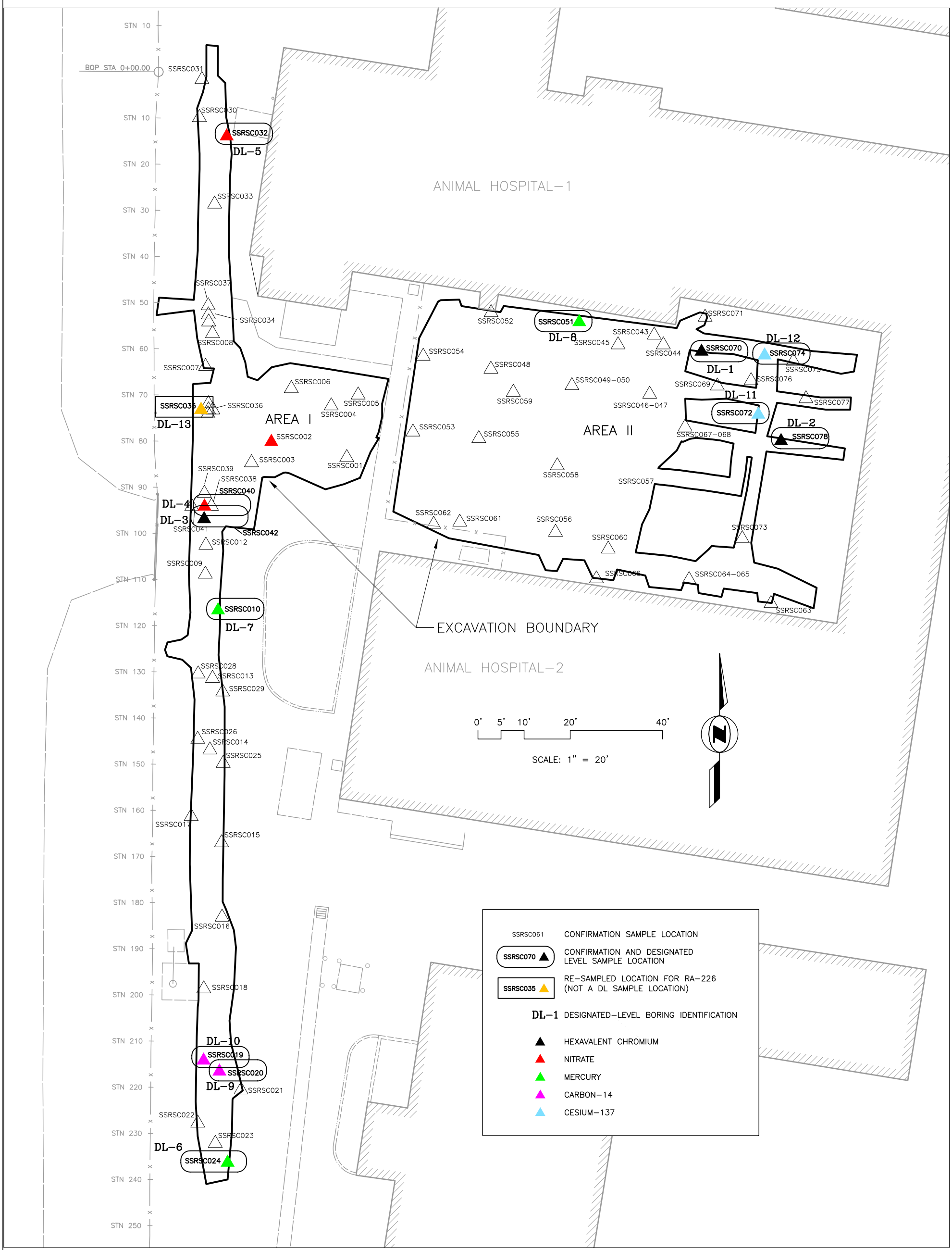

Figure 5-12. Designated-Level Sample Locations, LEHR Radium/Strontium Treatment Systems Area, UC Davis, California

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4006\226_CON_RPRT\4006-061.DWG | 04/27/01

6. PHASE II DATA EVALUATION

The data from the Ra/Sr RAs were evaluated in two phases:

- The Phase I Data Evaluation was based on field sampling and screening methods, summarized in Section 5; and,
- The Phase II Data Evaluation was based on analytical laboratory results from confirmation and DL samples. Figure 6-1 is a decision flow diagram for the Phase II Data Evaluation.

The Phase I Data Evaluation occurred immediately following waste removal while the excavations were open. The Phase I data was used to guide the excavation activities, and was based on screening sample analyses conducted during the RAs. The Phase I Data Evaluation was presented to DOE and the RPMs on July 27, 1999 and October 24, 2000 to reach consensus on whether cleanup goals were attained for driver COCs. During the DOE and RPM meetings, decisions were reached to proceed with collecting confirmation samples, backfilling the excavations, and restoring the Site. The meetings satisfied the Phase I Data Evaluation objectives as described in the WP.

The Phase II Data Evaluation, described in this section, was completed after all analytical results from the confirmation and DL sampling were received. Figure 6-2 presents the data evaluation process. During the Phase II Data Evaluation, confirmation and DL sampling results were tabulated according to chemical group and then risk, and DL analyses were conducted. These analyses were used to determine whether the RAOs presented in Section 1.2 were attained and, if not, make recommendations regarding any additional required actions. The first step in the Phase II Data Evaluation was data management and validation as described below.

6.1 Data Reduction/Verification/Reporting and Records Management

Obtaining valid and comparable data requires adequate QA/QC procedures and documentation. The quality assurance requirements applicable to the RA activities are detailed in the *Final Quality Assurance Project Plan for the Environmental Restoration Activities at the LEHR Site* (WA, 2000a). The Quality Assurance Project Plan (QAPP) was based upon the requirements of DOE Order 5700.6c "Quality Assurance" and QAMS-005/80 (US EPA, 1980) "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans" as they are applicable to the RA scope of work.

Per the QAPP, Sampling and Analysis Plan (SAP), and WP, the following activities were conducted to ensure data usability:

- QA/QC for sample collection;
- data reduction, verification, reporting, and validation; and,
- data management.

6.1.1 Quality Assurance/Quality Control Sample Collection

Field QA/QC samples were collected to ensure reliability of field sampling procedures and materials. Eight field duplicates, greater than 10% of the 70 confirmation samples, and two equipment rinsate blanks were collected following the RA as required in the QAPP and SAP. The duplicate results for the driver COCs, Ra-226 and Sr-90, were within 4% of the original sample concentrations.

6.1.2 Data Reduction, Verification, Reporting, and Validation

Accurate data reduction, validation, and reporting protocols are necessary to interpret data and make decisions. After the RA confirmation sampling was completed, data reduction, verification, reporting, and validation were performed as outlined in the QAPP, WP, and SAP.

Independent of the laboratory review, WA performed data validation and verification on the analyzed samples using the guidance of the "US EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (US EPA, 1988a) and "US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (US EPA, 1988b). Analytical results were qualified as a result of the data validation process in accordance with the flagging convention described in the QAPP.

Sample results and associated QA/QC results that were reviewed included (as applicable): holding times, field and laboratory blank results, laboratory control sample spike results, matrix spike/matrix spike duplicate results, laboratory matrix duplicate results, surrogate recoveries and internal standard performance. All sample results were identified as usable (no qualifier), estimated and usable (with J or UJ qualifier), or rejected and unusable (with R qualifier). Rejected data and data containing substantial untraceable omissions or errors were removed from the database before proceeding to determine the COC concentration terms. The removed data set accounted for less than 1% of all data.

6.1.3 Data Management

The analytical data were compiled in electronic form and entered into the LEHR Microsoft Access database. Only the laboratory data for 74 COCs were included in the risk analysis (Section 6.2) since these were the only analytes identified as risk COCs in earlier investigations. The laboratory data for all COCs were evaluated during the DL analyses.

Chemicals and radionuclides reported by the laboratory, but that were not one of the 74 risk COCs, were included in the database, but not evaluated during risk analysis. The laboratory provided results for these chemicals and radionuclides at no additional cost, since they are included in the standard reports for one or more analytical methods that also included a COC. For example, if a single organic compound was identified as a COC and CLP Method OLM 3.0 was required to analyze for the COC, all of the other organics under that method were also reported by the laboratory. The constituents that were detected in at least one confirmation sample, but were not included in the risk analysis because they do not have RBAS values, are: actinium-228, arsenic, beryllium, cobalt, iron, lead-212, molybdenum, nickel, nitrate, potassium-40, radium-228, thallium, thallium-208, thorium-230, uranium-233/234, uranium-238 and vanadium. The upcoming Site-Wide Risk Assessment will address all positive detections from the confirmation data set.

Some COCs were reported below laboratory detection limits for the confirmation samples. Per DOE (DOE, 1991) and US EPA (Gilbert, 1987) guidance documents, the data were managed as follows:

- All radionuclide results were used in the concentration calculations including negative values, zero values and results below the minimum detectable activity. All radiological data were used to avoid bias in the 95% upper confidence level (UCL) value (Gilbert, 1987; DOE, 1991).
- For non-radionuclides, only values above the laboratory/contract-required detection limit or analytical method detection limit were used to calculate the concentration terms (Gilbert, 1987).

6.2 Risk Screening

The risk screening conducted for this report evaluated potential impacts to human health at the three receptor locations shown in Figure 6-3. A risk-screening evaluation using RBAS values developed for the 74 risk COCs at the Site (Section 6.2.2) was conducted. RBAS values were developed using the US EPA Risk Assessment Guidance for Superfund (RAGS), Part B, "Development of Risk-Based Preliminary Remediation Goals" (US EPA, 1991) using a back-calculation rather than a forward-calculation approach for both carcinogenic and non-carcinogenic COCs. The forthcoming Site-Wide Risk Assessment will use the standard forward-calculation approach. The purpose of the risk screening was to determine if excess cancer risk was within the US EPA acceptable range of 10^{-4} to 10^{-6} and if noncarcinogenic effects were less than the cumulative HQ of 1.0.

6.2.1 Background Concentrations

Background concentrations of COCs in LEHR-area soil were calculated using analytical results of off-site soil samples and US EPA-approved statistical methods. This evaluation used background concentrations presented in Appendix D of the Work Plan (WA, 2000c). Specifically,

the 80% lower confidence limit of the 95th quantile for the available off-site soil data was selected to represent the background value for each COC.

The majority (80%) of the RA confirmation samples were collected at depths greater than four ft bgs. Therefore, the background concentrations calculated for soil from greater than four ft deep were used for the background comparisons during the Phase II Data Evaluation.

6.2.2 Risk-Based Action Standards

RBAS for the DOE Areas at the LEHR site were developed and presented in the *Draft Final Determination of Risk-Based Action Standards Report* (WA, 1997b). The RBAS values are site-specific concentrations that yielded the target incremental cancer risk or non-cancer risk for each COC. DOE and the regulatory agencies use the RBAS values as cleanup guidelines during RAs.

The RBAS values are single COC concentrations, which if present throughout the horizontal and vertical (0 to 15 ft depth) extent of all the DOE areas shown in Figure 6-3, might result in the specified maximum individual excess cancer risk level (or hazard quotient [HQ]) to an exposed individual. RBAS values were developed using the US EPA guidance for developing risk-based preliminary remediation goals using a back-calculation rather than a forward-calculation approach for both carcinogenic and non-carcinogenic COCs.

Assuming uniform contamination throughout all of the DOE areas to a depth of 15 ft, as well as using the back-calculation methods, the calculated RBAS values are conservative. A cumulative risk assessment will be conducted after the DOE and UC Davis RAs are complete to assess site-wide risk.

Calculating the RBAS values included the following steps:

- Identifying the COCs (74 chemicals and radionuclides);
- Identifying possible exposure pathways and scenarios;
- Conducting fate and transport modeling to relate on-site concentrations of the 74 COCs to concentrations in exposure media;
- Calculating the chemical dose or intake for each COC; and,
- Performing iterative back-calculations to determine the source soil concentration or RBAS that yielded the acceptable incremental cancer or non-cancer risk.

For carcinogenic compounds, the RBAS values meet the excess upper bound lifetime cancer risk between 10^{-4} and 10^{-6}. For systemic non-carcinogenic compounds, the RBAS values are equivalent to an HQ of 1.0 (representing no significant adverse effect during a lifetime).

Risk assessments evaluate excess or incremental risk due to the presence of contaminants above background or naturally occurring contaminant levels. Background is typically identified as

contributing zero excess or incremental risk since the contaminants are present regionally and often naturally occurring. For some of the COCs, the RBAS values are less than their background concentrations. Therefore, in the case where an RBAS value for a particular COC is less than the background concentration, the action standard is set at background. Additionally, if a COC is detected at or below background levels, it is assumed that this COC does not contribute to excess or incremental risk and is therefore removed from the risk analysis.

Three risk exposure scenarios were developed for evaluation and RBAS values were calculated for each scenario. The RBAS values for the 10^{-6} excess cancer risk level and HQ equal to 1.0 for all COCs under each risk scenario are presented in Tables 6-1 and 6-2. Figure 6-3 shows the locations of the scenario receptors.

- Scenario 1: On-Site Researcher—Represents potential on-site workers that may be exposed to source area soil through external radiation from radionuclides at or near the ground surface (for radionuclides only), ingestion, inhalation and dermal exposure.
- Scenario 2: East Side Residential Farmer—Represents potential off-site residential farmers that may be exposed to potentially impacted ground water, potentially impacted surface water (via recreational use), and via external radiation from radionuclides at or near the ground surface (for radionuclides only), inhalation of fugitive dust, soil ingestion, and agricultural foods potentially impacted by fugitive dust migration from the on-site source areas.
- Scenario 3: South Side Residential Farmer—Identical to Scenario 2 except that exposure to impacted ground water is not included, since ground water flow is generally toward the east, away from this receptor location, and ground water contamination does not impact Putah Creek.

6.2.3 Data Summary

A detailed discussion of results with regard to each RBAS is presented in Section 6.2.6. The data findings for the 74 COCs include:

- Twenty-five (34%) of the COCs were not detected. These 25 were therefore removed from the risk analysis and DL analysis.
- Forty-nine (66%) of the COCs had at least one detected value above the detection limits.
- Twenty-six (35%) of the COCs were not detected above their respective background concentrations.
- Only twelve COCs had at least one detected value greater than their respective lowest RBAS values.

- Only six COCs had at least one detected value greater than their respective US EPA Region 9 Residential PRG values.

6.2.4 Reasonable Maximum Exposure

The US EPA guidance (US EPA, 1994) recommends using a reasonable maximum exposure (RME) for Superfund risk assessments. The RME is a conservative estimate of intake and is defined as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site. The RME accounts for inherent environmental media sampling uncertainty in the contaminant concentration.

Per US EPA guidance (US EPA, 1994), statistical calculations were performed for each COC to determine the concentration terms. The statistical calculations included determining the mean, standard deviation, and the 95% UCL on the mean of data. The 95% UCL is a statistical value that is often calculated for Superfund sites to conservatively compare the cleanup area or remediation unit data to a pre-determined limit such as the RBAS.

US EPA recommends that the 95% UCL be used as the concentration term, or RME, in Superfund assessments because of the uncertainty associated with the true average concentration at a site. Though sampling plans are developed to collect an adequate number of samples to characterize the contamination at a site, the true mean of the contamination data set is rarely known or available.

The 95% UCL provides reasonable confidence that the true site average concentration will not be underestimated. The 95% UCL is defined as a value that, when calculated repeatedly for randomly drawn subsets of a site's data, equals or exceeds the true mean for the Site's concentration 95% of the time. Therefore, the 95% UCL is used as the average concentration because it is an available statistical value as opposed to the true mean of the population which typically is not available.

The 95% UCL varies depending on the distribution of the data and the mean for the data set and is calculated for a normally distributed data set, using the following formula:

$$95\%\ UCL = \bar{x} + t_{.05}(S/(N)^{1/2})$$

Where,

$\bar{x}$	=	Mean of the data set
$t_{.05}$	=	Student t value for a one-tailed 95% confidence interval and the representative number of degrees of freedom
S	=	Standard deviation of the data set
N	=	Number of samples

Six of the COCs have log-normally distributed confirmation data sets based on the background data sets. These COCs include barium, chromium, copper, manganese, zinc, and thorium-232. It is assumed therefore that the confirmation data sets for these six COCs are also log-normally distributed. The following log-normal formula is used to calculate the 95% UCL on the mean for these six COCs' data sets:

$$95\%\ \text{UCL} = e^{\bar{x}+0.5s^2+sH/(n-1)^{0.5}}$$

Where,

e	=	Constant (base of the natural log, equal to 2.718)
$\bar{x}$	=	Mean of the transformed data set
s	=	Standard deviation of the transformed data
H	=	H-statistic (from the table published in Gilbert, 1987)
N	=	Number of samples

If less than ten samples[1] contained detectable concentrations, the maximum detected concentration was selected as the concentration term or RME for the risk screening. This was the case for 12 of the 74 COCs. Otherwise, the 95% UCL on the mean was calculated to determine the concentration term or RME for the COCs, using US EPA procedures (US EPA, 1992).

6.2.5 Background Comparison

Background comparisons were performed for ten COCs with an RBAS less than the background value (Table 6-3). Per the US EPA guidance (US EPA, 1994), these comparisons were performed by comparing the data set for the background off-site soil data to the confirmation sampling data set for each applicable COC. For VOCs, SVOCs, and pesticides/PCBs, where no background data were available, the reported detection limit was used for the comparison.

US EPA guidance recommends the Wilcoxon Rank Sum (WRS) Test and the Quantile Test to perform the background comparison. These tests are outlined in the Statistical Method for Evaluating the Attainment of Cleanup Standards, Vol. 3 (US EPA, 1994). The WRS Test is used to determine whether the RA has uniformly attained the cleanup goal for a particular COC throughout the cleanup unit, whereas the Quantile Test is more appropriate to detect when an RA has failed in only a few areas within the cleanup unit.

The results of the WRS Test and Quantile Test from the background comparisons are summarized in Table 6-3. The comparison indicated that nine of ten COCs with RBAS values less than the background concentration passed the WRS Test. These COCs include antimony, barium,

[1] Sampling data from Superfund sites have shown that data sets with fewer than 10 samples per exposure area provide poor estimates of the mean concentration (US EPA, 1992). Thus, the maximum concentration is selected to represent the data set.

cadmium, copper, lead, manganese, Ra-226, thorium-228, and thorium-232. These nine COCs were eliminated from the risk screening since their confirmation data sets were similar to background and were therefore assumed not to contribute to excess or incremental risk at the site.

Mercury failed the WRS and Quantile Tests for the compiled data set. Mercury data at the Site are significantly stratified. Therefore, WRS and Quantile Tests were also performed for the stratified confirmation data. Thirteen of the mercury samples were collected from less than 4 ft bgs, and 57 were collected at greater than 4 ft bgs. The stratified evaluations indicated that the less than four ft bgs samples of mercury passed the WRS Test and had a qualified fail for the Quantile Test. The greater than four ft bgs samples of mercury failed both the WRS and Quantile Tests. Frequency plots of the background and confirmation data sets for mercury were overlain to visually compare their distributions (Figures 6-4A, 6-4B, and 6-4C). The combined and stratified data distributions are dissimilar suggesting that mercury is present in concentrations above background for the Site. Accordingly, mercury was not removed from the risk screening. The RBAS for mercury under Scenario 2 was revised using area-specific lithologic information and mercury speciation.

6.2.6 Risk Calculation

The risk screening assessed whether the first and second RAOs for the Ra/Sr Treatment Systems Area RAs were attained. The risk screening decision process is illustrated in Figure 6-5. For each carcinogenic COC with an RBAS above the background concentration, the RME is divided by the RBAS at specified risk levels (10^{-6}, 10^{-5}, and 10^{-4}). The sum of the RME/RBAS ratios for all COCs with an RBAS above the background concentration are then computed for the three risk scenarios. If the cumulative sum of the ratios is less than 1.0, the screening level evaluation concludes that the first RAO has been met.

A similar ratio is calculated for the cumulative HQ for non-carcinogenic COCs. If the sum of the RME/RBAS ratios for the non-carcinogens is less than 1.0, the risk analysis concludes the second RAO has been attained.

Below is an example of the calculation method used for the RME to RBAS comparisons.

Individual COC

$$\frac{RME_1}{RBAS_{1_{Scenario_n}}} = \text{ratio of RME to the RBAS for each scenario (n = Scenario 1, 2 or 3)}$$

where:

RME_1 = RME for COC_1

$RBAS_1$ = RBAS for COC_1, in Scenario n

Cumulative Carcinogenic COCs

$$\text{cumulative ratio} = \sum \frac{RME_1}{RBAS_{1Scenario_n}} + \frac{RME_2}{RBAS_{2Scenario_n}} + \frac{RME_3}{RBAS_{3Scenario_n}} \cdots + \frac{RME_m}{RBAS_{mScenario_n}}$$

Cumulative Non-Carcinogenic COCs

$$\text{cumulative ratio} = \sum \frac{RME_1}{RBAS_{1Scenario_n}} + \frac{RME_2}{RBAS_{2Scenario_n}} + \frac{RME_3}{RBAS_{3Scenario_n}} \cdots + \frac{RME_m}{RBAS_{mScenario_n}}$$

Table 6-4 illustrates the RME/RBAS ratios for each COC and each scenario at the 10^{-6} excess cancer risk level and HQ = 1.0 non-carcinogenic risk level. Table 6-5 shows the cumulative RME/RBAS ratios for each scenario at the 10^{-6}, 10^{-5}, and 10^{-4} excess cancer risk levels and HQ = 1.0 non-carcinogenic risk level.

6.2.6.1 Cancer Risk Calculations

Comparison of the RBAS values to the measured soil concentrations indicates that none of the individual COCs exceed the carcinogenic RBAS values in the Ra/Sr Treatment Systems Area for the 10^{-6}, 10^{-5}, or 10^{-4} target risk levels after the RA. Tables 6-4 and 6-5 show individual carcinogenic COC RME/RBAS ratios and the cumulative carcinogen RME/RBAS ratios, respectively.

Comparison of chemical and radionuclide soil concentrations to RBAS values for the 10^{-6}, 10^{-5} and 10^{-4} target excess cancer risk shows:

- At the 10^{-6} target incremental carcinogenic risk level, four carcinogenic chemicals are the most significant contributors to the cumulative RME/RBAS ratio of 1.34 for Scenario 1 (On-Site Worker):
  - Cs-137 RME/RBAS ratio = 0.47;
  - Thorium-234 RME/RBAS ratio = 0.23;
  - Heptachlor RME/RBAS ratio = 0.12; and,
  - Chlordane RME/RBAS ratio = 0.10.
- At the 10^{-6} target incremental carcinogenic risk level, five carcinogenic chemicals are the most significant contributors to the cumulative RME/RBAS ratio of 1.29 for Scenario 2 (East Side Residential Farmer).
  - Heptachlor RME/RBAS ratio = 0.31;
  - Uranium-235 RME/RBAS ratio = 0.24;
  - Chlordane RME/RBAS ratio = 0.19; and,
  - Plutonium-241 RME/RBAS ratio = 0.18;

  - Gamma-Chlordane RME/RBAS ratio = 0.10.
- At the 10^{-6} target incremental carcinogenic risk level, none of the carcinogenic chemicals exceed the RBAS, and the cumulative RME/RBAS ratio does not exceed 1.0; consequently, no significant contributors are identified.
- At the 10^{-5} target incremental carcinogenic risk level, none of the cumulative RME/RBAS ratios exceed 1.0; consequently, no significant contributors are identified.
- At the 10^{-4} target incremental carcinogenic risk level, none of the cumulative RME/RBAS ratios exceed 1.0; consequently, no significant contributors are identified.

These data demonstrate that the cumulative residual risk for carcinogens falls within the US EPA Comprehensive Environmental Response, Compensation and Liability Act risk range of 10^{-4} to 10^{-6} and only slightly exceeds the 10^{-6} level in Scenarios 1 and 2. Thus, the RA achieved RAO No. 1 by reducing the cumulative cancer risk to a nominal range of 10^{-4} to 10^{-6}.

6.2.6.2 Non-Cancer Risk Calculations

Comparison of the RBAS values to the measured site soil concentrations indicates that none of the COCs exceed their non-carcinogenic RBAS value based on an HQ of 1.0 after the RAs. Tables 6-4 and 6-5 show individual non-carcinogenic COC RME/RBAS ratios and the cumulative non-carcinogen RME/RBAS ratio, respectively.

Comparison of chemical site soil concentrations to RBAS values based on a cumulative HQ of 1.0 shows that one metal (mercury) contributes the most to a cumulative RME/RBAS ratio of 1.19. The mercury RME/RBAS ratio is 0.73.

The RAs have not achieved the second RAO by reducing the cumulative non-cancer HQ to below 1.0.

6.2.6.3 Comparisons of Preliminary Remediation Goals to Reasonable Maximum Exposure Values

The RME values for each COC were compared to the following action standards:

- Chemical Constituents—Residential PRGs established by US EPA Region 9, November 2000; and
- Radionuclides—Radionuclide PRGs established by US EPA Region 9 on April 13, 1998.

All of the non-carcinogenic COCs are below their respective residential PRG values. Two of the carcinogenic COCs, hexavalent chromium and Cs-137, marginally exceed their respective residential PRG values (Table 6-6).

6.2.7 Hot Measurement Analysis

A hot measurement analysis (US EPA, 1994) was also performed to determine if any COC concentrations in the RA exceeded their respective upper limit concentration value. If so, then further evaluation or additional remedial action may be required, at least locally, for the areas with hot measurements, regardless of the outcome of the background comparisons using the WRS and Quantile Tests or the risk screening analysis.

The hot measurement analysis is typically used in background comparisons in conjunction with the WRS and Quantile Tests to help ensure that unusually large sampling data measurements receive proper attention regardless of the outcome of the WRS and Quantile Tests. Due to the de-emphasis of high concentrations when grouped with the entire data set, the WRS and Quantile Tests may indicate that the remedial action is complete even if a few very high concentrations are detected in the remediation area.

For this Phase II Data Evaluation, a hot measurement analysis was performed on all COCs regardless of whether they were included in the background comparison to determine if COC measurements exceeded a value equal to ten times their respective 10^{-6} RBAS values for the carcinogenic COCs, and the RBAS for the non-carcinogenic COCs. A factor of ten times the 10^{-6} RBAS was selected since it would correspond to a 10^{-5} excess cancer risk level, or the median of the three cancer risk levels. The non-carcinogenic RBAS values were treated differently because, in contrast to carcinogens which have various risk levels such as 10^{-6}, 10^{-5}, and 10^{-4}, risk assessments typically use only one risk level for non-carcinogens: HI = 1.0.

The results of the hot measurement analysis are summarized in Table 6-7. Mercury was the only COC that failed the hot measurement analysis. As identified by the background comparison and the risk screening analysis, mercury needs further evaluation. The mercury hot measurement exceedances will therefore be addressed by this additional evaluation.

6.3 Designated-Level Analysis

RAO No. 3 is to mitigate any potential future impacts to ground water by reducing COC concentrations in soil. To determine whether this objective was attained, a DL analysis was conducted. DL analysis is a California State Water Resources Control Board-specific evaluation of whether soil contaminants have the potential to impact ground water that includes an evaluation of the soil types and analyte-specific mobility factors. The WP specified that DL samples would be collected during RA confirmation sampling. Sampling results would then be incorporated into the DL analysis to determine if residual COC concentrations in soil could impact ground water.

To optimize data collection and lower cost, a phased approach was used for DL sampling and analysis. The approach consisted of first collecting and evaluating the confirmation analytical results to determine whether any COCs were present at the site above background. DL sampling could then be implemented that would focus on specific COCs and hot spot areas. The DL approach approved by the RPMs consists of:

- Preliminary DL Analysis: Evaluate confirmation sampling results and identify DL COCs and potential hot spot areas;
- Data Gaps Investigation: Collect additional vertical profile data, if needed, for each DL COC at the potential hot spot area; and,
- Refined DL Analysis: Model and calculate the DL values that protect ground water using the vertical profile of DL COCs.

Figure 6-6 presents the preliminary DL analysis decision flow diagram. The preliminary DL analysis was conducted using the confirmation sampling results and includes data management, data evaluation and screening, and discussion/conclusions. A sampling plan was prepared to address the data gaps investigation. The additional data gaps DL samples were collected in May 2001. The results are presented in Section 5.7. DL results were used in the refined DL analysis of Phase C. Results of the DL analysis are presented below.

6.3.1 Data Management

Confirmation sampling data were used to conduct the preliminary DL analysis. Data validation and management were identical to that performed for the risk analysis. A total of 70 confirmation samples were analyzed and evaluated in the preliminary DL analysis. The complete suite of analyses consisted of 171 analytes and was tabulated for all 70 samples using the LEHR Microsoft Access database. The compiled data set was then processed through a screening and evaluation step described in the following section.

The DL data gap sampling was conducted after completing the preliminary DL analysis. A total of 65 DL data gap samples were analyzed for the DL COCs identified in Phase A, and the reported analytical data was tabulated using the LEHR Microsoft Access database.

6.3.2 Preliminary Designated-Level Data Analysis

The preliminary DL analysis consists of four steps as described in detail below. Figure 6-7 is a decision flow diagram for data evaluation and screening for the preliminary DL analysis.

6.3.2.1 Step 1—Detected versus Non-detected Analytes

Following completion of data validation, a table presenting all analytes that had been detected in at least one sample was generated. Of the 171 total analytes, 117 were not detected in any samples. The majority of these analytes were SVOCs, VOCs, and pesticides. Analytes not detected in any sample were removed from further DL evaluation. The 54 detected analytes are shown in Table 6-8 by their analytical group and include metals, pesticides, radionuclides, VOCs, and nitrate.

6.3.2.2 Step 2—Background Comparison

The majority of the confirmation samples were collected greater than four ft bgs. Therefore, the confirmation results were compared to the background data collected greater than four ft bgs. As shown in Table 6-8, many analytes were only detected in a limited number of samples at levels that were close to or slightly above background.

Step 2 of the preliminary DL data analysis consisted of comparing the frequency and magnitude of the detected analytes to site background levels. The screening criteria for frequency and magnitude were defined as 5% of the data values detected above background and a maximum concentration of 1.5 times the COC's background level, respectively. The 5% detection frequency was selected based on a 95th quantile calculation of the COC's background value; 5% of a sample population (data set) can be expected to be greater than the 95th quantile value (background). The 1.5 times analyte concentration above background was selected based on a review of acceptable error margin in analytical measurements. A detection of 1.5 times background was not considered a significant concentration above background. For organic compounds, such as pesticides, SVOCs, and VOCs, where no background data were available, the reported detection limits (RDLs) were used for the comparisons.

As shown in Table 6-8, metals including antimony, arsenic, barium, beryllium, and cobalt did not exceed background. Similarly, pesticides did not exceed background except for 4,4'-DDT, alpha-chlordane, gamma-chlordane, and heptachlor. SVOCs did not exceed background except for di-n-butylphthalate. VOCs did not exceed background except for 2-butanone, acetone, ethylbenzene, methylene chloride, toluene, and xylene. Background comparison also eliminated radionuclides such as Co-60, Ra-226, and tritium from the evaluation. At the completion of the Step 2 analysis, 22 analytes remained for further evaluation in Step 3.

6.3.2.3 Step 3—Chemical and Physical Properties

Step 3 of the preliminary DL data analysis consisted of comparing the chemical and physical properties that would determine the fate and transport mechanisms of the analytes in the environment and predict their potential impact to the ground water. Specifically, the soil adsorption coefficient (K_d) and the decay half-life of each analyte were used as indicators of the fate and transport in the vadose zone. Table 6-8 presents the K_d and half-life values for the analytes detected above background. K_d values were used to evaluate potential impacts of metals, pesticides, and VOCs; half-lives were utilized for radionuclides.

K_d values, which represent the relative capacity for a compound to sorb to the surface of a soil particle versus water, were based on data presented in the following references:

- The US EPA database titled "Superfund Chemical Data Matrix (SCDM)" from the US EPA internet website (http://www.epa.gov); and,
- "Soil Screening Guidance for Radionuclides: Technical Background Document," US EPA, EPA/540-R-00-006, October 2000.

The smaller the K_d value, the less sorptive (more mobile) the analyte. In this analysis, the lowest reported K_d value from the literature references for the analyte was selected to be more conservative.

During previous site-specific vadose zone Non-Isothermal Unsaturated Flow and Transport (NUFT) modeling, K_d values for specific organic compounds were correlated to the time for the peak concentration to occur at the water table (time-to-peak). A significant correlation was observed during the site-specific modeling, and thus the K_d criterion was selected based on an acceptable time-to-peak for organic compounds. For example, a K_d of 10 milliliters per gram (mL/g) would be equivalent to 2,000 years for the analyte to reach the water table at the peak concentration. A K_d of 1,000 mL/g, corresponds to a time-to-peak of about 100,000 years.

The K_d values for pesticides, SVOCs, and VOCs were compared to a K_d of 10 mL/g. The K_d values for inorganics, such as metals and radionuclides, which are typically less mobile, were compared to a K_d of 1,000 mL/g.

The majority of the analytes evaluated in Step 3 had K_d values less than the screening limits and were potentially less sorptive (more mobile). Detected organics have K_d values in the range of 3.8×10^{-3} to 1.9×10^{4} mL/g; three organic analytes were screened out of this analysis. Detected inorganics and radionuclides have K_d values in the range of 8.3 to 4,500 mL/g; five inorganic and inorganic analytes were screened out of this analysis.

The decay half-lives for the radionuclides detected at the site were selected from the following sources:

- The Handbook of Environmental Degradation Rates (Howard, 1991);
- US EPA database titled "Superfund Chemical Data Matrix (SCDM)" from the US EPA internet website; and ,

- "Soil Screening Guidance for Radionuclides: Technical Background Document," US EPA, EPA/540-R-00-006, October 2000.

A screening criterion of less than one year was chosen for half-life comparison based on the disposal history. Since land disposal activity at the site ceased at least 20 years ago, and given that the maximum activities of radionuclides at LEHR were on the order of milliCuries, radionuclides with half-lives of one year or less should not significantly impact the ground water.

Half-life values for several radionuclides detected at the site are much less than one year and were therefore eliminated from further evaluation. These radionuclides are typically daughter products (DPs) of other radionuclides and have half-lives on the order of minutes or days. For example, lead-214 and bismuth-214 are DPs of radium, have a 20-minute half-life, and therefore do not pose a risk to the ground water. Table 6-8 lists the radionuclides that fail the half-life screening test and were retained for evaluation in Step 4.

6.3.2.4 Step 4—Wilcoxon Rank Sum/Designated-Level/Biodegradability Test

Following Steps 1 through 3, 17 analytes were retained for Step 4 analysis (Table 6-9): hexavalent chromium, nitrate, cadmium, copper, mercury, molybdenum, silver, zinc, C-14, Cs-137, Sr-90, uranium-235, 2-butanone, acetone, ethylbenzene, methylene chloride, and toluene. For this analysis, the WRS Test was performed on the analytes when applicable. In addition, the biodegradability of specific VOCs and the magnitude or frequency of metals and radionuclides were also further scrutinized.

During the preliminary DL analysis, site-specific DLs were not available for the analytes since modeling had not been completed based on area-specific lithology to determine if the analyte would pose a potential risk to the ground water. DL values from the DL modeling for the SWT RA were compared to the Ra/Sr RA confirmation data for two of the analytes, hexavalent chromium and Sr-90. Based on this comparison, hexavalent chromium was detected above its corresponding SWT DL value while Sr-90 was detected below its corresponding SWT DL value.

The results of the WRS Test evaluation are summarized in Table 6-10. The WRS Test statistically measures the relative similarity between the background data set and the environmental sample population, and is used to indicate whether the confirmation data can be represented by the background distribution. To perform this test, at least 40% of the data set should be above the detection limit (US EPA, 1994).

Cadmium, copper, zinc, and uranium-235 had more than 40% detections and could be evaluated using the WRS Test without qualifications:. The following analytes had fewer than 40% detections and had qualified passes or failures while using the WRS Test due to the limited number of detections: hexavalent chromium, nitrate, mercury, silver, and Sr-90. The background data sets for molybdenum and C-14 were at or below the detection limits; therefore, a WRS Test and Histogram Comparison were not feasible for these two analytes.

Cadmium and copper passed the WRS Test for the comparison to background samples collected at greater than four ft bgs. Analytes with more than 40% detections that failed the WRS

Test for the comparison to background samples collected at greater than four ft bgs included zinc and uranium-235. Although qualified, nitrate and silver passed the WRS Test, while hexavalent chromium, mercury, and Sr-90 had qualified fails for the WRS Test.

A histogram for each analyte was prepared and is presented in Appendix C. Analysis of the histograms shows that the confirmation data sets mirror the background data distributions for copper and zinc. Therefore, these analytes are not present at levels above background concentrations and can be removed from further DL evaluation.

6.3.2.5 Analytes Removed After Step 4

Twelve of the 17 analytes were removed from consideration as potential DL COCs after Step 4, as discussed below.

- **Cadmium** was detected in only five samples above background, and it slightly exceeded the 5% cutoff used in Step 2 by 2.1%. Fifty-six percent of the cadmium confirmation results were less than the detection limit; therefore, cadmium does not appear to pose a potential threat to ground water and was not retained as a DL COC.
- **Copper** was detected in only four samples above background, and it slightly exceeded the 5% cutoff used in Step 2 by 0.7%. Copper passed the WRS Test for background data greater than four ft bgs, and the histograms presented in Appendix C show that the confirmation data set mirrors the background data distribution. Copper does not have a primary MCL and does not appear to pose a potential threat to ground water. Therefore, it was not retained as a DL COC.
- **Molybdenum** was detected in 39 samples above background in concentrations ranging from 0.20 to 0.64 mg/kg. The maximum concentration is less than or equal to 2.5 times background. The background value is the detection limit since no activities were detected during the previous background sampling; therefore, a WRS Test and histogram comparison could not be conducted. Molybdenum does not have a Primary or Secondary MCL. The tap water PRG is 150 mL/g; and the very low concentrations on-site should not impact ground water at this concentration.
- **Silver** was detected in 19 samples above background in concentrations ranging from 0.15 to 1.12 mg/kg. The maximum concentration is less than or equal to two times background. Silver was a qualified pass for the WRS Test based on the limited number of samples with detections. Silver does not have a primary MCL. Therefore, it was not retained as a DL COC.
- **Zinc** was detected in only six samples above background, and it slightly exceeded the 5% cutoff used in Step 2 by 3.6%. Zinc failed the WRS Test for background data greater than four ft bgs, but the histograms (Appendix C) show that the confirmation data set mirrors the background data distribution. The maximum zinc concentration was less than two times background. Zinc does

not have a primary MCL and does not appear to pose a potential threat to ground water; therefore, it was not retained as a DL COC.

- **Sr-90** was detected in 29 samples above background in concentrations ranging from 0.02 to 2.18 pCi/g, and 46% of the sample activities were less than the RDL. Sr-90 was a qualified fail for the WRS Test based on the limited number of samples with detections, and the histograms (Appendix C) show that the confirmation data set does not mirror the background data distribution. The DL modeling from the SWT RA identified that a DL soil value of 17 pCi/g would protect ground water. Assuming relatively similar lithology, the maximum value of 2.17 pCi/g in the Ra/Sr Area is an order of magnitude below the SWT DL value for Sr-90.
- **Uranium-235** was detected in 18 samples above background in concentrations ranging from 0.01 to 0.06 pCi/g. Uranium-235 failed the WRS Test, and the histograms show that the confirmation data set does not mirror the background data distribution. The maximum concentration is less than 2.5 times the background value. Uranium-235 naturally-occurring isotope. The lab reported errors ranging from 27%-84% for the confirmation sample concentrations.
- **2-butanone, acetone, ethylbenzene**, **methylene chloride**, and **toluene** do not have background values. Therefore, the RDLs were used for the background comparisons and a WRS Test and histogram comparison were not feasible. These organics have K_d values less than 10 mL/g. 2-butanone, acetone, ethylbenzene, and toluene were detected at relatively low concentrations and are readily biodegradable in the environment. 2-butanone (a.k.a., methyl ethyl ketone) and methylene chloride do not have primary or secondary MCLs. These organics do not appear to pose a potential threat to ground water. Therefore, they were not retained as DL COCs. All five of these compounds were removed in Step 4.

6.3.2.6 Analytes Retained After Step 4

The remaining five of seventeen analytes were retained as potential DL COCs after Step 4, based on the information provided below.

- **Hexavalent chromium** was detected in 56 samples above the background value of 0.054 mg/kg in concentrations ranging from 0.08 to 0.84 mg/kg.
- **Nitrate** was detected in eight samples above the background value of 36.0 mg/kg in concentrations ranging from 38.8 to 304.0 mg/kg.
- **Mercury** was detected in 38 confirmation samples above background in concentrations ranging from 0.25 to 2 mg/kg.
- Only six **C-14** confirmation samples were detected, with results ranging from 0.03 to 2.41 pCi/g. Those activities exceed the background activity and slightly exceeded the 5% cutoff used in Step 2 by 3.6%. The background value is the detection limit since no activities were detected during the previous background

sampling; therefore, a WRS Test and histogram comparison could not be conducted.

- **Cs-137** was detected in 16 samples above the background value of 0.007 pCi/g in activities ranging from 0.0072 to 0.6120 pCi/g. In addition, the above-background Cs-137 activities appeared to be co-located with detections of Sr-90.

6.3.3 Data Gaps Investigation

Following the recommendations of the preliminary DL analysis, a data gaps investigation was performed. Data gaps investigation consisted of collecting additional vertical profile data for the five analytes identified as DL COCs. This sampling and the analytical results are presented in detail in Section 5.7.

6.3.4 Refined Designated Level Analysis

This section summarizes the methodologies, assumptions, and rationale used to conduct the refined DL analysis. The refined DL analysis consisted of performing vadose zone modeling to determine the potential adverse impacts to ground water at the Site. The modeling tool used consists of a computer program written to interface with the multiphase fate and transport modeling code NUFT (Nitao, 1996). The details of the model, including the selection of input parameter values and model setup, are the same as those presented in previous reports (WA, 1997d; WA, 2000). Parameters are only discussed below if changes were made for this modeling effort. The iterative calculation approach as it applies to this tool is described in WA, 2000. Modeling input and results are included in Appendix D.

The scope of this modeling was limited to developing a soil profile model that was representative of the post-RA conditions in the Ra/Sr Area. One conservative infiltration rate was used. For mercury, modeling was conducted using two different contamination intervals.

6.3.5 Indicator Constituents and Distribution

The modeled contamination depth intervals were selected based on the actual distribution of nitrate, hexavalent chromium, mercury, Cs-137, and C-14 as established by the post-RA confirmation sampling and follow-up DL sampling. The DL sampling analytical results are presented in Table 5-9.

Two contamination intervals were selected for modeling the distribution of mercury in the subsurface at Ra/Sr Areas I and II. One interval extends from ground surface to ten ft bgs based on DL sampling results at location SSRSC051 and confirmation sampling results. Mercury was 1.8 mg/kg in confirmation sample SSRSC051 and above background (1.2 mg/kg) at 7.5 ft bgs in DL boring SSRSC051. The mercury concentration was significantly below background in all DL boring

SSRSC051 samples from 12.5 ft bgs to 32.5 ft bgs. Therefore, the Ra/Sr Area I mercury contamination was assumed to be below background approximately midway (10 ft bgs) between the 1.2 mg/kg concentration at 7.5 ft bgs and the 0.17 mg/kg concentration at 12.5 ft bgs.

The mercury results for Ra/Sr Area I DL samples indicated that mercury is present between ground surface and approximately 3.5 ft bgs at location SSRSC010 and between ground surface and approximately eight ft bgs at location SSRSC024. These intervals were not modeled because the zero to ten ft bgs contamination interval selected for Ra/Sr Area 2 is inclusive of these depths. However, a 10 to 15 ft bgs interval was modeled based on 0.38 mg/kg and 0.42 mg/kg concentrations in confirmation samples SSRSC005 and SSRSC006 at 10 ft bgs. No contamination is assumed to currently exist above these samples because they are located at the base of excavation and covered with clean fill. The contaminated interval was conservatively assumed to extend another 5 ft below the base of the excavation to a depth of 15 ft bgs.

Cs-137, nitrate, and hexavalent chromium contamination intervals were conservatively assumed to extended throughout the entire soil column. We assumed distribution throughout the entire soil column because:

- Cs-137 was above background in all but one designated level sample between ground surface and 22 ft bgs at locations SSRSC072 and SSRSC074.
- Concentrations of nitrate were above background in all but one designated level sample collected at location SSRSC032 (Figure 5-9).
- Hexavalent chromium concentrations were above background in all DL samples collected at locations SSRSC042, SSRSC070, and SSRSC078.

The modeled C-14 contamination interval was between 5 and 14 ft bgs. This interval was selected based on concentrations above background in confirmation sample data located between 5.5 ft bgs (0.277 pCi/g in SSRSC024) and 13.5 ft bgs (2.41pCi/g in SSRSC020). Sample results in Table 5-9 indicate C-14 was not above background at the DL sampling locations, SSRSC019 and SSRSC020 at 8 and 13.5 ft bgs, respectively (Figure 5-9). Thus, it was assumed that C-14 contamination does not extend below 14 ft bgs.

To be conservative, we assumed each COC was homogeneously distributed within the established contamination interval.

6.3.6 Soil Profile

A soil profile representing typical lithologies encountered in the post-RA Ra/Sr Area was developed based on the DL boreholes. As shown in Table 5-10, the subsurface lithology to 45 ft bgs in the Ra/Sr Area is dominated by clayey silt and silty clay, with one zone of more permeable silty sands in the interval from 29.5 to 32.5 ft bgs. For the DL model, the entire vadose zone (0 to 20 ft bgs) was assumed to be very low estimated permeability silty clay.

6.3.7 Ground Water Goals

The California and/or US EPA MCLs were used as the primary ground water goals in the DL modeling. In addition, estimated background concentrations were used as ground water goals. These background concentrations were based on COC concentrations detected in ground water from well UCD1-18, located approximately 500 ft up-gradient of the LEHR site. For mercury, C-14, and Cs-137, one-half of the lowest detection limits were used because these COCs have never been detected in well UCD1-18. For nitrate and hexavalent chromium, the 80% lower confidence limit (LCL) on the 95th quantile of concentrations detected in well UCD1-18 was used. The background nitrate and hexavalent chromium concentrations were 25 mg/L and 0.0394 mg/L respectively. The nitrate background value of 25 mg/L is higher than the 10 mg/L MCL.

6.3.8 Parameter Value Estimation

The assumptions and data used to develop the input parameters for modeling calculations are described in detail in WA, 1997d. In general, the same soil physical and hydraulic properties that were used previously to model the Ra/Sr Area were also used for this modeling effort. The physical, chemical and hydraulic input parameter values are summarized in Appendix D. Conservative assumptions regarding the selected parameters are described below:

- Depth to ground water: The smallest depth to the water table (20 ft) observed at the site was used in the model;
- Infiltration: An infiltration rate of 10.8 cm/year, corresponding to 25% of the mean annual precipitation rate (Dames and Moore, 1994), was selected. The infiltration was assigned to the model at constant rates resulting in continuous vertical flux towards the water table. This is a very conservative assumption since there are periods when the direction of flux is reversed due to evapotranspiration;
- Permeability and porosity: The highest measured values for each soil type are used in the model;
- Volatility: No volatilization was used for any of the COCs;
- Dispersion: No dispersion was used for any of the COCs;
- Partitioning coefficients: The smallest measured or reported partitioning coefficients were used for each soil type to minimize attenuation due to adsorption. The partitioning coefficient for all mercury species was assumed to be 52 mL/g, which is the lowest value found for mercury. This mercury K_d was from the Superfund Chemical Data Matrix (USEPA, 1996);
- Initial concentration distribution: ICs are assumed uniformly distributed throughout the entire extent of the selected interval thereby significantly overestimating the total mass for that interval; and,

- Dilution: A thin aquifer thickness at the bottom of the model was used to represent the top of the water table as a receptor. Dilution is therefore negligible and this assumption overestimates the concentrations of ICs that may reach the water table.

6.3.9 Model Setup, Initialization, and Parameter Sensitivity Analysis

The details of the conceptual model, boundary conditions and the initial flow conditions are described in *One-Dimensional Vadose Zone Modeling (*WA, 1997d). The iterative modeling approach used to determine soil concentrations is described in *Addendum to Former Dog Pens Technical Memoranda (*WA, 2000e).

The sensitivity of the model to infiltration rate, lithology, dispersion, grid-cell spacing, initial contaminant mass inventory and distribution, and ground water goal was discussed in detail in *One-Dimensional Vadose Zone Modeling (*WA, 1997d) and *Addendum to Former Dog Pens Technical Memoranda (*WA, 2000e). Although no formal sensitivity analysis was performed on retardation factor and vadose zone thickness, increasing these parameters would be expected to increase peak time and decrease peak concentration.

In summary, these sensitivity analyses suggest that the DL modeling performed for the Ra/Sr area produces conservatively low allowable soil concentrations for a given ground water goal because: 1) no vadose zone dispersion was included; 2) contaminant mass was estimated conservatively high; 3) retardation factors, especially for C-14 which was assumed to be in methanol form, were estimated conservatively low; and, 4) the vadose zone thickness used was the minimum recorded. The infiltration rate and lithologies used to represent the Ra/Sr area are considered representative, and using the most conservative reasonable representation of these parameters would not significantly change the modeling results. Therefore, the DL modeling results are expected to overestimate actual impacts to ground water.

6.3.10 Refined Designated-Level Analysis Results and Conclusions

The results of the modeling performed during refined DL analysis are presented in Appendix D and summarized in Table 6-11, and are discussed by COC below.

6.3.10.1 Mercury

Because the mercury in LEHR soil is known to be greater than 99% mercuric sulfide (WA, 2000e), the DL modeling result for mercuric sulfide using the 11 µg/L MCL is the most appropriate for comparison with Ra/Sr Area soil data. As shown on Table 6-11 and in Appendix D, the DL modeling results indicate a soil mercuric sulfide concentration of 1.23 mg/kg could result in a peak ground water impact of 11 µg/L in approximately 5,000 years. The maximum mercury concentration detected in Ra/Sr Area confirmation samples was 2 mg/kg, which exceeds this model result, but the RME (95% UCL) concentration is 0.66 mg/kg, which is below the model result.

Table 6-11 also presents DL modeling results using background as a mercury ground water goal. Data from upgradient well UCD1-18 were used to represent the background concentration. Because mercury has not been detected in this well, one-half of the recent detection limit for mercury analyses (0.1 μg/L) was used as the ground water goal. As shown on Table 6-11, this ground water goal results in a modeled soil concentration of 0.0116 mg/kg. This concentration is at least an order of magnitude lower than the background soil mercury concentration (which is not well-defined, but is at least 0.63 mg/kg in shallow 0 - 4 ft deep soil and 0.248 mg/kg in soil deeper than 4 ft bgs).

Based on these DL modeling results, mercury in Ra/Sr Area soil does not appear to present a significant threat to ground water. The RME concentration might result in some measurable impact to ground water, but the peak concentration would be well below the 11 μg/L MCL and would occur in approximately 5,000 years.

6.3.10.2 Cesium-137

The DL modeling results for Cs-137 indicate that its presence in Ra/Sr Area soil presents no significant risk to ground water. Using the estimated background activity of 1 pCi/L as a ground water goal results in an allowable soil concentration of 2.77 pCi/g. The maximum Cs-137 activity detected in Ra/Sr Area confirmation sampling and DL borings was 0.664 pCi/g. Therefore, based on these results, Cs-137 in Ra/Sr Area soil presents no threat to ground water.

6.3.10.3 Nitrate

The DL results indicate that nitrate levels of 1.73 mg/kg may result in ground water impact equal to the 10 mg/L nitrate (as nitrogen) MCL (Table 6-11). These results are lower than the preliminary DL analysis value of 10 mg/kg, primarily because the minimum depth-to-water was raised to 20 ft bgs for the refined modeling, resulting in a higher peak ground water concentration in a shorter time.

There are known regional nitrate impacts to ground water in the LEHR area, as a result of agricultural activities. For example, ground water from well UCD1-18 located approximately 500 ft upgradient of the LEHR site has a nitrate concentration of 25 mg/L (80% LCL on 95th quantile of available data). Using this concentration as a ground water goal for the DL modeling results in an allowable soil concentration of 4.05 mg/kg.

To put into perspective the potential additional impact to ground water represented by nitrate above background in the Ra/Sr Area soil, the mass of this nitrate was calculated to be 366 pounds (Section 6.3.1.3.1). The mass of nitrate in one acre of vadose zone (assumed to be 20 ft thick) at the average background concentration of 12.4 mg/kg is approximately 1,100 pounds (assuming a soil density of 1.7 g/ml). Agriculture in the UC Davis area discharges an estimated 17,000 pounds of nitrate (as nitrogen) per year to ground water, and the UC Davis outfall has historically discharged 36,500 pounds of nitrate as nitrogen per year to Putah Creek (Dames & Moore, 1990). Therefore, the incremental potential impact to ground water from nitrate remaining in Ra/Sr soil is not significant compared to these regional nitrate impacts.

6.3.10.4 Hexavalent Chromium

The DL modeling results for hexavalent chromium indicate that a soil concentration of 0.912 mg/kg distributed throughout the vadose zone may result in ground water impact at the 50 ug/L MCL. Based on the DL modeling, a soil concentration of 0.719 mg/kg distributed throughout the vadose zone might result in ground water impact at the estimated 39 ug/L background level. The hexavalent chromium background concentration for soil is 0.054 mg/kg.

The maximum hexavalent chromium concentration detected in Ra/Sr Area confirmation soil samples was 0.841 mg/kg, and the RME concentration was 0.31 mg/kg. The DL sampling maximum result was 0.614 mg/kg. Based on the DL modeling, any impact on ground water from these concentrations of hexavalent chromium in Ra/Sr soil will be insignificant and well below the MCL.

6.3.10.5 Carbon-14

Using the 2,000 pCi/L MCL as the ground water goal, the DL modeling result for C-14 is 2.34 pCi/g in soil, with a peak ground water activity equivalent to the MCL in 15 years. Using the 3.5 pCi/L estimated background ground water concentration as a goal, the resulting DL soil limit is 0.0041 pCi/g. The LEHR background soil activity is 0.13 pCi/g.

The maximum C-14 activity detected in confirmation and DL samples is 2.41 pCi/g, and the RME concentration is 0.2 pCi/g. Based on the DL modeling, C-14 in Ra/Sr soil may locally impact ground water, but the impact would be expected to be below the MCL.

Table 6-1. Summary of Risk-Based Action Standards for Carcinogenic Compounds in Surface Soil at the 10^{-6} Risk Level, LEHR, UC Davis, California

	Risk-Based Action Standards				
Analyte	**Background Concentration (mg/kg)[1]**	**Scenario 1 10^{-6} Risk (mg/kg)**	**Scenario 2 10^{-6} Risk (mg/kg)**	**Scenario 3 10^{-6} Risk (mg/kg)**	**2000 PRG Residential 10^{-6} risk (mg/kg)**
4,4'-DDD	None	7.9	9.4	70,000	2.4
4,4'-DDE	None	5.6	9.0	61,000	1.7
4,4'-DDT	None	5.6	30	23,000	1.7
Alpha-BHC	None	0.30	0.0075	8,400	0.09
Alpha-Chlordane	None	1.5	0.80	5.9	1.6 total
Arochlor-1260	None	0.25	4.9	120	0.22
Benzene	None	0.23	0.015	NC	0.65
Benzo(a)anthracene	None	2.6	1.2	30,000	0.65
Benzo(a)pyrene	None	0.26	0.24	1,300	0.062
Benzo(b)fluoranthene	None	2.6	3.3	12,000	0.62
Benzo(k)fluoranthene	None	26	27	100,000[2]	0.61
Bis(2-Ethylhexyl)phthalate	None	136	7.7	8.6	35
Cadmium (Cd)	0.46	4,800	100,000[2]	100,000[2]	9.0
Carbazole	None	95	2.2	100,000[2]	24
Carbon Tetrachloride	None	0.22	0.055	NC	0.24
Chlordane	**None**	**1.5**	**0.78**	**5.9**	**1.6 total**
Chromium (Cr)	181	720	100,000[2]	100,000[2]	210
Chromium, Hexavalent (Cr+6)	**0.054**	**100**	**100,000[2]**	**23,000**	**0.2**
Chrysene	None	260	20	100,000[2]	6.2
Delta-BHC	None	0.30	0.013	0.21	0.32
Dibenzo(a,h)anthracene	None	0.26	0.54	260	0.062
Dieldrin	None	0.12	0.015	4,100	0.030
Formaldehyde	None	220	NC	NC	9,200
Gamma-BHC	None	1.5	0.030	35,000	0.44
Gamma-Chlordane	None	1.5	0.81	6.4	1.6 total
Heptachlor	None	0.42	0.17	14,000	0.11
Heptachlor Epoxide	None	0.21	0.00057	1,800	0.053
Indeno(1,2,3-cd)pyrene	None	2.6	4.9	4,600	0.62
Lead (Pb)	9.5	3.0	0.044	19	400
Mercury (Hg)	**0.63**	**16,000**	**15**	**540**	**23**
Methylene Chloride	None	7.2	0.13	NC	8.4
Pentachlorophenol	None	16	13	100,000[2]	3

Table 6-1. Summary of Risk-Based Action Standards for Carcinogenic Compounds in Surface Soil at the 10^{-6} Risk Level, LEHR, UC Davis, California (continued)

	Risk-Based Action Standards				
Analyte	**Background Concentration (pCi/g)**	**Scenario 1 10^{-6} Risk (pCi/g)**	**Scenario 2 10^{-6} Risk (pCi/g)**	**Scenario 3 10^{-6} Risk (pCi/g)**	**1996 PRG Residential 10^{-6} risk (pCi/g)**
Radionuclides					
Americium-241	<0.014	17	0.092	16,000	1.9
Bismuth-212 (Th-228 Daughter)	0.43	DP	DP	DP	DP
Bismuth-214 (Ra-226 Daughter)	0.54	DP	DP	DP	DP
Carbon-14	<0.13	4,200	9,500	7,000	770
Cesium-137+D	0.012	0.10	200,000	25,000	0.020
Cobalt-60	<0.006	0.022	32,000	5,800	0.0043
Lead-210+D	1.6	9.6	40	40	0.78
Lead-214 (Ra-226 Daughter)	0.58	DP	DP	DP	DP
Plutonium-241 +D	<0.50	600	3.2	2,200,000	150
Radium-223 (U-235 Daughter)	DP	DP	DP	DP	DP
Radium-226+D	**0.75**	**0.0042**	**1,100**	**1,100**	**0.0062**
Strontium-90+D	**0.056**	**10**	**290,000**	**34,000**	**14**
Thorium-228+D	0.74	0.032	2,000	1,600	0.041
Thorium-232	0.75	0.022	3,800	2,200	24
Thorium-234 (U-238+D)	0.78	3.2	88,000	63,000	0.69
Tritium	<1.2	130,000	5.4	2,500,000	11,000
Uranium-235+D	0.039	0.79	0.15	32,000	0.16

Notes

[1]Background concentration calculations are presented in Appendix C of the Work Plan.

[2]Risk not exceeded for free-phase interstitial compound. Assumes 10% by weight (i.e., 100,000 mg/kg) as the maximum soil concentration.

Scenario 1 - On-Site Researcher, Scenario 2 - East-Side Residential Farmer, and Scenario 3 - South-Side Residential Farmer

Highlighted compounds are the Removal Action "Driver" compounds.

Abbreviations

DP Daughter product; standard driven by parent isotope.
NC Exposure pathway incomplete for compound.
None Analyte is not present in background soil samples.

Table 6-2. Summary of Risk-Based Action Standards for Non-Carcinogenic Compounds in Surface Soil at a Hazard Quotient of 1.0, LEHR Site, UC Davis, California

		Risk-Based Action Standards			
Analyte	**Background Concentration (mg/kg)[1]**	**Scenario 1 (mg/kg)**	**Scenario 2 (mg/kg)**	**Scenario 3 (mg/kg)**	**2000 PRG Residential HQ = 1.0 risk (mg/kg)**
2-Butanone (MEK)	None	710	12	NC	7,300
Acenaphthene	None	41,000	250	100,000[2]	3,700
Acetone	None	830	1.7	1,900	1,600
Anthracene	None	200,000	1,400	100,000[2]	22,000
Antimony (Sb)	1.4	680	0.30	100,000[2]	31
Barium (Ba)	260	100,000[2]	53	100,000[2]	5,400
Benzo(g,h,i)perylene	None	20,000	9,100	100,000[2]	N/A
Cadmium (Cd)	0.51	850	0.38	100,000[2]	9
Chromium (Cr)	181	100,000[2]	760	100,000[2]	210
Chromium, Hexavalent (Cr+6)	**0.054**	**8,500**	**3.8**	**740**	**0.2**
Copper (Cu)	60	63,000	28	100,000[2]	2,900
Dibenzofuran	None	2,700	14	100,000[2]	290
Diethyl Phthalate	None	100,000[2]	220	100,000[2]	49,000
Di-n-Butylphthalate	None	68,000	890	3,300	6,100
Di-n-Octylphthalate	None	14,000	28,000	4,900	1,200
Endosulfan I	None	4,100	29	100,000[2]	370
Endosulfan Sulfate	None	4,100	26	100,000[2]	2,600
Ethyl Benzene	None	2,400	10	NC	230
Fluoranthene	None	27,000	1,800	100,000[2]	2,300
Fluorene	None	27,000	170	100,000[2]	2,000
Formaldehyde	None	100,000	1.7	10,000	9,200
Manganese (Mn)	750	52,000	36	100,000[2]	1,800
Mercury (Hg)	**0.63**	**510**	**0.9**	**6.4**	**23**
Methoxychlor	None	3,400	100	100,000[2]	310
Naphthalene	None	27,000	39	100,000[2]	56
Phenanthrene	None	20,000	1,200	100,000[2]	N/A
Pyrene	None	20,000	490	100,000[2]	2,300
Selenium (Se)	1.2	8,500	58	100,000[2]	390
Silver (Ag)	0.55	8,500	3.8	100,000[2]	390
Styrene	None	710	76	NC	1,700
Toluene	None	920	19	NC	520
Xylenes (Total)	None	1,700	700	NC	210
Zinc (Zn)	87	100,000[2]	3,400	100,000[2]	23,000

Notes
[1]Background concentration calculations are presented in Appendix C of the Work Plan.
[2]Risk not exceeded for free-phase interstitial compound. Assumes 10% by weight (i.e., 100,000 mg/kg) as the maximum soil concentration.
Scenario 1 - On-Site Researcher, Scenario 2 - East-Side Residential Farmer, and Scenario 3 - South-Side Residential Farmer
Highlighted compounds are the Removal Action "Driver" compounds.

Abbreviations
N/A Not Applicable
NC Exposure pathway incomplete for compound
None Analyte is not present in background soil samples.

Table 6-3. Background Comparison for Constituents of Concern with Risk-Based Action Standards Less Than Background, LEHR Radium/Strontium Area Removal Action, UC Davis, California

Constituent of Concern	WRS Test [1, 2]	Quantile Test [2]	Requires Histogram Comparison?	Histogram Comparison	Conclusion
Antimony	P	P	N		COC is at or below background [4]
Barium	P	P	N		COC is at or below background [4]
Cadmium	P	**F**	**Y**	**P** [3]	COC is at or below background [4]
Copper	P	P	N		COC is at or below background [4]
Lead	P	P	N		COC is at or below background [4]
Manganese	P	P	N		COC is at or below background [4]
Mercury (combined)	**F (Q)**	**F**	**Y**	**F**	COC exceeds background [5]
Mercury (<4 ft bgs stratified)	**P**	**F**	**Y**	**F**	COC exceeds background [5]
Mercury (>4 ft bgs stratified)	**F (Q)**	**F**	**Y**	**F**	COC exceeds background [5]
Radium-226	P	P	N		COC is at or below background [4]
Thorium-228	P	P	N		COC is at or below background [4]
Thorium-232	P	P	N		COC is at or below background [4]

Notes

[1]US EPA guidance recommends using the Wilcoxon Rank Sum Test (WRS Test) and the Quantile Test to perform the background comparisons. These tests are outlined in *Statistical Method for Evaluating the Attainment of Cleanup Standards*, Vol. 3 (US EPA, 1994). The WRS Test is used to determine whether the removal action has uniformly attained the cleanup goal for a particular constituent of concern (COC) throughout the cleanup unit, whereas the Quantile Test is more appropriate to detect when removal action has failed in only a few areas within the cleanup unit. The following COCs have log-normally distributed background data sets and are therefore assumed to have log-normal confirmation data sets: barium, copper, manganese, and thorium-232. The background comparisons for these COCs used log-transformed data.

[2]The COC passed the statistical test if "P" is indicated. The COC failed the test if "F" is indicated. A "P" or "F" with "(Q)" indicates the pass or fail was qualified due to a limited number of background or confirmation samples, or a limited number of samples above the detection limit.

[3]The 95% UCL for cadmium was less than the background concentration. Fifty-six percent of the samples were not detected above the detection limit. Except for five sample concentrations all of the results were less than the background concentration. Cadmium does not appear to be present at concentrations exceeding background and therefore should have no impact on excess non-carcinogenic risk.

[4]This COC is present on site at or below background conditions. If a COC is detected at or below background levels, it is assumed that this COC does not contribute to excess or incremental risk and is therefore removed from the risk analysis for the Radium/Strontium (Ra/Sr) Treatment Systems Areas I and II confirmation sample results.

[5]Mercury has historically been a depth-stratified analyte at the site. Therefore, combined depth-stratified evaluations were performed of the WRS, Quantile, and Histogram Tests. Mercury failed both the WRS and Quantile Tests overall. Mercury passed the WRS Test and failed the Quantile Test for shallow samples. Mercury failed both the WRS and Quantile Tests for the deep samples. Mercury failed the histogram comparisons for combined, shallow, and deep sample data sets. Mercury was therefore included in the risk analysis for the Ra/Sr Treatment Systems Areas I and II confirmation sample results.

[6]The following COCs did not have RBAS values since they are daughter products of other radioactive COCs:

Constituent of Concern	WRS Test	Quantile Test	Notes
Bismuth-212	Not tested	Not tested	Daughter product to thorium-228. 95% UCS < background
Bismuth-214	Not tested	Not tested	Daughter product to radium-226. 95% UCL = background
Lead-214	Not tested	Not tested	Daughter product to radium-226. 95% UCL ≅ background

Table 6-4. Screening Analysis for Risk Constituents of Concern, LEHR Radium/Strontium Treatment System Areas Removal Action, UC Davis, California

Constituent	Units	Number of Samples Analyzed	Number of Samples > Detection Limit[1]	Number of Detections > Background	Background Concentration (>4 ft bgs)	Maximum Detected Concentration	95% UCL	RME[2]	Carc. RBAS Scenario 1	Carc. RBAS Scenario 2	Carc. RBAS Scenario 3	Non-Carc. RBAS Scenario 1	Non-Carc. RBAS Scenario 2	Non-Carc. RBAS Scenario 3	Carc. Scen. 1 RME/RBAS Ratio	Carc. Scen. 2 RME/RBAS Ratio	Carc. Scen. 3 RME/RBAS Ratio	Non-Carc. Scen. 1 RME/RBAS Ratio	Non-Carc. Scen. 2 RME/RBAS Ratio	Non-Carc. Scen. 3 RME/RBAS Ratio	Carc. RME/ Residential PRG Ratio	Non-Carc. RME/ Residential PRG Ratio
General																						
Chromium, Hexavalent	mg/kg	70	56	56	0.05	0.84	0.31	0.31	105.00	120,000.00	23,000.00	8,500.0	3.8	740.0	0.00	0.00	0.00	0.00	0.08	0.00	1.54	n/a
Metals																						
Antimony	mg/kg	70	3	0	1.40	0.92	n/a	0.92	n/a	n/a	n/a	680.0	0.3	100,000.0	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Barium[3]	mg/kg	70	70	1	294.00	317.00	205.75	205.75	n/a	n/a	n/a	110,000.0	53.0	100,000.0	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Cadmium	mg/kg	70	31	5	0.51	1.40	0.37	0.37	4,800.00	n/a	n/a	850.0	0.4	100,000.0	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Chromium[3]	mg/kg	70	70	21	125.00	175.00	118.30	118.30	720.00	840,000.00	160,000.00	100,000.0	760.0	100,000.0	0.16	0.00	0.00	0.00	0.16	0.00	0.56	n/a
Copper[3]	mg/kg	70	70	4	61.80	182.00	49.68	49.68	n/a	n/a	n/a	63,000.0	28.0	610,000.0	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Lead	mg/kg	70	70	3	9.50	15.10	7.88	7.88	3.00	0.04	19.00	n/a	n/a	n/a	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Manganese[3]	mg/kg	70	70	7	750.00	895.00	665.25	665.25	n/a	n/a	n/a	52,000.0	36.0	100,000.0	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Mercury[4]	mg/kg	70	70	38	0.25	2.00	0.66	0.66	15,898.00	15.00	540.00	510.0	0.9	6.4	0.00	0.04	0.00	0.00	0.73	0.10	n/a	0.03
Selenium	mg/kg	70	58	15	1.20	1.80	1.14	1.14	n/a	n/a	n/a	8,500.0	58.0	100,000.0	n/a	n/a	n/a	0.00	0.02	0.00	n/a	0.00
Silver	mg/kg	70	38	19	0.55	1.12	0.53	0.53	n/a	n/a	n/a	8,500.0	3.8	100,000.0	n/a	n/a	n/a	0.00	0.14	0.00	n/a	0.00
Zinc[3]	mg/kg	70	70	6	93.10	151.00	82.00	82.00	n/a	n/a	n/a	510,000.0	3,400.0	150,000.0	n/a	n/a	n/a	0.00	0.02	0.00	n/a	0.00
Pesticides/PCBs																						
4,4'-DDD	ug/kg	70	0	0	0.00	n/a	n/a	n/a	7,900.00	9,400.00	7.00E+07	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
4,4'-DDE	ug/kg	70	4	4	0.00	3.20	n/a	3.20	5,600.00	9,000.00	6.10E+07	n/a	n/a	n/a	0.00	0.00	0.00	n/a	n/a	n/a	0.00	n/a
4,4'-DDT	ug/kg	70	12	12	0.00	133.00	31.58	31.58	5,600.00	30,000.00	2.30E+07	n/a	n/a	n/a	0.01	0.00	0.00	n/a	n/a	n/a	0.02	n/a
alpha-BHC	ug/kg	70	0	0	0.00	n/a	n/a	n/a	300.00	7.50	8.40E+06	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
alpha-Chlordane	ug/kg	70	20	20	0.00	277.00	66.29	66.29	1,500.00	800.00	5.90E+03	n/a	n/a	n/a	0.04	0.08	0.01	n/a	n/a	n/a	0.04	n/a
Chlordane	ug/kg	70	20	20	0.00	623.00	146.49	146.49	1,500.00	780.00	5.90E+03	n/a	n/a	n/a	0.10	0.19	0.02	n/a	n/a	n/a	0.09	n/a
delta-BHC	ug/kg	70	0	0	0.00	n/a	n/a	n/a	300.00	13.00	2.10E+02	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Dieldrin	ug/kg	70	0	0	0.00	n/a	n/a	n/a	120.00	15.00	4.10E+06	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Endosulfan I	ug/kg	70	0	0	0.00	n/a	n/a	n/a	n/a	n/a	n/a	4,100,000.0	29,000.0	100,000,000.0	0.00	0.00	0.00	0.00	0.00	0.00	n/a	0.00
Endosulfan Sulfate	ug/kg	70	0	0	0.00	n/a	n/a	n/a	n/a	n/a	n/a	4,100,000.0	26,000.0	100,000,000.0	0.00	0.00	0.00	0.00	0.00	0.00	n/a	n/a
gamma-BHC	ug/kg	70	0	0	0.00	n/a	n/a	n/a	1,500.00	30.00	3.50E+07	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
gamma-Chlordane	ug/kg	70	20	20	0.00	346.00	80.20	80.20	1,500.00	810.00	6.40E+03	n/a	n/a	n/a	0.05	0.10	0.01	n/a	n/a	n/a	0.05	n/a
Heptachlor	ug/kg	70	3	3	0.00	52.20	n/a	52.20	420.00	170.00	1.40E+07	n/a	n/a	n/a	0.12	0.31	0.00	n/a	n/a	n/a	0.47	n/a
Heptachlor Epoxide	ug/kg	70	0	0	0.00	n/a	n/a	n/a	210.00	0.57	1.80E+06	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Methoxychlor	ug/kg	70	0	0	0.00	n/a	n/a	n/a	n/a	n/a	n/a	3,400,000.0	100,000.0	100,000,000.0	0.00	0.00	0.00	0.00	0.00	0.00	n/a	0.00
PCB-1260 (Aroclor)	ug/kg	70	0	0	0.00	n/a	n/a	n/a	250.00	4,900.00	1.20E+05	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Radionuclides																						
Americium-241	pCi/g	70	21	3	0.01	0.08	0.01	0.01	17.00	0.09	16,000.00	n/a	n/a	n/a	0.00	0.08	0.00	n/a	n/a	n/a	0.00	n/a
Bismuth-212	pCi/g	70	70	3	0.43	0.66	0.37	0.37	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bismuth-214	pCi/g	70	70	7	0.54	2.50	0.56	0.56	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Carbon-14	pCi/g	70	21	6	0.13	2.41	0.20	0.20	4,200.00	9,500.00	7,000.00	n/a	n/a	n/a	0.00	0.00	0.00	n/a	n/a	n/a	0.00	n/a
Cesium-137	pCi/g	70	21	16	0.01	0.61	0.05	0.05	0.10	200,000.00	25,000.00	n/a	n/a	n/a	0.47	0.00	0.00	n/a	n/a	n/a	2.34	n/a
Cobalt-60	pCi/g	70	0	0	0.01	0.01	0.00	0.00	0.02	32,000.00	5,800.00	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.05	n/a
Lead-210	pCi/g	70	19	2	1.60	3.74	0.69	0.69	9.60	40.00	40.00	n/a	n/a	n/a	0.07	0.02	0.02	n/a	n/a	n/a	0.88	n/a
Lead-214	pCi/g	70	70	11	0.58	3.14	0.64	0.64	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Plutonium-241	pCi/g	70	21	7	0.50	11.49	0.56	0.56	600.00	3.20	2,200,000.00	n/a	n/a	n/a	0.00	0.18	0.00	n/a	n/a	n/a	0.00	n/a
Radium-223	pCi/g	70	0	0	n/a	0.08	0.00	0.00	n/a	n/a	n/a	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	n/a	n/a
Radium-226	pCi/g	70	70	3	0.75	1.81	0.64	0.64	0.00	1,100.00	1,100.00	n/a	n/a	n/a	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Strontium-90	pCi/g	70	43	29	0.06	2.18	0.31	0.31	10.00	280,000.00	34,000.00	n/a	n/a	n/a	0.03	0.00	0.00	n/a	n/a	n/a	0.02	n/a
Thorium-228	pCi/g	70	70	6	0.77	1.12	0.63	0.63	0.03	2,000.00	1,600.00	n/a	n/a	n/a	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Thorium-232[3]	pCi/g	70	70	1	0.80	0.81	0.55	0.55	0.02	3,800.00	2,200.00	n/a	n/a	n/a	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Thorium-234	pCi/g	70	70	12	0.78	2.36	0.72	0.72	3.20	88,000.00	63,000.00	n/a	n/a	n/a	0.23	0.00	0.00	n/a	n/a	n/a	n/a	n/a
Tritium	pCi/g	70	0	0	1.20	0.66	-0.02	-0.02	130,000.00	5.40	2,500,000.00	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Uranium-235	pCi/g	70	70	18	0.04	0.06	0.04	0.04	0.79	0.15	32,000.00	n/a	n/a	n/a	0.04	0.24	0.00	n/a	n/a	n/a	0.22	n/a
SVOCs																						
Acenaphthene	ug/kg	70	3	3	0.00	36.40	n/a	36.40	n/a	n/a	n/a	4.1E+07	2.5E+05	1.0E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00

Table 6-4. Screening Analysis for Risk Constituents of Concern, LEHR Radium/Strontium Treatment System Areas Removal Action, UC Davis, California (continued)

Constituent	Units	Number of Samples Analyzed	Number of Samples > Detection Limit[1]	Number of Detections > Background	Background Concentration (>4 ft bgs)	Maximum Detected Concentration	95% UCL	RME[2]	Carc. RBAS Scenario 1	Carc. RBAS Scenario 2	Carc. RBAS Scenario 3	Non-Carc. RBAS Scenario 1	Non-Carc. RBAS Scenario 2	Non-Carc. RBAS Scenario 3	**Carc. Scen. 1 RME/RBAS Ratio**	**Carc. Scen. 2 RME/RBAS Ratio**	**Carc. Scen. 3 RME/RBAS Ratio**	**Non-Carc. Scen. 1 RME/RBAS Ratio**	**Non-Carc. Scen. 2 RME/RBAS Ratio**	**Non-Carc. Scen. 3 RME/RBAS Ratio**	**Carc. RME/ Residential PRG Ratio**	**Non-Carc. RME/ Residential PRG Ratio**
Anthracene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	n/a	n/a	n/a	2.0E+08	1.4E+06	1.0E+08	0.00	0.00	0.00	0.00	0.00	0.00	n/a	0.00
Benzo(a)anthracene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	2,600.00	1,200.00	3.00E+07	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Benzo(a)pyrene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	260.00	240.00	1.30E+06	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Benzo(b)fluoranthene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	2,600.00	3,300.00	1.20E+07	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Benzo(g,h,i)perylene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	n/a	n/a	n/a	2.0E+07	9.1E+06	1.0E+08	0.00	0.00	0.00	0.00	0.00	0.00	n/a	n/a
Benzo(k)fluoranthene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	26,000.00	27,000.00	1.30E+08	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Bis(2-Ethylhexyl)phthalate	ug/kg	70	28	28	0.00	198.00	68.51	68.51	136,000.00	7,700.00	8.60E+03	n/a	n/a	n/a	0.00	0.01	0.01	n/a	n/a	n/a	0.00	n/a
Carbazole	ug/kg	70	1	1	0.00	32.20	n/a	32.20	95,000.00	2,200.00	1.00E+08	n/a	n/a	n/a	0.00	0.01	0.00	n/a	n/a	n/a	0.00	n/a
Chrysene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	261,000.00	20,000.00	1.00E+08	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Dibenzo(a,h)anthracene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	260.00	540.00	2.60E+05	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Dibenzofuran	ug/kg	70	1	1	0.00	27.00	n/a	27.00	n/a	n/a	n/a	2.7E+06	1.4E+04	1.0E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00
Diethyl Phthalate	ug/kg	70	3	3	0.00	6.60	n/a	6.60	n/a	n/a	n/a	5.5E+08	2.2E+05	1.0E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00
Di-n-Butylphthalate	ug/kg	70	13	13	0.00	380.00	98.08	98.08	n/a	n/a	n/a	6.8E+07	8.9E+05	3.3E+06	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00
Di-n-Octylphthalate	ug/kg	70	0	0	0.00	n/a	n/a	n/a	n/a	n/a	n/a	1.4E+07	2.8E+07	4.9E+06	0.00	0.00	0.00	0.00	0.00	0.00	n/a	0.00
Fluoranthene	ug/kg	70	2	2	0.00	71.40	n/a	71.40	n/a	n/a	n/a	2.7E+07	1.8E+06	1.0E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00
Fluorene	ug/kg	70	1	1	0.00	35.30	n/a	35.30	n/a	n/a	n/a	2.7E+07	1.7E+05	1.0E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00
Indeno(1,2,3-cd)pyrene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	2,600.00	4,900.00	4.60E+06	n/a	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Naphthalene	ug/kg	70	1	1	0.00	31.60	n/a	31.60	n/a	n/a	n/a	2.7E+07	3.9E+04	1.0E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00
Pentachlorophenol	ug/kg	70	1	1	0.00	18.60	n/a	18.60	16,000.00	13,000.00	1.00E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	n/a	n/a	0.01	n/a
Phenanthrene	ug/kg	70	3	3	0.00	161.00	n/a	161.00	n/a	n/a	n/a	2.0E+07	1.2E+06	1.0E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	n/a
Pyrene	ug/kg	70	3	3	0.00	63.20	n/a	63.20	n/a	n/a	n/a	2.0E+07	4.9E+05	1.0E+08	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00
VOCs																						
2-Butanone	ug/kg	70	15	15	0.00	132.00	83.55	83.55	n/a	n/a	n/a	710,000.0	12,000.0	n/a	n/a	n/a	n/a	0.00	0.01	n/a	n/a	0.00
Acetone	ug/kg	70	9	9	0.00	44.80	n/a	44.80	n/a	n/a	n/a	830,000.0	1,700.0	1,900,000.0	n/a	n/a	n/a	0.00	0.03	0.00	n/a	0.00
Benzene	ug/kg	70	0	0	0.00	n/a	n/a	n/a	230.00	15.00	n/a	710,000.0	12,000.0	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
Carbon Tetrachloride	ug/kg	70	0	0	0.00	n/a	n/a	n/a	220.00	55.00	n/a	710,000.0	12,000.0	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a
EthylBenzene	ug/kg	70	16	16	0.00	1.20	0.93	0.93	n/a	n/a	n/a	2,400,000.0	10,000.0	n/a	n/a	n/a	n/a	0.00	0.00	n/a	n/a	0.00
Methylene Chloride	ug/kg	70	70	70	0.00	7.04	3.72	3.72	7,200.00	130.00	n/a	710,000.0	12,000.0	n/a	0.00	0.03	n/a	0.00	0.00	n/a	0.00	n/a
Styrene	ug/kg	70	2	2	0.00	0.86	n/a	0.86	n/a	n/a	n/a	710,000.0	76,000.0	n/a	n/a	n/a	n/a	0.00	0.00	n/a	n/a	0.00
Toluene	ug/kg	70	59	59	0.00	263.00	100.42	100.42	n/a	n/a	n/a	920,000.0	19,000.0	n/a	n/a	n/a	n/a	0.00	0.01	n/a	n/a	0.00
Xylenes (Total)	ug/kg	70	26	26	0.00	5.51	3.46	3.46	n/a	n/a	n/a	510,000,000.0	3,400,000.0	150,000,000.0	n/a	n/a	n/a	0.00	0.00	0.00	n/a	0.00
														SUM OF RME/RBAS RATIO:	**1.34**	**1.29**	**0.08**	**0.00**	**1.19**	**0.10**	**6.31**	**0.04**

Notes

[1] For radionuclides, this value identifies the number of samples that exceeded the MDA.

[2] RME = reasonable maximum exposure. The 95% UCL on the mean was used when available If a 95% UCL was not available, the maximum detected concentration was used.

[3] Barium, chromium, copper, manganese, zinc, and thorium-232 have log-normally distributed background data sets and are therefore assumed to have log-normal confirmation data sets.

[4] The mercury non-carcinogenic RBAS for Scenario 2 was revised based on area-specific lithology and concentration profile.

[5] The RBAS for this COC was less than the background value. Per the work plan, a background comparison was conducted.
The COC data set was determined to mirror the background data set. Therefore, the COC was not considered a contributor to excess risk
from the site, and a RME/RBAS ratio was not calculated for inclusion in the cumulative summation. The COC was removed from further risk screening.

Abbreviations:
bgs = below ground surface
Carc. = Carcinogenic
ft = feet
µg/kg = microgram per kilogram
mg/kg = milligram per kilogram
n/a = not applicable
PCBs = polychlorinated biphenyls
pCi/g = picoCurie per gram

Table 6-5. Risk Screening Summary, LEHR Radium/Strontium Area Removal Actions, UC Davis, California

Excess Risk	Carc. Scenario 1	Carc. Scenario 2	Carc. Scenario 3	Non-Carc. Scenario 1	Non-Carc. Scenario 2	Non-Carc. Scenario 3
10^{-6}	**1.34**	**1.29**	0.08	N/A	N/A	N/A
10^{-5}	0.134	0.129	0.008	N/A	N/A	N/A
10^{-4}	0.013	0.013	0.001	N/A	N/A	N/A
HQ = 1	N/A	N/A	N/A	0.00	**1.19**	0.10

Summary of Constituents of Concern that Cause RME/RBAS Sums to Exceed 1.0
10^{-6} Carcinogen Scenario 1 Greatest Contributors
0.47 cesium-137
0.23 thorium-234
0.12 heptachlor
0.1 chlordane
10^{-6} Carcinogen Scenario 2 Greatest Contributors
0.31 heptachlor
0.24 uranium-235
0.18 plutonium-241
0.19 chlordane
0.10 gamma-chlordane
Non-Carcinogen Scenario 2 Greatest Contributor
0.73 mercury [1]

Notes
[1] The RBAS for this scenario is less than the background value. Mercury did not pass the background comparison. The issue is being researched.
[2] The non-carcinogen RBAS for Scenario 2 was revised. Area-specific lithology was used to generate an area-specific RBAS for inorganic mercury that is more appropriate and representative of the area.
RME Reasonable Maximum Exposure = 95% UCL or maximum value (if a 95% UCL was not available).

Abbreviations
Carc. carcinogenic
Non-Carc. non-carcinogenic

Table 6-6. Constituents of Concern that Exceeded US EPA Residential Preliminary Remediation Goal Values, LEHR Radium/Strontium Area Removal Actions, UC Davis, California

	RME	US EPA Residential PRG	RME/PRG
Carcinogenic COCs that Exceeded USEPA Residential PRG Values (10^{-6})			
Chromium VI (hexavalent)	0.31 mg/kg	0.20 mg/kg	1.54
Cesium-137	0.05 pCi/g	0.02 pCi/g	2.34
Non-Carcinogenic COCs that Exceeded USEPA Residential PRG Values (HQ = 1.0)			
None			

Abbreviations

COCs	Constituents of concern
HQ	Hazard Quotient for non-carcinogen risk
mg/kg	milligrams per kilogram
pCi/g	picoCuries per gram
PRG	Preliminary Remediation Goal as established by US EPA Region 9, November 2000
RME	Reasonable Maximum Exposure
US EPA	U.S. Environmental Protection Agency

Table 6-7. Hot Measurement Analysis Summary, LEHR Radium/Strontium Area Removal Actions, UC Davis, California

	Hot Measurement Maximum	Hot Measurement Upper Limit[1, 2]	Values Greater than Hot Measurement Upper Limit
Carcinogenic COCs that Exceeded Hot Measurement Upper Limit[1]			
None	N/A	N/A	N/A
Non-Carcinogenic COCs that Exceeded Hot Measurement Upper Limit[2]			
Mercury	2.00 mg/kg	0.22 mg/kg	Forty-four values (ranging from 0.23-2.0 mg/kg)

Notes

[1]Hot Measurement Upper Limit for carcinogens = 10 x RBAS value for 10-6 risk level.

[2]Hot Measurement Upper Limit for non-carcinogens = RBAS value for HQ=1.0

Abbreviations

COC constituent of concern
mg/kg milligram per kilogram
N/A Not Applicable
RBAS Risk-Based Action Standard

Table 6-8. Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Phase 1 - Steps 1, 2, and 3

		STEP 1			STEP 2				STEP 3				
Constituent	Units	Number of Samples Analyzed	Number of Samples w/ Detections	Background or Detection Limit (DL) Concentration (1)	Number of Detections Above Background/DL	Max. Detected Concentration	% of Detections Above Background or DL	Is Max Conc. > 1.5xBKG **AND** % Detected Above BKG>5%?	Partitioning Coefficient (K_d) (mL/g) (2)	Is the K_d Less Than 10 mL/g (Organics) OR Less Than 1,000 mL/g (Inorganics)	Half-Life (Years) (3)	Is the Half-Life Greater Than 1 Year?	Does the Analyte Fail the K_d **OR** Half-Life Test?
General Chemistry													
Chromium, Hexavalent	mg/kg	70	56	0.0540	56	0.8410	80.0%	YES	1.90E+01	YES	N/A	---	YES
Nitrate	mg/kg	70	65	36.0000	8	304.0000	11.4%	YES	0.00E+00	YES	N/A	---	YES
Metals (5)													
Antimony	mg/kg	70	3	1.4000	0	0.9200	0.0%	NO	---	---	---	---	---
Arsenic	mg/kg	70	70	10.9000	0	10.2000	0.0%	NO	---	---	---	---	---
Barium	mg/kg	70	70	294.0000	1	317.0000	1.4%	NO	---	---	---	---	---
Beryllium	mg/kg	70	32	0.9240	0	0.6500	0.0%	NO	---	---	---	---	---
Cadmium	mg/kg	70	31	0.5100	5	1.4000	7.1%	YES	7.50E+01	YES	N/A		YES
Chromium	mg/kg	70	70	125.0000	21	175.0000	30.0%	NO	---	---	---	---	---
Cobalt	mg/kg	70	70	31.0000	0	30.6000	0.0%	NO	---	---	---	---	---
Copper	mg/kg	70	70	61.8000	4	182.0000	5.7%	YES	4.30E+02	YES	N/A	---	YES
Iron	mg/kg	70	70	44,000.0000	1	45,400.0000	1.4%	NO	---	---	---	---	---
Lead	mg/kg	70	70	9.5000	3	15.1000	4.3%	NO	---	---	---	---	---
Manganese	mg/kg	70	70	750.0000	7	895.0000	10.0%	NO	---	---	---	---	---
Mercury	mg/kg	70	70	0.2480	38	2.0000	54.3%	YES	5.20E+01	YES	N/A	---	YES
Molybdenum	mg/kg	70	48	0.2600	39	0.6350	55.7%	YES	2.00E+01	YES	N/A	---	YES
Nickel	mg/kg	70	70	246.0000	27	316.0000	38.6%	NO	---	---	---	---	---
Selenium	mg/kg	70	58	1.2000	15	1.8000	21.4%	NO	---	---	---	---	---
Silver	mg/kg	70	38	0.5500	19	1.1200	27.1%	YES	8.30E+00	YES	N/A	---	YES
Thallium	mg/kg	70	3	1.6000	1	1.7300	1.4%	NO	---	---	---	---	---
Vanadium	mg/kg	70	70	80.3000	1	84.9000	1.4%	NO	---	---	---	---	---
Zinc	mg/kg	70	70	93.1000	6	151.0000	8.6%	YES	6.20E+01	YES	N/A	---	YES
Pesticides/PCBs													
4,4'-DDD	µg/kg	70	0	*3.6000*	0		0.0%	NO	---	---	---	---	---
4,4'-DDE	µg/kg	70	4	*3.6000*	4	3.2000	5.7%	NO	---	---	---	---	---
4,4'-DDT	µg/kg	70	12	*3.6000*	12	133.0000	17.1%	YES	1.92E+04	NO	N/A	---	NO
Aldrin	µg/kg	70	0	*1.8000*	0		0.0%	NO	---	---	---	---	---
alpha-BHC	µg/kg	70	0	*1.8000*	0		0.0%	NO	---	---	---	---	---
alpha-Chlordane	µg/kg	70	20	*1.8000*	20	277.0000	28.6%	YES	1.40E+02	NO	N/A	---	NO
Aroclor-1016	µg/kg	70	0	*35.8000*	0		0.0%	NO	---	---	---	---	---
Aroclor-1221	µg/kg	70	0	*71.7000*	0		0.0%	NO	---	---	---	---	---
Aroclor-1232	µg/kg	70	0	*35.8000*	0		0.0%	NO	---	---	---	---	---
Aroclor-1242	µg/kg	70	0	*35.8000*	0		0.0%	NO	---	---	---	---	---
Aroclor-1248	µg/kg	70	0	*35.8000*	0		0.0%	NO	---	---	---	---	---
Aroclor-1254	µg/kg	70	0	*35.8000*	0		0.0%	NO	---	---	---	---	---
Aroclor-1260	µg/kg	70	0	*35.8000*	0		0.0%	NO	---	---	---	---	---
beta-BHC	µg/kg	70	0	*1.8000*	0		0.0%	NO	---	---	---	---	---
delta-BHC	µg/kg	70	0	*1.8000*	0		0.0%	NO	---	---	---	---	---

Table 6-8. Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Phase 1 - Steps 1, 2, and 3 (continued)

		STEP 1			STEP 2				STEP 3				
Constituent	Units	Number of Samples Analyzed	Number of Samples w/ Detections	Background or Detection Limit (DL) Concentration (1)	Number of Detections Above Background/DL	Max. Detected Concentration	% of Detections Above Background or DL	Is Max Conc. > 1.5xBKG **AND** % Detected Above BKG>5%?	Partitioning Coefficient (K_d) (mL/g) (2)	Is the K_d Less Than 10 mL/g (Organics) OR Less Than 1,000 mL/g (Inorganics)	Half-Life (Years) (3)	Is the Half-Life Greater Than 1 Year?	Does the Analyte Fail the K_d **OR** Half-Life Test?
Dieldrin	µg/kg	70	0	*3.6000*	0		0.0%	NO	---	---	---	---	---
Endosulfan I	µg/kg	70	0	*1.8000*	0		0.0%	NO	---	---	---	---	---
Endosulfan II	µg/kg	70	0	*3.6000*	0		0.0%	NO	---	---	---	---	---
Endosulfan sulfate	µg/kg	70	0	*3.6000*	0		0.0%	NO	---	---	---	---	---
Endrin	µg/kg	70	1	*3.6000*	1	2.0000	1.4%	NO	---	---	---	---	---
Endrin aldehyde	µg/kg	70	0	*3.6000*	0		0.0%	NO	---	---	---	---	---
Endrin ketone	µg/kg	70	0	*3.6000*	0		0.0%	NO	---	---	---	---	---
gamma-BHC (Lindane)	µg/kg	70	0	*1.8000*	0		0.0%	NO	---	---	---	---	---
gamma-Chlordane	µg/kg	70	20	*1.8000*	20	346.0000	28.6%	YES	2.80E+02	NO	N/A	---	NO
Heptachlor	µg/kg	70	3	*1.8000*	3	52.2000	4.3%	NO	---	---	---	---	---
Heptachlor epoxide	µg/kg	70	0	*1.8000*	0		0.0%	NO	---	---	---	---	---
Methoxychlor	µg/kg	70	0	*17.9000*	0		0.0%	NO	---	---	---	---	---
Toxaphene	µg/kg	70	0	*95.1000*	0		0.0%	NO	---	---	---	---	---
Radionuclides (6)													
Actinium-228	pCi/g	70	70	0.6420	3	0.7860	4.3%	NO	---	---	---	---	---
Americium-241	pCi/g	70	21	0.0140	3	0.0847	4.3%	NO	---	---	---	---	---
Bismuth-212	pCi/g	70	70	0.4340	3	0.6620	4.3%	NO	---	---	---	---	---
Bismuth-214	pCi/g	70	70	0.5400	7	2.1300	10.0%	YES	NDA	N/A	3.79E-05	NO	NO
Carbon-14	pCi/g	70	21	0.1300	6	2.4100	8.6%	YES	8.00E-01	YES	5.73E+03	YES	YES
Cesium-137	pCi/g	70	21	0.0070	16	0.6120	22.9%	YES	1.00E+03	NO	3.02E+01	YES	NO
Cobalt-60	pCi/g	70	0	0.0060	0	0.0051	0.0%	NO	---	---	---	---	---
Lead-210	pCi/g	70	19	1.6000	2	2.8800	2.9%	NO	---	---	---	---	---
Lead-212	pCi/g	70	70	0.6840	3	1.0865	4.3%	NO	---	---	---	---	---
Lead-214	pCi/g	70	70	0.5810	11	2.5200	15.7%	YES	6.00E+00	YES	5.10E-05	NO	NO
Plutonium-241	pCi/g	70	12	0.5000	7	11.4894	10.0%	YES	4.50E+03	NO	1.44E+01	YES	NO
Potassium-40	pCi/g	70	70	14.0000	2	14.7500	2.9%	NO	---	---	---	---	---
Radium-223	pCi/g	70	0	0.0000	0	0.0822	0.0%	NO	---	---	---	---	---
Radium-226	pCi/g	70	70	0.7520	3	1.7200	4.3%	NO	---	---	---	---	---
Radium-228	pCi/g	70	70	0.6550	2	0.7860	2.9%	NO	---	---	---	---	---
Strontium-90	pCi/g	70	43	0.0560	29	2.1800	41.4%	YES	3.50E+01	YES	2.91E+01	YES	YES
Thallium-208	pCi/g	70	70	0.2230	3	0.2770	4.3%	NO	---	---	---	---	---
Thorium-228	pCi/g	70	70	0.7710	6	1.1200	8.6%	NO	---	---	---	---	---
Thorium-230	pCi/g	70	70	1.0400	1	1.0900	1.4%	NO	---	---	---	---	---
Thorium-232	pCi/g	70	70	0.8000	1	0.8070	1.4%	NO	---	---	---	---	---
Thorium-234	pCi/g	70	70	0.7800	12	1.5495	17.1%	YES	1.10E+01	YES	6.60E-02	NO	NO
Tritium	pCi/g	70	0	1.2000	0	0.6550	0.0%	NO	---	---	---	---	---
Uranium-233/234	pCi/g	70	70	0.7060	4	0.8370	5.7%	NO	---	---	---	---	---
Uranium-235	pCi/g	70	70	0.0380	18	0.0645	25.7%	YES	4.00E-01	YES	7.04E+08	YES	YES
Uranium-238	pCi/g	70	70	0.6450	7	0.8250	10.0%	NO	---	---	---	---	---

Table 6-8. Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Phase 1 - Steps 1, 2, and 3 (continued)

		STEP 1			STEP 2				STEP 3				
Constituent	Units	Number of Samples Analyzed	Number of Samples w/ Detections	Background or Detection Limit (DL) Concentration (1)	Number of Detections Above Background/DL	Max. Detected Concentration	% of Detections Above Background or DL	Is Max Conc. > 1.5xBKG **AND** % Detected Above BKG>5%?	Partitioning Coefficient (K_d) (mL/g) (2)	Is the K_d Less Than 10 mL/g (Organics) OR Less Than 1,000 mL/g (Inorganics)	Half-Life (Years) (3)	Is the Half-Life Greater Than 1 Year?	Does the Analyte Fail the K_d **OR** Half-Life Test?
SVOCs													
Di-n-butylphthalate	µg/kg	70	13	*358.0000*	13	380.0000	18.6%	NO	---	---	---	---	---
VOCs													
2-Butanone	µg/kg	70	15	*10.8000*	15	132.0000	21.4%	YES	3.80E-03	YES	N/A	---	YES
Acetone	µg/kg	70	9	*10.8000*	9	44.8000	12.9%	YES	7.19E-03	YES	N/A	---	YES
Ethylbenzene	µg/kg	70			16	1.2000	22.9%	YES	7.30E-01	YES	N/A	---	YES
Methylene Chloride	µg/kg	70			70	7.0400	100.0%	YES	2.40E-02	YES	N/A	---	YES
Styrene	µg/kg	70			2	0.8600	2.9%	NO	---	---	---	---	---
Toluene	µg/kg	70	59	*10.8000*	59	263.0000	84.3%	YES	3.60E-01	YES	N/A	---	YES
Xylene	µg/kg	70	59	*10.8000*	26	5.5100	37.1%	NO					

Table 6-8. Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Phase 1 - Steps 1, 2, and 3 (continued)

Notes

(1) Background values for data from greater than 4 feet below ground surface (ft bgs) were used because the majority of the confirmation samples were collected at this depth. For SVOCs, VOCs, pesticides, and any other constituents without a background value, the lowest reportable detection limit was used for background concentration (*in italics*).

(2) K_d values are based on the lowest reasonable value observed in literature and site-specific vadose zone modeling data that relate K_d to the time-to-peak in ground water. Examples of references used for Kd values: "Soil Screening Guidance for Radionuclides: Technical Background Document,", USEPA, EPA/540-R-00-006, October 2000; and Superfund Chemical Data Matrix (SCDM) database downloaded from the US EPA web page (http:\\www.epa.gov).

(3) Half-life values obtained from "Handbook of Environmental Degradation Rates" by Howard, Boethling, Jarvis, Meylan, and Michalenko (1991) and the US EPA SCDM database. Criteria are based on site-specific information regarding time of last waste burial and process knowledge regarding levels of radionuclide activity used at LEHR for research.

(4) A constituent is considered a Designated Level (DL) Constituent of Concern (COC) if it is organic and its K_d is less than 10 mL/g (pesticides/SVOCs/VOCs), or it is inorganic and its K_d is less than 1,000 mL/g (metals, minerals, and radionuclides), or if it is a radionuclide and its half-life is greater than 1 year.

(5) Metals list does not include: aluminum, calcium, magnesium, potassium, or sodium results. No background data were available for these elements.

(6) Gross alpha and non-volatile beta results are not included in this table. These parameters were analyzed as indicators for alpha and beta emitting radionuclides.

Abbreviations

BKG = background
Conc = concentration
DL = Detection Limit
K_d = partitioning coefficient
Max = maximum
mg/kg = milligrams per kilogram
mL/g = milliLiters per gram
pCi/g = picoCuries per gram
µg/kg = micrograms per kilogram

Table 6-9. Preliminary Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Step 4, UC Davis, California

Constituent	Units	Background/DL Concentration (1)	Number of Detections Above Background/DL	Max. Detected Concentration	% Detected Above Background/DL	Partitioning Coefficient (K_d) (mL/g) (2)	Half-Life (Years) (3)	DL (mg/kg or pCi/g) (5)	Is Constituent a Designated Level COC? (4)	Explanation
General Chemistry										
Chromium, Hexavalent	mg/kg	0.0540	56	0.8410	80.0%	1.90E+01	N/A	Not Avail.	YES	Requires additional evaluation/sampling
Nitrate	mg/kg	36.0000	8	304.0000	11.4%	0.00E+00	N/A	12.0000	YES	Requires additional evaluation/sampling
Metals (5)										
Cadmium	mg/kg	0.5100	5	1.4000	7.1%	7.50E+01	N/A	Not Avail.	NO	Only 5 samples> BKG, 56% of samples < Detection Limit
Copper	mg/kg	61.8000	4	182.0000	5.7%	4.30E+02	N/A	Not Avail.	NO	Only 4 samples> BKG, slightly exceeds 5% cutoff for detects > BKG; BKG & confirmation samples histograms are similar
Mercury	mg/kg	0.2480	38	2.0000	54.3%	5.20E+01	N/A	Not Avail.	YES	Requires additional evaluation/sampling
Molybdenum	mg/kg	0.2600	39	0.6350	55.7%	2.00E+01	N/A	Not Avail.	NO	No Primary or Secondary MCLs. Max. concentration < 2.5 x BKG. The tap water PRG is 150 mL/g; the concentrations on-site should not impact ground water at this concentration.
Silver	mg/kg	0.5500	19	1.1200	27.1%	8.30E+00	N/A	Not Avail.	NO	No Primary MCL. Max. conc. ≤ 2 x BKG. Passed WRS Test qualified since a large percentage, 46%, of the samples were less than the detection limit.
Zinc	mg/kg	93.1000	6	151.0000	8.6%	6.20E+01	N/A	Not Avail.	NO	Only 6 samples> BKG, BKG & confirmation samples histograms are similar; Max. conc. ≤ 2 x BKG; No Primary MCL.
Pesticides/PCBs										
None										
Radionuclides										
Carbon-14	pCi/g	0.1300	6	2.4100	8.6%	8.00E-01	5.73E+03	Not Avail.	YES	Requires additional evaluation/sampling
Cesium-137	pCi/g	0.0070	16	0.6120	22.9%	1.00E+03	3.02E+01	Not Avail.	YES	Appears co-located with detections of Sr-90. Requires additional evaluation/sampling, though it was not identified as a potential DL COC after Step 4. WRS qualified pass <4-ft bgs; qualified fail ≥4-ft bgs; BKG & confirmation samples histograms are similar. See Note 6.
Strontium-90	pCi/g	0.0560	29	2.1800	41.4%	3.50E+01	2.91E+01	Not Avail.	NO	The DL modeling from the SWT RA identified a DL soil value of 17 pCi/g would be protective of ground water. Assuming relatively similar lithology, the maximum value of 2.17 pCi/g in the Ra/Sr Area is an order of magnitude below the SWT RA DL value for Sr-90.
Uranium-235	pCi/g	0.0380	18	0.0645	25.7%	4.00E-01	7.04E+08	Not Avail.	NO	Max. conc. < 2 x BKG. This is not a known LEHR research isotope. Uranium-235 is a naturally-occurring isotope. The lab reported errors ranging from 27%-84% for the confirmation sample concentrations.
SVOCs										
None										
VOCs										
2-Butanone	µg/kg	10.8000	15	132.0000	21.4%	3.80E-03	N/A	Not Avail.	NO	Low Concentration and Biodegradable; No Primary or Secondary MCLs.
Acetone	µg/kg	10.8000	9	44.8000	12.9%	7.19E-03	N/A	Not Avail.	NO	Low Concentration and Biodegradable
Ethylbenzene	µg/kg	0.0000	16	1.2000	22.9%	7.30E-01	N/A	Not Avail.	NO	Low Concentration and Biodegradable
Methylene Chloride	µg/kg	0.0000	70	7.0400	100.0%	2.40E-02	N/A	Not Avail.	NO	Low Concentration and Biodegradable; No Primary or Secondary MCLs.
Toluene	µg/kg	10.8000	59	263.0000	84.3%	3.60E-01	N/A	Not Avail.	NO	Low Concentration and Biodegradable

Dark shading indicates DL COC.

Table 6-9. Preliminary Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Step 4, UC Davis, California (continued)

Notes

[1]Background values for data from greater than four feet below ground surface (ft bgs) were used because the majority of the confirmation samples were collected at this depth. For SVOCs, VOCs, pesticides, and any other constituents without a background value, the lowest reportable detection limit was used for background concentration (*in italics*).

[2]K_d values are based on the lowest reasonable value observed in literature and site-specific vadose zone modeling data that relate K_d to the time-to-peak in ground water. Examples of references used for K_d values: "Soil Screening Guidance for Radionuclides: Technical Background Document,", US EPA, EPA/540-R-00-006, October 2000; and Superfund Chemical Data Matrix (SCDM) database downloaded from the US EPA web page (http:\\www.epa.gov).

[3]Half-life values obtained from "Handbook of Environmental Degradation Rates" by Howard, Boethling, Jarvis, Meylan, and Michalenko 1991 and the US EPA SCDM database. Criteria are based on site-specific information regarding time of last waste burial and process knowledge regarding levels of radionuclide activity used at LEHR for research.

[4]A constituent is considered a Designated Level (DL) Constituent of Concern (COC) if it is organic and its K_d is less than 10 mL/g (pesticides/SVOCs/VOCs), or it is inorganic and its K_d is less than 1,000 mL/g (metals, minerals, and radionuclides), or if it is a radionuclide and its half-life is greater than one year.

[5]Designated-Levels were not calculated for the Ra/Sr Areas. Area-specific lithology information and modeling were not available at the time of this evaluation.

[6]Cesium-137 was not identified as a potential DL COC in Steps 1-3, but it was retained since it appeared to be co-located with detected concentrations of strontium-90 which was retained after Step 3 for Step 4 evaluation.

Abbreviations

bgs	below ground surface
COC	Constituent of Concern
DL	Designated-Level
ft	feet
K_d	soil-water partitioning coefficient
mg/kg	milligrams per kilogram
mL/g	milliliters per gram
N/A	Not Applicable
SCDM	Superfund Chemical Data Matrix

Table 6-10. Preliminary Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Step 4, Wilcoxon Rank Sum Test Results for Analytes Remaining After Step 3, UC Davis, California

Analyte Category	Analyte	WRS Test Results	Histogram Comparison	DL Modeling	Bio-degradability	Is the Analyte a DL COC?	Other Information
General	Hexavalent chromium	Fail (Q)	Fail	N/A	Fail	Yes	Requires additional evaluation/sampling
General	Nitrate	Pass (Q)	Pass	N/A	Fail	Yes	Requires additional evaluation/sampling
Metal	Cadmium	Pass	Fail	N/A	Fail	No	Only 5 samples> BKG, 56% of samples < Det Limit
Metal	Copper	Pass	Pass	N/A	Fail	No	Only 4 samples> BKG, slightly exceeds 5% cutoff for detects > BKG; BKG and conf. sample histograms are similar
Metal	Mercury	Fail (Q)	Fail	N/A	Fail	Yes	Requires additional evaluation/sampling
Metal	Molybdenum	(1)	N/A	N/A	Fail	No	No Primary or Secondary MCLs. Max. conc. < 2.5 x BKG. The tap water PRG is 150 mL/g; the concentrations on-site should not impact ground water at this concentration.
Metal	Silver	Pass (Q)	Fail	N/A	Fail	No	No Primary MCL. Max. conc. < 2 x BKG. Passed WRS Test, but qualified since a large percentage, 46%, of the samples were less than the detection limit.
Metal	Zinc	Fail	Pass	N/A	Fail	No	Only 6 samples> BKG, BKG and conf. samples histograms are similar; Max. conc. < 2 x BKG; No Primary MCL.
Radionuclide	Carbon-14	(Note 1)	N/A	N/A	N/A	Yes	Requires additional evaluation/sampling

Table 6-10. Preliminary Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Step 4, Wilcoxon Rank Sum Test Results for Analytes Remaining After Step 3, UC Davis, California (continued)

Analyte Category	Analyte	WRS Test Results	Histogram Comparison	DL Modeling	Bio-degradability	Is the Analyte a DL COC?	Other Information
Radionuclide	Cesium-137	Fail (Q)	Pass	N/A	N/A	Yes	Requires additional evaluation/sampling
Radionuclide	Strontium-90	Fail (Q)	Fail	N/A	N/A	No	The DL modeling from the SWT RA identified a DL soil value of 17 pCi/g would protect ground water. Assuming relatively similar lithology, the maximum value of 2.17 pCi/g in the Ra/Sr Area is an order of magnitude below the SWT RA DL value for Sr-90.
Radionuclide	Uranium-235	Fail	Fail	N/A	N/A	No	Max. conc. < 2 x BKG. This is not a known LEHR research isotope. Uranium-235 is a naturally-occurring isotope. The lab reported errors ranging from 27%-84% for the confirmation sample concentrations.
VOC	2-butanone	N/A	N/A	N/A	Pass	No	Low concentration and biodegradable; no Primary or Secondary MCLs.
VOC	Acetone	N/A	N/A	N/A	Pass	No	Low concentration and biodegradable
VOC	Ethylbenzene	N/A	N/A	N/A	Pass	No	Low concentration and biodegradable
VOC	Methylene chloride	N/A	N/A	N/A	Pass	No	Low concentration and biodegradable; no Primary or Secondary MCLs.
VOC	Toluene	N/A	N/A	N/A	Pass	No	Low concentration and biodegradable

Table 6-10. Preliminary Designated-Level Data Evaluation for Confirmation Samples Collected for LEHR Radium/Strontium Area Removal Actions—Step 4, Wilcoxon Rank Sum Test Results for Analytes Remaining After Step 3, UC Davis, California (continued)

Note 1 The background concentrations for molybdenum and carbon-14 were all below the laboratory detection limit; therefore, it was not possible to run a WRS Test or Histogram Comparison.

Abbreviations

BKG	background
COC	constituent of concern
DL	Designated-Level
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
N/A	Not Applicable
RA	Removal Action
RBAS	Risk-Based Action Standard
SWT	Southwest Trenches
WRS	Wilcoxon Rank Sum Test

Table 6-11. Summary Evaluation of Potential Impact of Designated-Level Constituents of Concern in Radium/Strontium Area Soil on Ground Water, LEHR Site, UC Davis, California

COC	Confirmation Sampling		Confirmation	DL Sampling		Soil Background Value	NUFT Soil Result	NUFT Soil Result	Summary of Ground Water Impact Potential
	Maximum (mg/kg or pCi/g)	Depth of Maximum (ft)	95% UCL (mg/kg or pCi/g)	Maximum (mg/kg or (pCi/g)	Depth of Maximum (ft)	(mg/kg or pCi/g)	(BG goal) (mg/kg or pCi/g)	(MCL goal) (mg/kg or pCi/g)	
Hexavalent Chromium	0.841	7	0.31	0.614	12	0.054	0.719	0.912	Any impact above background would be insignificant
Mercury[1]	2	1, 5.5	0.66	1.2	7.5	0.63/0.25 [3]	0.0116	1.23	Localized impact above background possible; impact above MCL unlikely; note peak time for ground water impact is 5,000 years
Nitrate (as N)	304	20	34.4	132	29.5	36	4.05	1.73	Localized impact above background and MCL possible
Cesium-137	0.612	6	0.05	0.664	16	0.01	2.77	554	Impact above background and/or MCL very unlikely
Carbon-14[2]	2.41	13.5	0.20	0.076	18.5	0.130	0.004	2.34	Localized impact above background possible, but impact expected to be below MCL

Notes

[1]Assumed to be as mercuric sulfide.
[2]Assumed to be as methanol.
[3]The first number is for 0 to 4 ft bgs soil, the second number is for >4 ft bgs.

Abbreviations

BG	background, based on concentrations in ground water from upgradient well UCD1-18
COC	constituent of concern
DL	designated level
ft	feet
mg/kg	milligrams per kilogram
MCL	Primary Maximum Contaminant Level for Ground Water
N	Nitrogen
NA	not applicable or not available
NUFT	Non-isothermal, Unsaturated Flow and Transport model
pCi/g	picoCuries per gram
UCL	Upper confidence limit on the true mean based on sample data

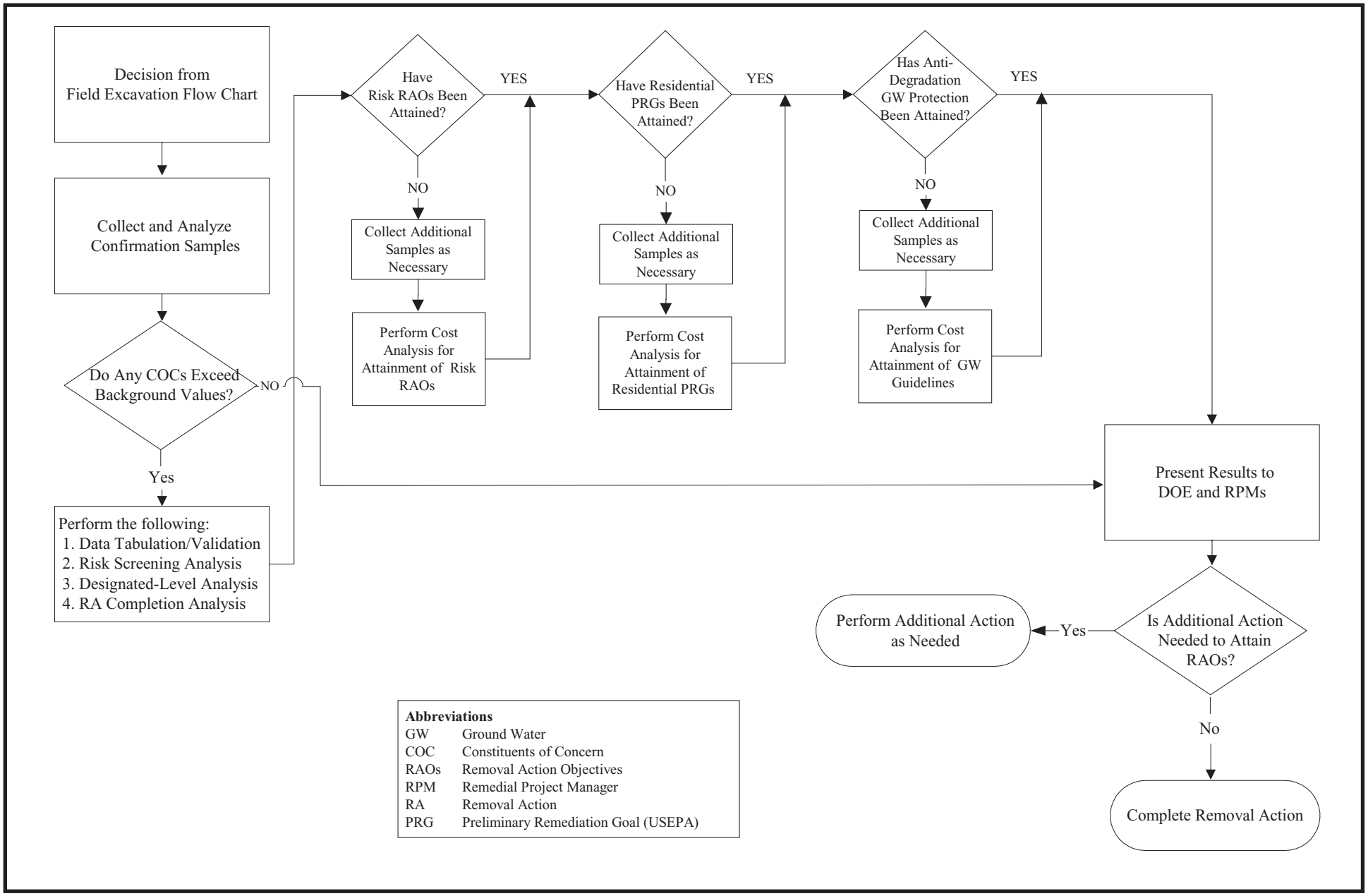

Figure 6-1. Radium/Strontium Treatment Systems Area Removal Action Phase II Data Evaluation Decision Flow Diagram, LEHR, UC Davis, California

Weiss Associates

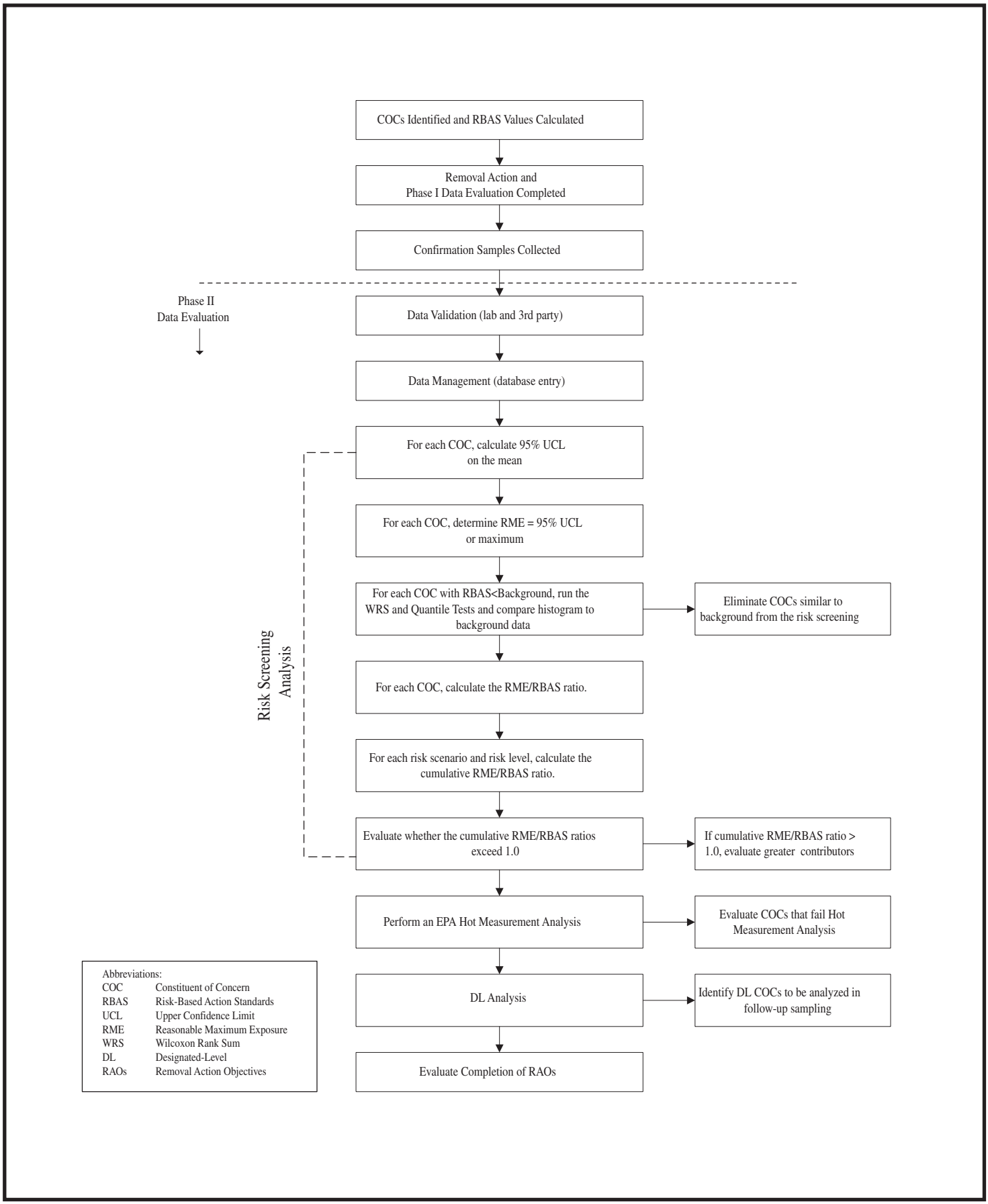

Figure 6-2. LEHR Data Evaluation Process

Weiss Associates

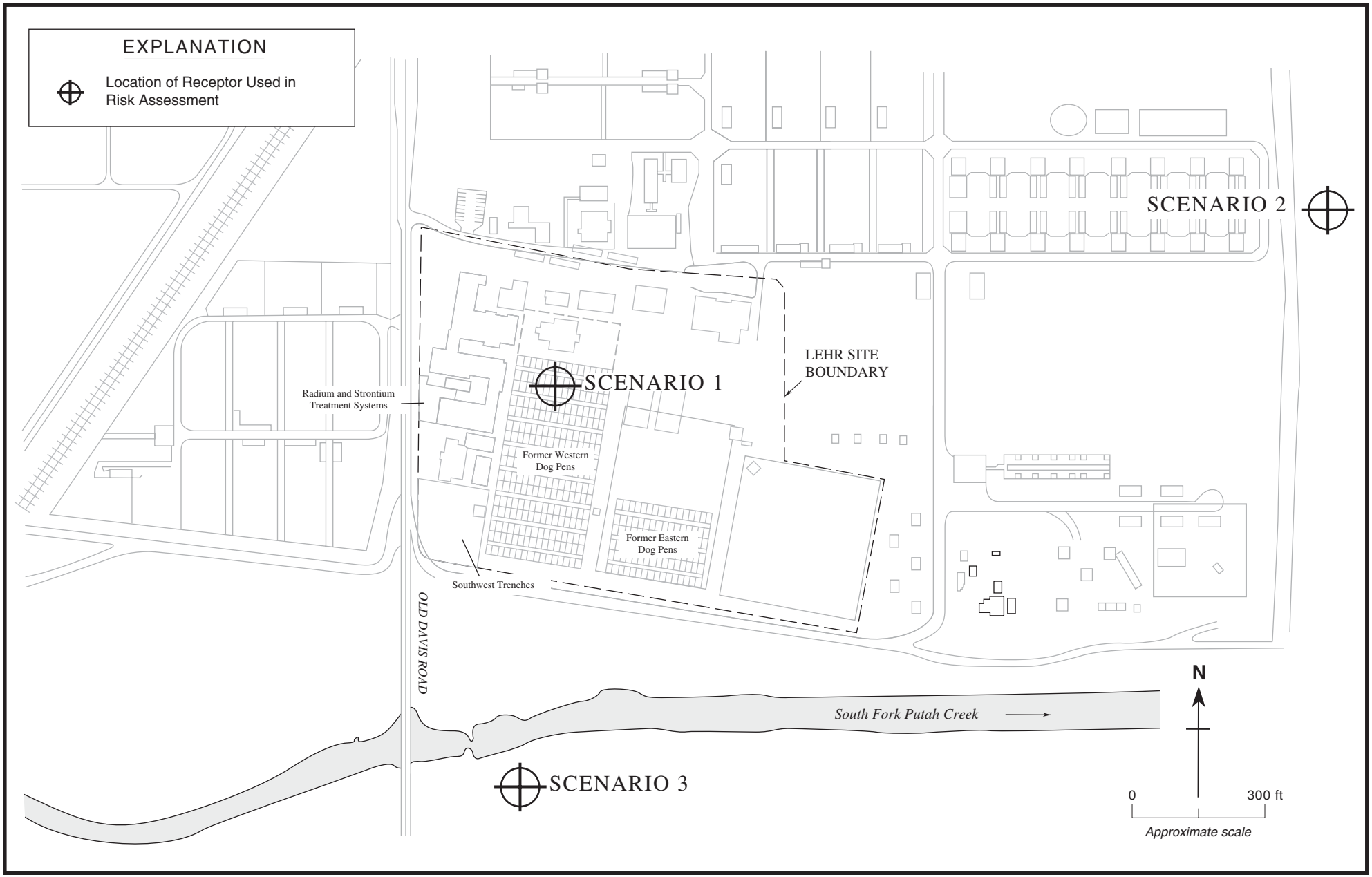

Figure 6-3. Locations of Receptors for Risk Scenarios 1,2, and 3, LEHR Site, UC Davis, California

Weiss Associates

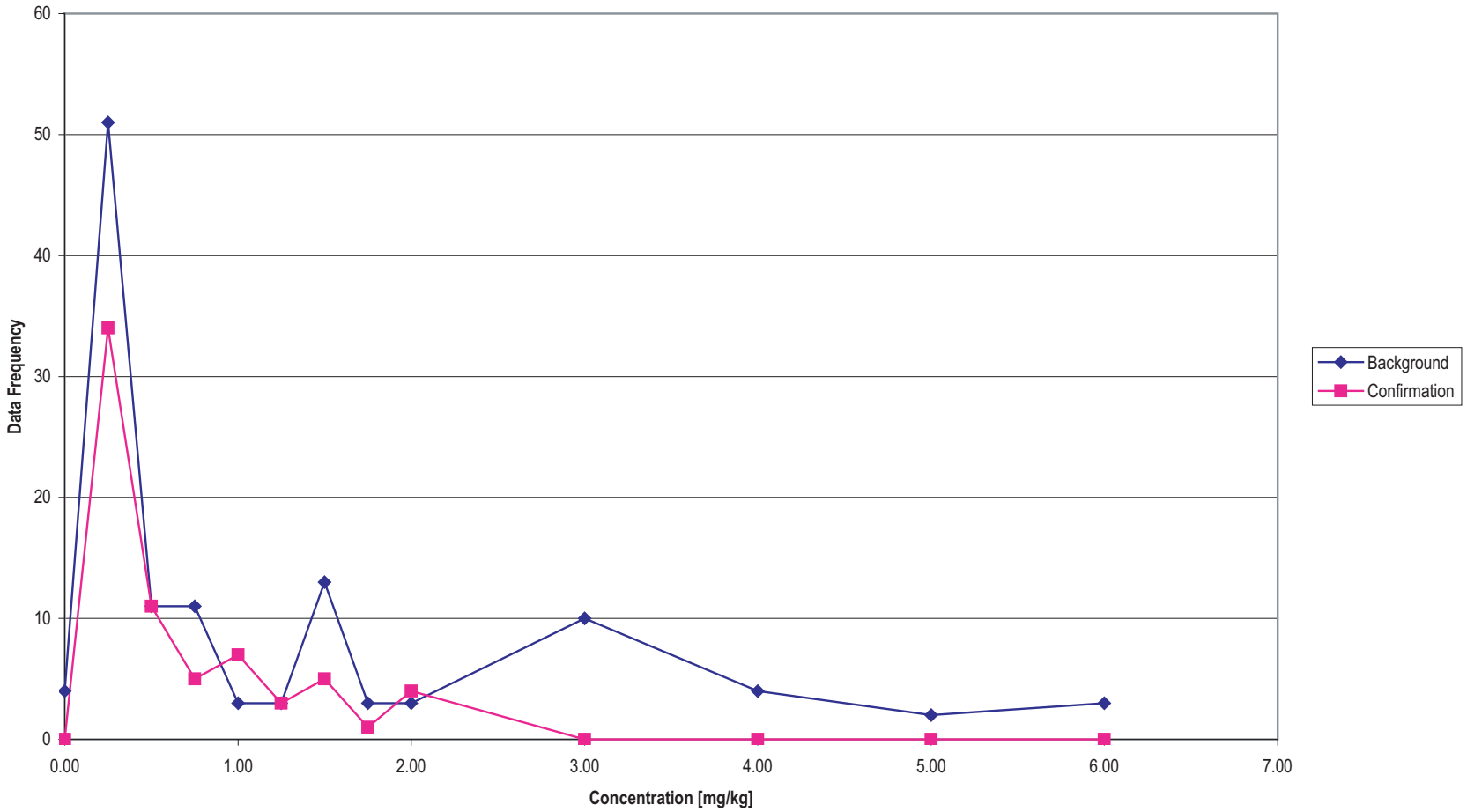

Figure 6-4a. Mercury Frequency Distribution Comparing Background Data to Confirmation Sample Results, LEHR Site, UC Davis, California

Weiss Associates

06/21/01

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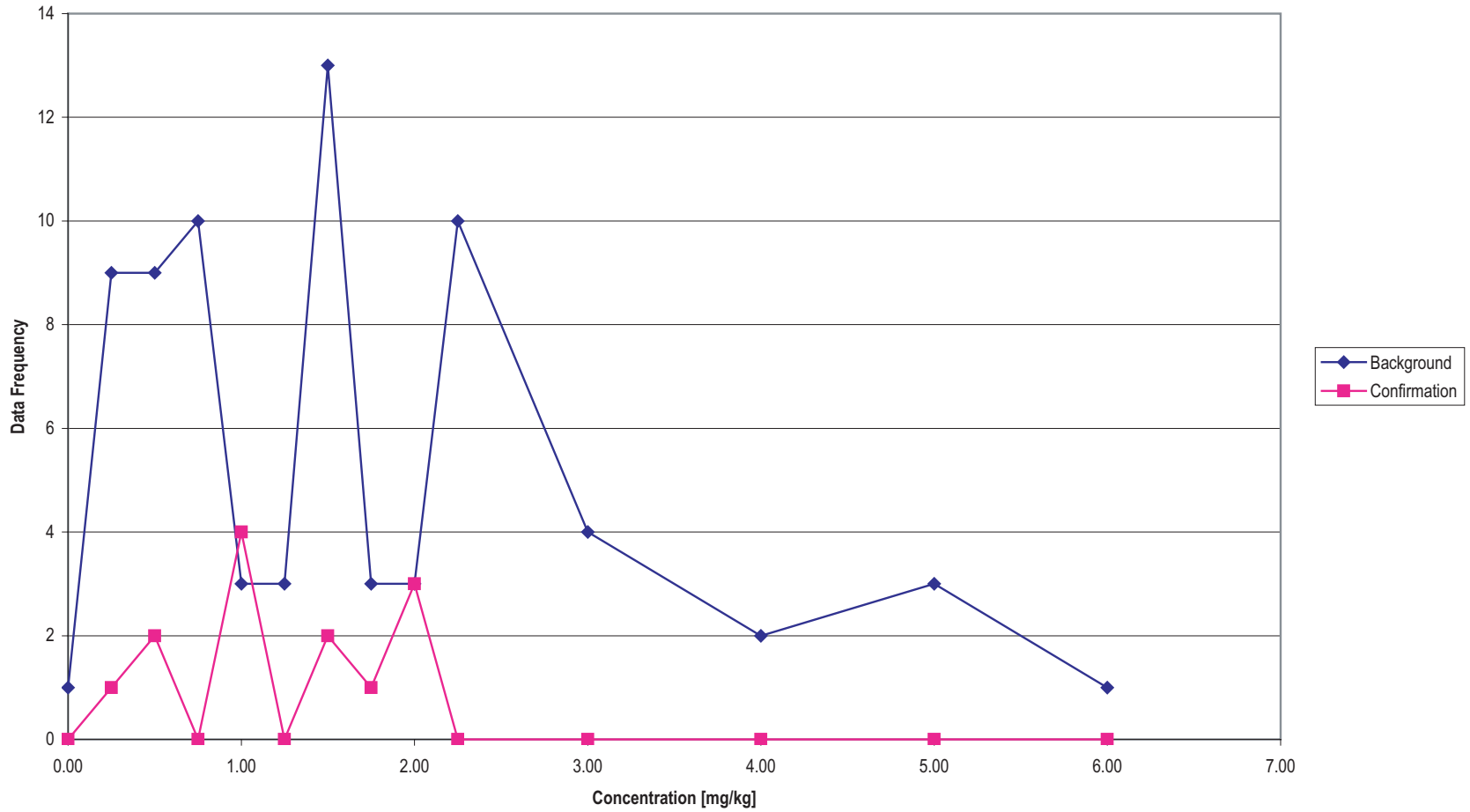

Figure 6-4b. Stratified Mercury Frequency Distribution Comparing Background Data to Confirmation Sample Results Less Than Four Feet Below Ground Surface, LEHR Site, UC Davis, California

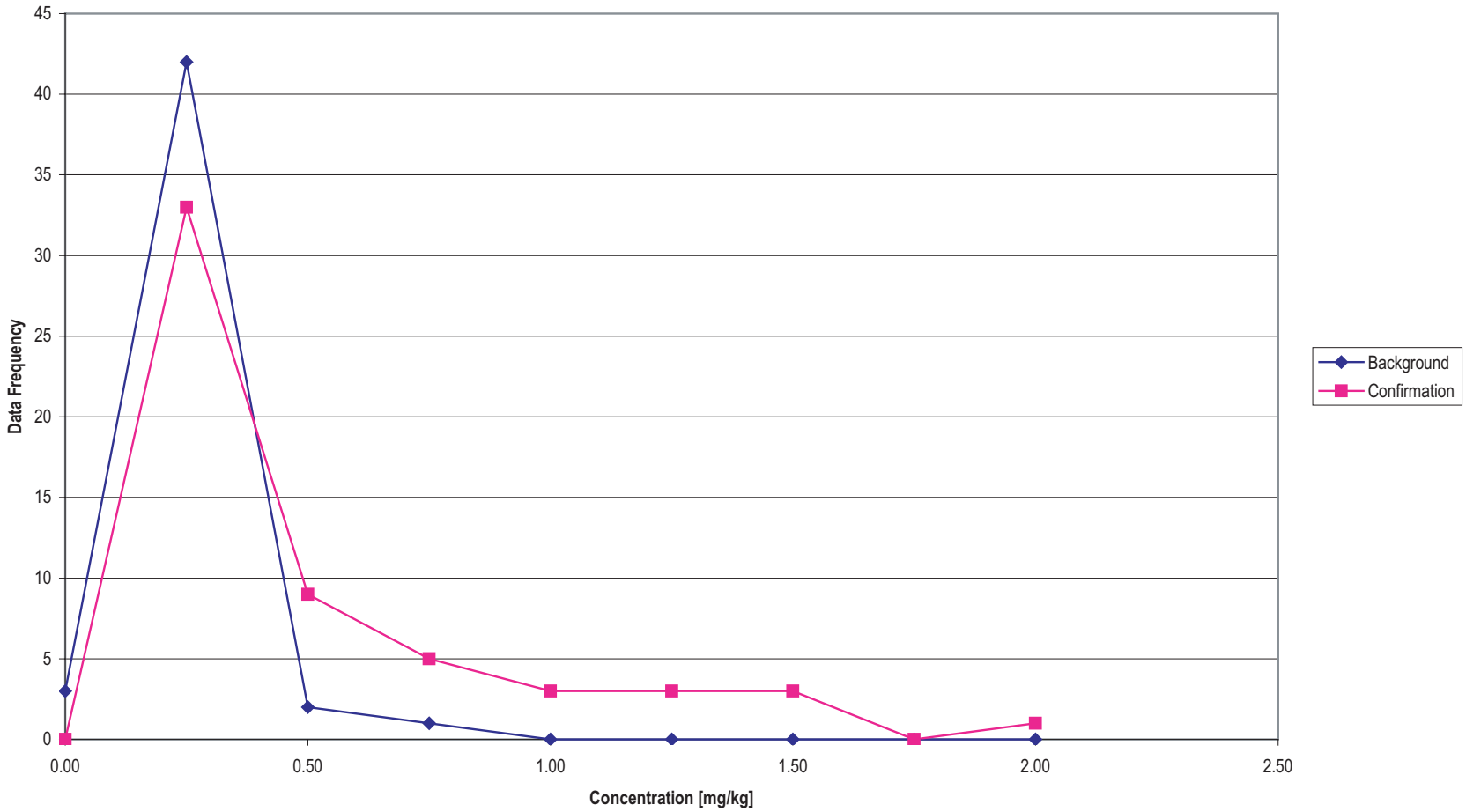

Figure 6-4c. Stratified Mercury Frequency Distribution Comparing Background Data to Confirmation Sample Results Greater Than Four Feet Below Ground Surface, LEHR Site, UC Davis, California

Weiss Associates

06/21/01

4006\226_CON_RPRT\4006-025.ai

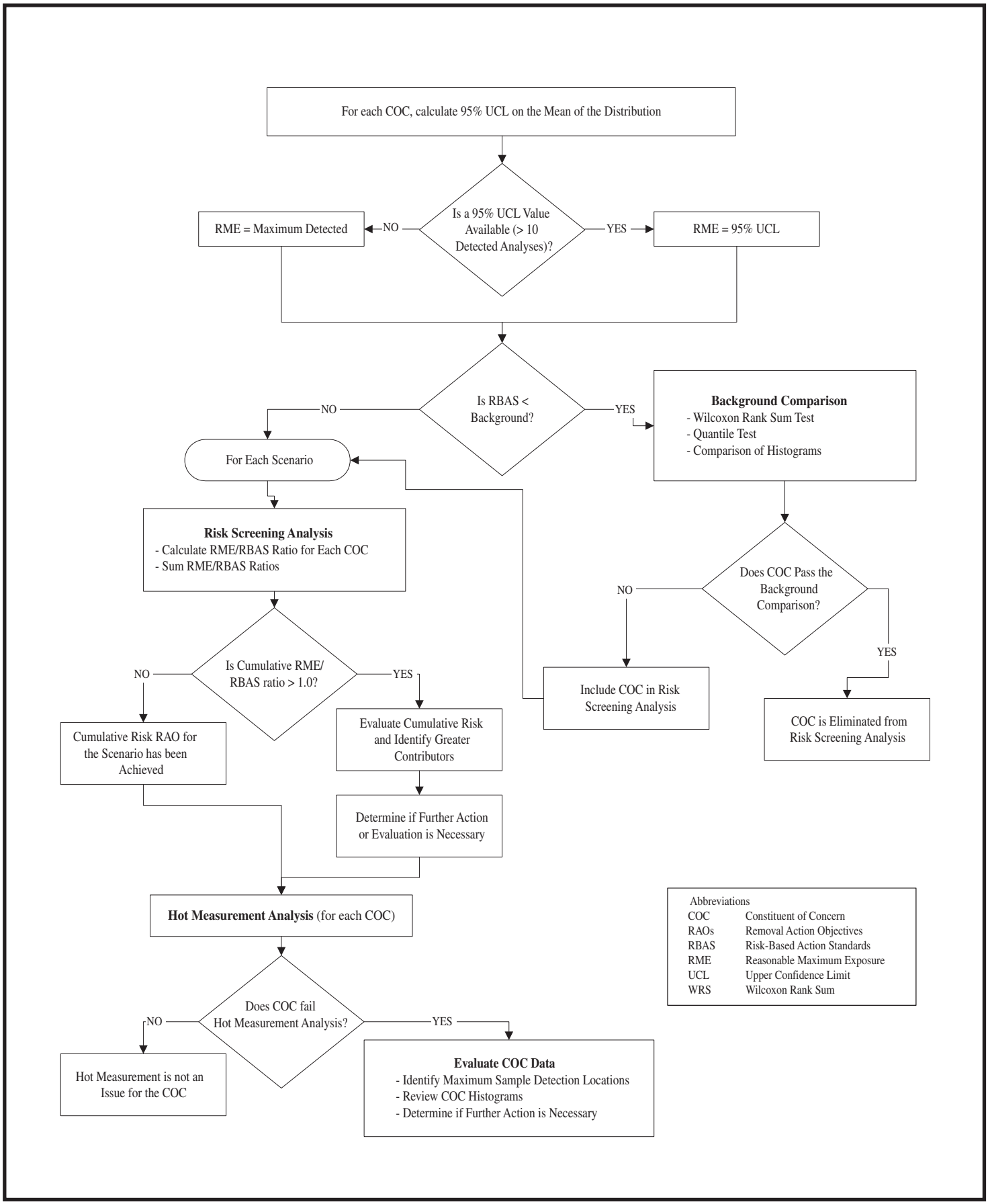

Figure 6-5. Risk Screening Decision Flow Chart, LEHR Site, UC Davis, California

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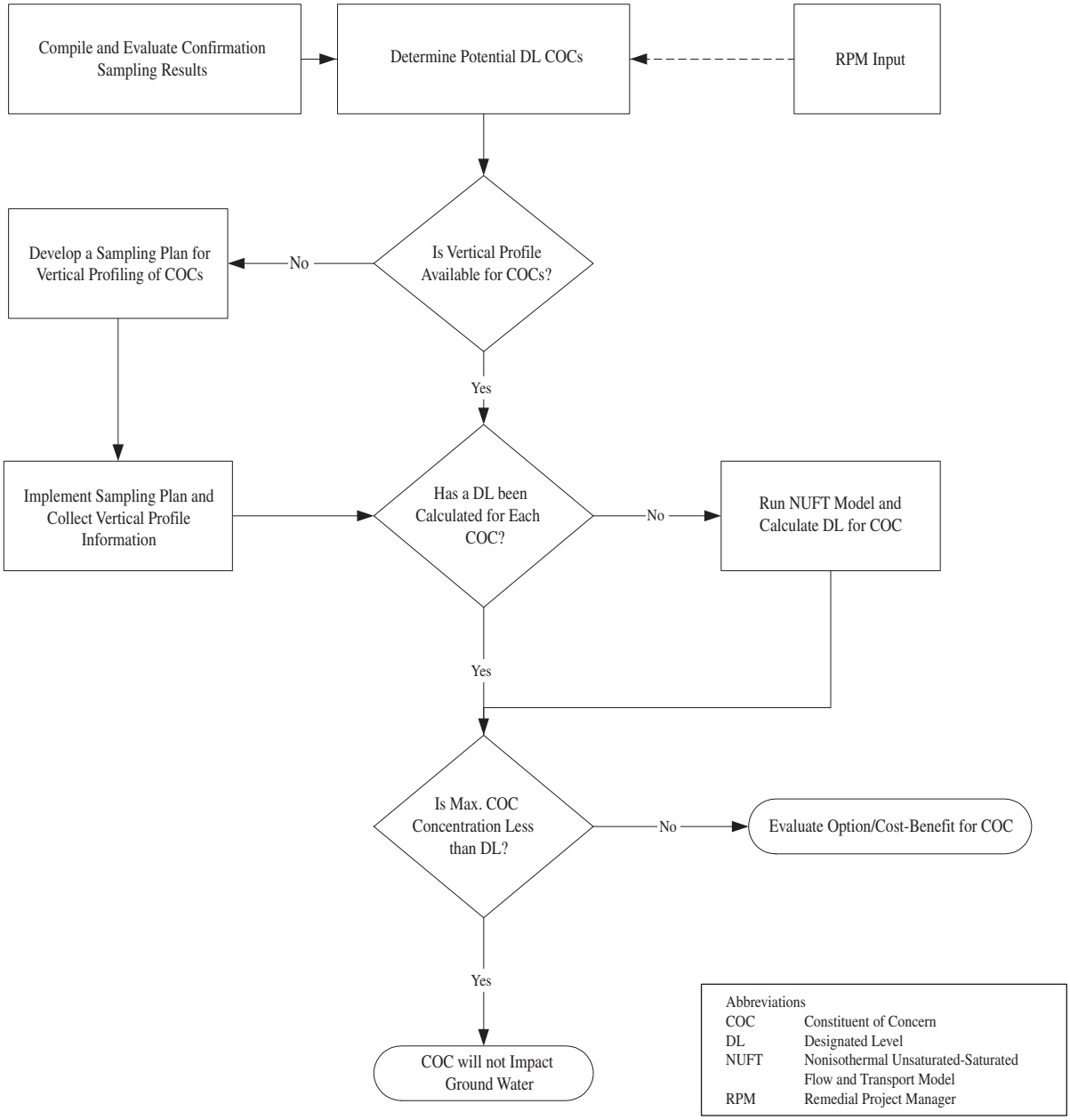

Figure 6-6. Designated-Level Analysis Decision Flow Chart, LEHR Site, UC Davis, California

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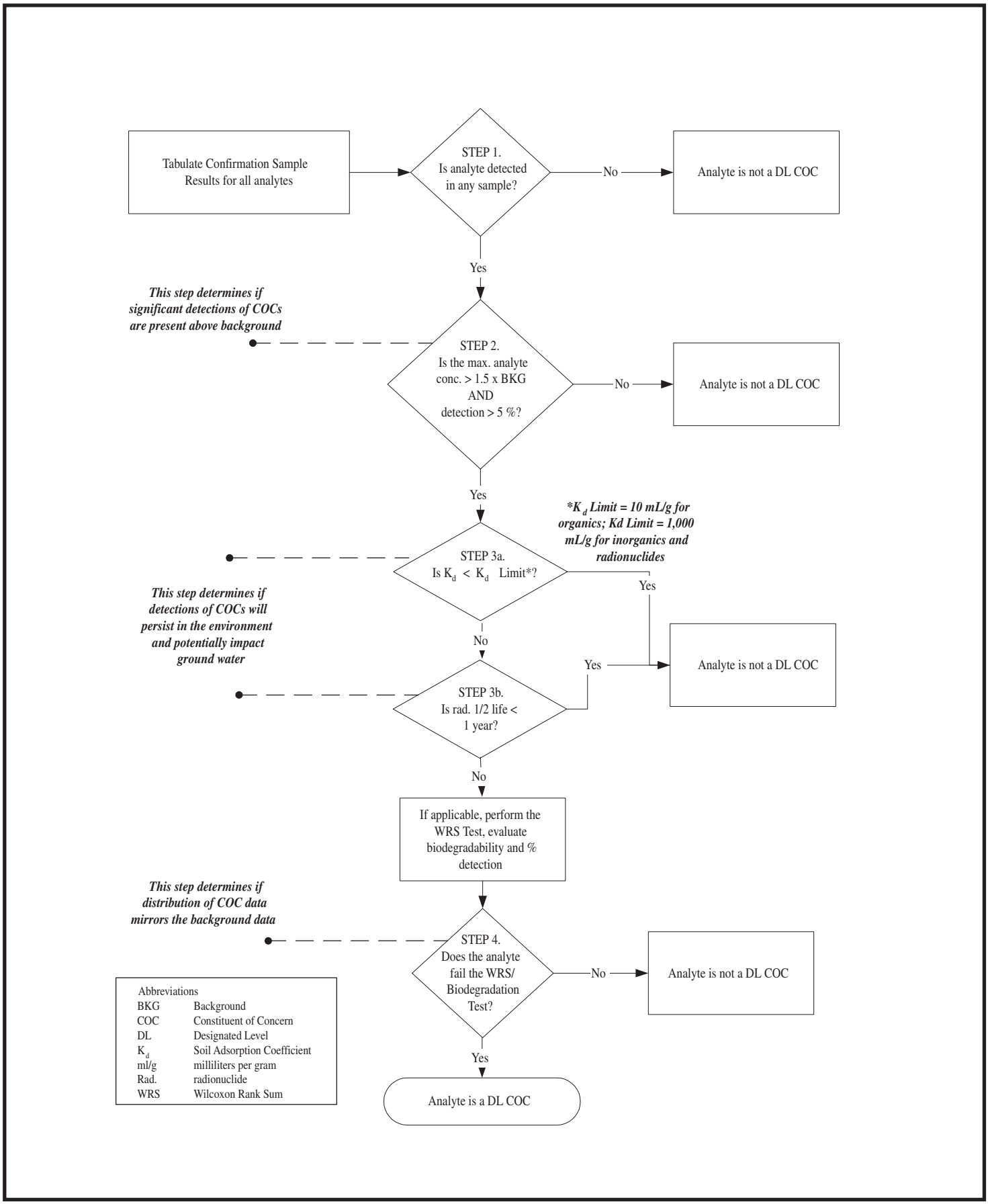

Figure 6-7. Preliminary Designated-Level Analysis Flow Chart, LEHR Site, UC Davis, California

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7. REMOVAL ACTION COMPLETION ANALYSIS

The RA at the Ra/Sr Treatment Systems Area was conducted to remove all subsurface structures and associated contaminated soil to meet the five RAOs defined for the RA. Attainment of each is discussed below.

7.1 Removal Action Objective 1–Reduce Cancer Risk

The first RAO is to reduce the excess cumulative cancer risk from the Ra/Sr Treatment Systems Area to the nominal range of 10^{-4} to 10^{-6} using 10^{-6} as the point of departure. As discussed in Section 6.2.6.1, the cancer risk for all three scenarios is below 10^{-5}. In addition, excess risk for Scenario 3 is below 10^{-6}. Excess cancer risks for Scenarios 1 and 2 are 1.66×10^{-6} and 1.99×10^{-6}, respectively, only marginally above 10^{-6}. **Therefore, this objective has been attained as a result of RA activities by reducing the cumulative cancer risk to a nominal range of 10^{-4} to 10^{-6}.**

7.2 Removal Action Objective 2–Reduce Non-Cancer Hazard Indices

The second RAO was to reduce the non-cancer cumulative HQ below 1.0. The cumulative non-carcinogenic Scenario 2 RME/RBAS ratio is 1.19. **Therefore, this RAO may not have been attained. Attainment of this RAO will be determined during the planned Site-Wide Risk Assessment.**

7.3 Removal Action Objective 3–Mitigate Ground Water Impact

The third RAO was to mitigate potential future impacts to ground water associated with residual COC concentrations in soil. The RA successfully removed all sources and structures with the potential to create an environmental release in the Ra/Sr Area; thereby mitigating future potential impacts to ground water. The DL analysis (Section 6.3) indicates that some residual nitrate, mercury and C-14 in soil in the Ra/Sr Area may result in future localized impacts above background and/or MCLs. However, these residual COCs are not widespread and do not pose a significant short- or long-term threat to ground water. The evaluation of the possible need for future remedial action to address these residual COCs will be addressed in the DOE-Areas Remedial Investigation/Feasibility Study (RI/FS). **Based on the analytical results obtained during the confirmation and DL data gaps sampling and the DL modeling, the RA has attained this RAO by mitigating ground water impacts.**

7.4 Removal Action Objective 4–Mitigate Ecological Risk

The fourth RAO is to mitigate potential ecological risks during and after the RA. During the RA, mitigation measures (fencing) were implemented to protect sensitive habitat on site. No impact to ecological receptors was observed during the RA. Since no ecological risk screening has been performed at the Site, no ecological risk-based screening standards are available for comparison and evaluation of this RAO. **Attainment of this RAO will be determined during the planned Site-Wide Risk Assessment.**

7.5 Removal Action Objective 5–Minimize Disruption to University Research

The fifth RAO is to minimize disruption to University research activities while conducting the RA. The RA implemented at the Ra/Sr Treatment Systems during the summers of 1999 and 2000 did not significantly disrupt University research. **Therefore this objective has been attained.**

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APPENDIX A

RADIUM/STRONTIUM TREATMENT SYSTEM REMOVAL ACTIONS WASTE CHARACTERIZATION RESULTS

A. RADIUM/STRONTIUM TREATMENT SYSTEM REMOVAL ACTIONS WASTE CHARACTERIZATION RESULTS

During the Ra/Sr Treatment Systems Area I and Area II Removal Actions (RA), several waste streams were generated which require characterization prior to disposal or reuse. The waste streams are:

- Low Level Radioactive waste;
- Overburden soil (soil above waste); and,
- Liquid waste generated from decontamination activities.

The waste streams were stored either in stockpiles in the Western Dog Pens (WDP) or the former Cobalt-60 field, containerized in B-25 boxes, super sacks, Lift Liners or in 55-gallon drums. Each waste stream has been characterized in accordance with the Waste Management Plan (WMP) and related sampling plans. Below is a description of the sampling activities and the analytical results for each waste stream.

A.1 Area I

A.1.1 Low Level Radioactive Waste

The low-level radioactive waste stream was containerized in B-25 boxes, super sacks and 55-gallon drums and stored in the WDP or Geriatrics I building. This waste stream consisted of soil, concrete, gravel, cobbles and PPE.

Approximately 1,275 cubic yards (cu yd) of Low Level waste was generated during the Area I RA. Table A-1 presents a summary of the maximum detected constituents in the low-level radioactive waste stream.

A.1.1.1 Sampling Activity

Characterization sampling was conducted as the B-25 boxes were being filled or after the B-25 boxes were placed in the WDP for storage. The samples that were collected directly from the excavator bucket were put into pre-sterilized glass jars using a hand trowel. Four point composite samples were collected from the B-25 boxes. These samples were either homogenized in the field in a stainless steel mixing bowl or homogenized in the offsite laboratory.

A minimum of one waste characterization sample was collected for each structure (i.e. distribution box, drywell #1, etc.). Sample CWRSC001, CWRSC011 through CWRSC017, CWRSC020 and CWRSC021 were collected and analyzed for pesticides/PCBs, VOCs, SVOCs, metals, radionuclides, paint filter, reactivity cyanide and sulfide and formaldehyde.

A.1.1.2 Analytical Results

For discussion purposes only a few constituents will be discussed and they are:

- Metals-mercury, chromium;
- Radionuclides- lead-210 (Pb-210), plutonium-241(Pu-241), radium-226 (Ra-226) and strontium-90 (Sr-90);
- Nitrate.

Sample CWRSC017 had 13 of 17 of the maximum detected concentrations for all of the metals detected in Area I waste. Sample CWRSC017, collected from the Southern Leach Trench (SLT), had the maximum detected concentration of chromium at 660 mg/kg. Sample CWRSC014, collected from Drywell Number Two (DW-2), had the maximum detected concentration of mercury at 0.87 mg/kg. CWRSC013, collected the distribution box, had the maximum concentration of Pb-210 at 6.74 pCi/g. Sample CWRSC052, collected from DW-2, had the maximum detected concentration of Pu-241 at 12.1 pCi/g. Sample CWRSC011, collected from Drywell Number One (DW-1), had the maximum detected concentration of Ra-226 at 16.1 pCi/g. Sample CWRSC011, collected from DW-1, had the maximum detected concentration of Sr-90 at 1.31 pCi/g. Sample CWRSC017, collected from the SLT, had the maximum detected concentration of Nitrate at 116 mg/kg.

A.1.2 Overburden Soil

Approximately 441 cu yd of overburden soil were generated as part of the RA. The procedures for characterizing this soil were in accordance to the Sampling and Analysis Plan described in the Work Plan, Revision F, May 10, 1999. Overburden soil was sampled to determine whether it was suitable for reuse in the excavations as backfill material. The overburden sampling activities and evaluation approach are discussed in Section 2.2.4 of the main text. The analytical results and evaluations findings are discussed in greater detail in a letter to DOE dated October 19, 2000. Approximately 380 cu yd of this soil were deemed suitable for use as backfill in the Area II excavation since they contained radionuclides above background and all other COCs were below either RBAS or their respective background.

A.1.3 Investigation-Derived Waste

During several sampling activities, liquid from decontamination (DECON) procedures was generated. DECON liquid was placed in four 55-gallon drums and stored in the Cobalt-60 field at the LEHR Site. The four drums of DECON water were sealed, assigned waste tracking numbers and transported to Geri-1 and placed on spill containment pallets. As a cost savings measure, no samples were collected. The DECON liquid was added to Ra/Sr Area II waste prior to characterization as a dust suppressant.

A.2 Area II

A.2.1 Low-Level Radioactive Waste

The Low-Level Radioactive waste stream was containerized in B-25 boxes, Lift Liners and 55-gallon drums and stored in the WDP, the former Co-60 field or Geriatrics I building.

Approximately 1,200 cu yd of low-level waste was generated during the Area II RA. Table A-2 presents a summary of the maximum detected constituents in the low-level radioactive waste stream. This waste stream consisted of soil, concrete, gravel, wood, water and PPE.

A.2.1.1 Sampling Activity

Sludge and wood samples were collected from Tank A of the Strontium Treatment prior to commencing removal action activities. The objective of collecting additional sludge and wood samples from Tank A was to assess whether semi-volatile organic compounds (SVOCs) and metals exceed state and federal hazardous waste thresholds (i.e., the Toxicity Characteristic Leaching Procedure and Soluble Threshold Limit Concentration.) Additionally, specific waste disposal samples are required to meet the waste acceptance criteria of Envirocare of Utah (Envirocare). Samples were collected from only Tank A because the contents of the other treatment tanks were previously removed and disposed (Chemical Waste, 1992). Results from this activity were used to guide the Radium/Strontium Treatment Systems Area II Removal Action.

A free liquid sample was collected from Tanks B through I and composited. The sample was analyzed for for pesticides, VOCs, SVOCs, metals, radionuclides, paint filter, reactivity cyanide and sulfide and formaldehyde. The free liquid was pumped from the tanks into 55 gallon drums prior to their demolition and removal.

Characterization sampling was conducted either as the Lift Liners were being filled. The samples that were collected directly from the excavator bucket were put into pre-sterilized glass jars using a hand trowel. Samples that were collected from Lift Liners were either homogenized in the onsite laboratory in a stainless steel mixing bowl or homogenized in the offsite laboratory.

A minimum of one waste characterization sample was collected for each structure (i.e. Sr-90 leach field, Ra-226 Tank, etc.). Sample CWRSC088 through CWRSC090, CWRSC093, CWRSC094 and CWRSC100 through CWRSC107 were collected and analyzed for pesticides/PCBs, VOCs, SVOCs, metals, radionuclides, paint filter, reactivity cyanide and sulfide and formaldehyde.

A.2.1.2 Analytical Results

For discussion purposes only a few constituents will be discussed and they are:

- Metals-mercury, hexavalent chromium;
- Radionuclides- Ra-226 and Sr-90;
- Nitrate.

Sample CWRSC089 had the maximum detected concentrations for mercury detected in Area II waste. This sample was collected from the Sr-90 leach field. Sample CWRSC105 had the maximum detected concentration of hexavalent chromium at 1.23 mg/kg. Sample CWRSC105 was collected from the Sr-90 tank soil, concrete and debris waste stream. Sample CWRSC106, collected from the Ra/Sr Tank waste stream, had the maximum detected concentration of Ra-226 at 0.614 pCi/g. Sample CWRSC103, collected from the Ra-226 tank waste stream had the maximum detected concentration of Sr-90 at 261 pCi/g. CWRSC103 had the maximum detected concentration of Nitrate at 42.6 mg/kg.

A.2.2 Overburden Soil

Approximately 40 cu. yds. of overburden was segregated during the Ra/Sr Area II RA. One characterization sample was collected from the stockpile and the data is being evaluated. The procedures for characterizing this soil were in accordance to the Sampling and Analysis Plan described in the Work Plan, Revision 0, July 24, 2000.

A.2.3 Investigation-Derived Waste

No IDW was generated during the Area II RA.

ATTACHMENT 1

GRID SYSTEM AND STOCKPILE DIMENSION

Table 1. Radium/Strontium Treatment Systems Area I Removal Action Overburden Stockpile Area and Volume Calculation

Stockpile	Base Length L	Base Width W (ft)	Top Width b (ft)	Top Length l (ft)	Side s (ft)	Calculated Height h (ft)	Calculated Stockpile Volume Vs (cu yd)
Import Fill	192	15	8.5	186	6.25	5.3	441

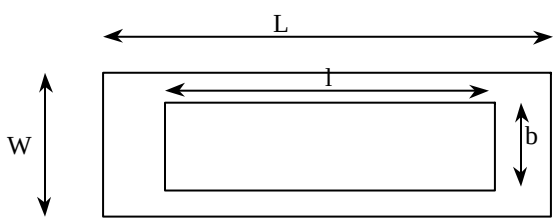
Assumption: Stockpiles are shaped as trapezoids.

Abbreviations
cu yd cubic yards
ft feet

Equations:

$$h = \sqrt{s^2 - \left(\frac{W-b}{2}\right)^2} \qquad Vs = \frac{h \times 0.5 \times (W \times L \times b \times l)}{27}$$

Stockpile Plan View:



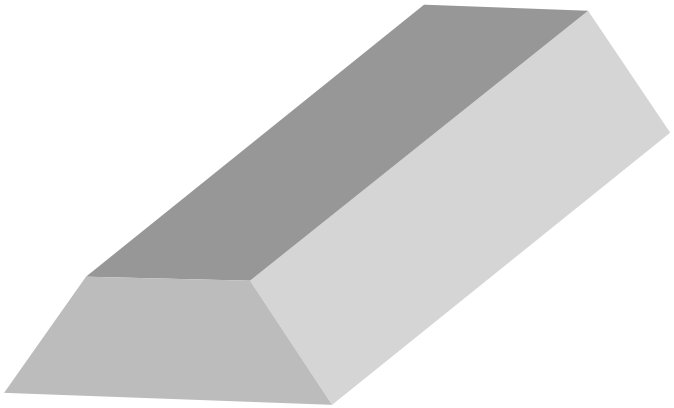


Table A-1. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area I Removal Action

Constituent	Units	Maximum Concentration	Sample ID of Maximum Concentration	Sample Location
Metals				
Antimony	mg/kg	0.61	CWRSC001	DT #2
Arsenic	mg/kg	37.6	CWRSC017	SLT
Barium	mg/kg	1020	CWRSC017	SLT
Beryllium	mg/kg	2.3	CWRSC017	SLT
Cadmium	mg/kg	0.75	CWRSC049	DW-3
Chromium	mg/kg	660	CWRSC017	SLT
Chromium, Hexavalent	mg/kg	0.483	CWRSC020	NLT
Cobalt	mg/kg	94.4	CWRSC017	SLT
Copper	mg/kg	54.6	CWRSC017	SLT
Lead	mg/kg	60.1	CWRSC017	SLT
Mercury	mg/kg	0.87	CWRSC014	DW-2
Molybdenum	mg/kg	3.9	CWRSC017	SLT
Nickel	mg/kg	869	CWRSC017	SLT
Selenium	mg/kg	1.3	CWRSC017 &051	SLT, DW-1
Silver	mg/kg	2.7	CWRSC017	SLT
Vanadium	mg/kg	296	CWRSC017	SLT
Zinc	mg/kg	617	CWRSC017	SLT
Pesticides				
PCB-1254	ug/kg	86.9	CWRSC017	SLT
Radionuclides				
Actinium-228	pCi/g	0.572	CWRSC053	DW-3
Americium-241	pCi/g	0.344	CWRSC016	DW-3
Bismuth-212	pCi/g	0.368	CWRSC053	DW-3
Bismuth-214	pCi/g	8.36	CWRSC011	DW-1
Carbon-14	pCi/g	0.352	CWRSC011	DW-1
Cesium-137	pCi/g	0.737	CWRSC011	DW-1
Cobalt-60	pCi/g	0.00191	CWRSC017	SLT

Table A-1. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area I Removal Action (continued)

Constituent	Units	Maximum Concentration	Sample ID of Maximum Concentration	Sample Location
Lead-210	pCi/g	6.74	CWRSC013	DB
Lead-212	pCi/g	0.579	CWRSC053	DW-3
Lead-214	pCi/g	9.4	CWRSC011	DW-1
Plutonium-241	pCi/g	12.1	CWRSC052	DW-2
Potassium-40	pCi/g	12.1	CWRSC054	DW-3
Radium-223	pCi/g	0.0834	CWRSC011	DW-1
Radium-226	pCi/g	16.1	CWRSC011	DW-1
Radium-228	pCi/g	0.572	CWRSC053	DW-3
Strontium-90	pCi/g	1.31	CWRSC011	DW-1
Thallium-208	pCi/g	0.182	CWRSC053	DW-3
Thorium-228	pCi/g	0.622	CWRSC052	DW-2
Thorium-230	pCi/g	0.573	CWRSC015	AH-2 Domestic Sewer
Thorium-232	pCi/g	0.569	CWRSC053	DW-3
Thorium-234	pCi/g	0.966	CWRSC020	NLT
Tritium	pCi/g	0.246	CWRSC052	DW-2
Uranium-233/234	pCi/g	0.508	CWRSC054	DW-3
Uranium-235	pCi/g	0.0329	CWRSC051	DW-1
Uranium-238	pCi/g	0.519	CWRSC017	SLT
SVOCs				
Bis(2-Ethylhexyl)Phthalate	ug/kg	246	CWRSC017	SLT
Pentachlorophenol	ug/kg	327	CWRSC049	DW-3
VOCs				
2-Butanone	ug/kg	10.3	CWRSC014	DW-2
2-Hexanone	ug/kg	1.1	CWRSC020	NLT
Acetone	ug/kg	66.2	CWRSC020	NLT
Carbon Disulfide	ug/kg	4	CWRSC054	DW-3
Chloroform	ug/kg	0.82	CWRSC001	DT #2
EthylBenzene	ug/kg	2.2	CWRSC052	DW-2

Table A-1. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area I Removal Action (continued)

Constituent	Units	Maximum Concentration	Sample ID of Maximum Concentration	Sample Location
Methylene Chloride	ug/kg	80.1	CWRSC053	DW-3
Toluene	ug/kg	193	CWRSC052	DW-2
Xylenes (Total)	ug/kg	6.3	CWRSC052	DW-2
Misc. Waste Characterization				
Cyanide, Reactive	mg/kg	0.0202	CWRSC051	DW-1
Formaldehyde	mg/kg	1.15	CWRSC013	DB
Nitrogen, Nitrate	mg/kg	116	CWRSC017	SLT
Standard Plate Count	Cfu/100	5670000	CWRSC015	AH-2 Domestic Sewer
Sulfide, Reactive	mg/kg	0.108	CWRSC054	DW-3
Sulfide, Reactive	mg/kg	0.108	CWRSC055	DW-3
Total Organic Carbon	mg/kg	258	CWRSC049	DW-3
Diesel Range Organics	mg/kg	2.7	CWRSC049	DW-3

Abbreviations

AH-2 Animal Hospital #2
DB Distribution Box
DT #2 Domestic Tank #2
DW Drywell
mg/kg milligrams per kilogram
Misc. Miscellaneous
SLT Southern Leach Trench
SVOCs semi-volatile organic compounds
VOCs volatile organic compounds
Ug/kg microgram per kilogram
pCi/g picocurie per gram

Table A-2. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area II Removal Action

Constituent	Units	Maximum Concentration	Sample ID of Maximum Concentration	Sample Location
Metals				
Aluminum	mg/kg	21300	CWRSC107	Ra/Sr Tanks
Antimony	mg/kg	2.02	CWRSC088	Sr-90 Leachfield
Arsenic	mg/kg	12.4	CWRSC086	Sr-90-Tank A-Wood
Barium	mg/kg	404	CWRSC085	Sr-90-Tank A-Sludge
Beryllium	mg/kg	0.481	CWRSC094	Ra-226 Influent Tank Piping
Cadmium	mg/kg	36	CWRSC085	Sr-90-Tank A-Sludge
Chromium	mg/kg	152	CWRSC088	Sr-90 Leachfield
Chromium, Hexavalent	mg/kg	1.23	CWRSC105	Ra-226 Effluent Tank Piping
Cobalt	mg/kg	26.2	CWRSC101	Ra-226 Effluent Tank Piping
Copper	mg/kg	1020	CWRSC085	Sr-90-Tank A-Sludge
Iron	mg/kg	37800	CWRSC107	Ra/Sr Tanks
Lead	mg/kg	187	CWRSC085	Sr-90-Tank A-Sludge
Magnesium	mg/kg	29100	CWRSC101	Ra-226 Effluent Tank Piping
Manganese	mg/kg	934	CWRSC101	Ra-226 Effluent Tank Piping
Mercury	mg/kg	3.33	CWRSC089	Sr-90 Leachfield
Molybdenum	mg/kg	9.07	CWRSC085	Sr-90-Tank A-Sludge
Nickel	mg/kg	720	CWRSC085	Sr-90-Tank A-Sludge
Potassium	mg/kg	1540	CWRSC093	Sr-90 Leachfield
Selenium	mg/kg	2.37	CWRSC093	Sr-90 Leachfield
Silver	mg/kg	14	CWRSC085	Sr-90-Tank A-Sludge
Thallium	mg/kg	3.37	CWRSC085	Sr-90-Tank A-Sludge
Vanadium	mg/kg	70.3	CWRSC107	Ra/Sr Tanks
Zinc	mg/kg	674	CWRSC085	Sr-90-Tank A-Sludge
Herbicide				
2,4-D	µg/kg	2.8	CWRSC090	Sr-90 Leachfield/DB
Pesticides				
4,4'-DDD	µg/kg	3.3	CWRSC085	Sr-90-Tank A-Sludge
alpha-Chlordane	µg/kg	238	CWRSC087	Sr-90-Tank A-Wood
Aroclor-1254	µg/kg	560	CWRSC085	Sr-90-Tank A-Sludge

Table A-2. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area II Removal Action (continued)

Constituent	Units	Maximum Concentration	Sample ID of Maximum Concentration	Sample Location
Aroclor-1260	µg/kg	446	CWRSC085	Sr-90-Tank A-Sludge
Chlordane (tech.)	µg/kg	1460	CWRSC094	Ra-226 Influent Tank Piping
gamma-Chlordane	µg/kg	292	CWRSC094	Ra-226 Influent Tank Piping
Heptachlor	µg/kg	5	CWRSC093	Sr-90 Leachfield
Radionuclides				
Actinium-228	pCi/g	0.614	CWRSC090	Sr-90 Leachfield/DB
Americium-241	pCi/g	0.0407	CWRSC093	Sr-90 Leachfield
Bismuth-212	pCi/g	0.503	CWRSC094	Ra-226 Influent Tank Piping
Bismuth-214	pCi/g	0.557	CWRSC107	Ra/Sr Tanks
Carbon-14	pCi/g	0.132	CWRSC107	Ra/Sr Tanks
Cesium-137	pCi/g	0.286	CWRSC089	Sr-90 Leachfield
Cobalt-60	pCi/g	0.0151	CWRSC094	Ra-226 Influent Tank Piping
Lead-210	pCi/g	0.982	CWRSC107	Ra/Sr Tanks
Lead-212	pCi/g	0.597	CWRSC089	Sr-90 Leachfield
Lead-214	pCi/g	0.633	CWRSC107	Ra/Sr Tanks
Plutonium-241	pCi/g	0.878	CWRSC094	Ra-226 Influent Tank Piping
Potassium-40	pCi/g	12.7	CWRSC093	Sr-90 Leachfield
Radium-223	pCi/g	0.177	CWRSC089	Sr-90 Leachfield
Radium-226	pCi/g	0.602	CWRSC106	Ra/Sr Tanks
Radium-228	pCi/g	0.614	CWRSC090	Sr-90 Leachfield/DB
Strontium-90	pCi/g	261	CWRSC103	Ra-226 Tank
Thallium-208	pCi/g	0.188	CWRSC089	Sr-90 Leachfield
Thorium-228	pCi/g	0.615	CWRSC089	Sr-90 Leachfield
Thorium-230	pCi/g	0.685	CWRSC107	Ra/Sr Tanks
Thorium-232	pCi/g	0.759	CWRSC089	Sr-90 Leachfield
Thorium-234	pCi/g	0.856	CWRSC094	Ra-226 Influent Tank Piping
Tritium	pCi/g	0.381	CWRSC103	Ra-226 Tank
Uranium-233/234	pCi/g	0.507	CWRSC106	Ra/Sr Tanks
Uranium-235/236	pCi/g	0.0452	CWRSC094	Ra-226 Influent Tank Piping
Uranium-238	pCi/g	0.5	CWRSC104	Sr-90 Tank

Table A-2. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area II Removal Action (continued)

Constituent	Units	Maximum Concentration	Sample ID of Maximum Concentration	Sample Location
SVOCs				
2-Methylnaphthalene	µg/kg	1550000	CWRSC086DL	Sr-90-Tank A-Wood
Acenaphthene	µg/kg	2530000	CWRSC086DL	Sr-90-Tank A-Wood
Acenaphthylene	µg/kg	33800	CWRSC087DL	Sr-90-Tank A-Wood
Anthracene	µg/kg	1680000	CWRSC086DL	Sr-90-Tank A-Wood
Benzo(a)anthracene	µg/kg	1080000	CWRSC086DL	Sr-90-Tank A-Wood
Benzo(a)pyrene	µg/kg	261000	CWRSC086DL	Sr-90-Tank A-Wood
Benzo(b)fluoranthene	µg/kg	284000	CWRSC086DL	Sr-90-Tank A-Wood
Benzo(g,h,i)perylene	µg/kg	35900	CWRSC087DL	Sr-90-Tank A-Wood
bis(2-Ethylhexyl)phthalate	µg/kg	19500	CWRSC103DL	Ra-226 Tank
Carbazole	µg/kg	144000	CWRSC086	Sr-90-Tank A-Wood
Chrysene	µg/kg	930000	CWRSC086DL	Sr-90-Tank A-Wood
Dibenzofuran	µg/kg	1550000	CWRSC086DL	Sr-90-Tank A-Wood
Dimethylphthalate	µg/kg	785	CWRSC085	Sr-90-Tank A-Sludge
Fluoranthene	µg/kg	6260000	CWRSC086DL	Sr-90-Tank A-Wood
Fluorene	µg/kg	2450000	CWRSC086DL	Sr-90-Tank A-Wood
Indeno(1,2,3-cd)pyrene	µg/kg	36600	CWRSC087DL	Sr-90-Tank A-Wood
Naphthalene	µg/kg	1480000	CWRSC086DL	Sr-90-Tank A-Wood
Pentachlorophenol	µg/kg	119000	CWRSC103DL	Ra-226 Tank
Phenanthrene	µg/kg	13300000	CWRSC086DL	Sr-90-Tank A-Wood
Pyrene	µg/kg	5850000	CWRSC086DL	Sr-90-Tank A-Wood
VOCs				
2-Butanone	µg/kg	40.8	CWRSC103	Ra-226 Tank
4-Methyl-2-pentanone	µg/kg	1.5	CWRSC105	Sr-90 Tank
Acetone	µg/kg	195	CWRSC103	Ra-226 Tank
Benzene	µg/kg	0.42	CWRSC090	Sr-90 Leachfield/DB
Benzo(k)fluoranthene	µg/kg	419000	CWRSC086DL	Sr-90-Tank A-Wood
Bromofluorobenzene	µg/kg	60.8	CWRSC105	Sr-90 Tank
Chloroform	µg/kg	0.44	CWRSC105	Sr-90 Tank
Dibromofluoromethane	µg/kg	49.6	CWRSC105	Sr-90 Tank

Table A-2. Summary of Maximum Detected Constituents in the Waste Characterization Samples from the Radium/Strontium Treatment Systems Area II Removal Action (continued)

Constituent	Units	Maximum Concentration	Sample ID of Maximum Concentration	Sample Location
Ethylbenzene	µg/kg	5.9	CWRSC103	Ra-226 Tank
Methylene chloride	µg/kg	23.1	CWRSC090	Sr-90 Leachfield/DB
Styrene	µg/kg	336	CWRSC103	Ra-226 Tank
Toluene	µg/kg	100	CWRSC103	Ra-226 Tank
Toluene-d8	µg/kg	57	CWRSC105	Sr-90 Tank
Xylenes (total)	µg/kg	45.7	CWRSC103	Ra-226 Tank
Misc. Waste Characterization				
Formaldehyde	mg/kg	7.3	CWRSC085	Sr-90-Tank A-Sludge
Nitrate	mg/kg	42.6	CWRSC103	Ra-226 Tank
Sulfide, Reactive	mg/kg	0.161	CWRSC101	Ra-226 Effluent Tank Piping
Total Plate Count	Cfu/100	499000	CWRSC087R	Sr-90-Tank A-Wood

Abbreviations

DB Distribution Box
mg/kg milligrams per kilogram
Misc. Miscellaneous
pCi/g picoCuries per gram
Ra-226 radium-226
Sr-90 strontium-90
SVOCs semi-volatile organic compounds
VOCs volatile organic compounds
µg/kg micrograms per kilogram

Table A-3. Maximum Detected Semi-Volatile Organic Compounds in the Waste Characterization Soil Samples from the Radium/Strontium Treatment Systems Area II Removal Action

Constituent	Maximum Concentration (µg/kg)	Sample ID of Maximum Concentration	Sample Location
2,4,6-Trichlorophenol	13.7	CWRSC125(t)	Sr-90 Tank Area
2-Methylnaphthalene	1,760,000	CWRSC125	Sr-90 Tank Area
Acenaphthene	57,300	CWRSC125	Sr-90 Tank Area
Anthracene	34,300	CWRSC125	Sr-90 Tank Area
Benzo(a)anthracene	10,900	CWRSC125	Sr-90 Tank Area
Benzo(a)pyrene	142	CWRSC105	Sr-90 Tank Area
Benzo(b)fluoranthene	165	CWRSC105	Sr-90 Tank Area
Benzo(g,h,i)perylene	36.9	CWRSC105	Sr-90 Tank Area
Benzo(k)fluoranthene	173	CWRSC105DL	Sr-90 Tank Area
bis(2-Ethylhexyl)phthalate	19,500	CWRSC103DL	Ra-226 Tank Area
Carbazole	239	CWRSC105	Sr-90 Tank Area
Chrysene	15,500	CWRSC125	Sr-90 Tank Area
Dibenzofuran	43,200	CWRSC125	Sr-90 Tank Area
Fluoranthene	20,600	CWRSC125	Sr-90 Tank Area
Fluorene	118,000	CWRSC125	Sr-90 Tank Area
Indeno(1,2,3-cd)pyrene	36.8	CWRSC105	Sr-90 Tank Area
Naphthalene	140,000	CWRSC125	Sr-90 Tank Area
Pentachlorophenol	7,010,000	CWRSC125DL	Sr-90 Tank Area
Phenanthrene	396,000	CWRSC125	Sr-90 Tank Area
Pyrene	78,100	CWRSC125	Sr-90 Tank Area

Abbreviation
ID identification (number)
Ra-226 radium-226
Sr-90 strontium-90
µg/kg micrograms per kilogram

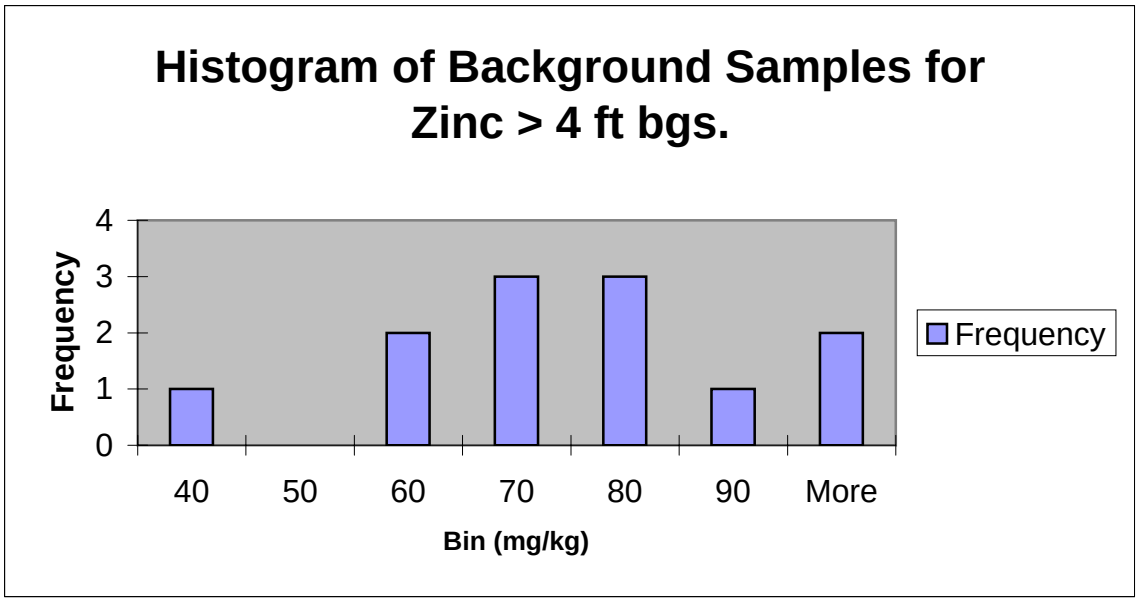
APPENDIX B

CONFIRMATION SAMPLE ANALYTICAL RESULTS

The confirmation sample data are presented in Appendix E of the DOE Areas Remedial Investigation Report.

APPENDIX C

HISTOGRAMS


Histogram of Background Samples for Zinc > 4 ft bgs.
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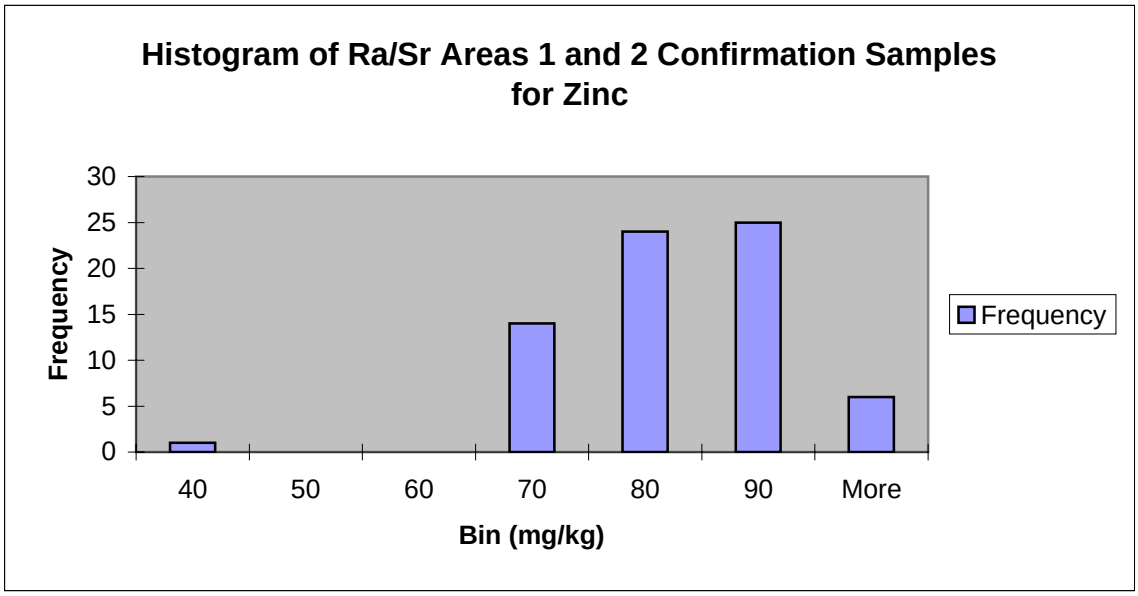
2
1
0
40
50
60
70
80
90
More
Bin (mg/kg)
Frequency


Histogram of Ra/Sr Areas 1 and 2 Confirmation Samples for Zinc
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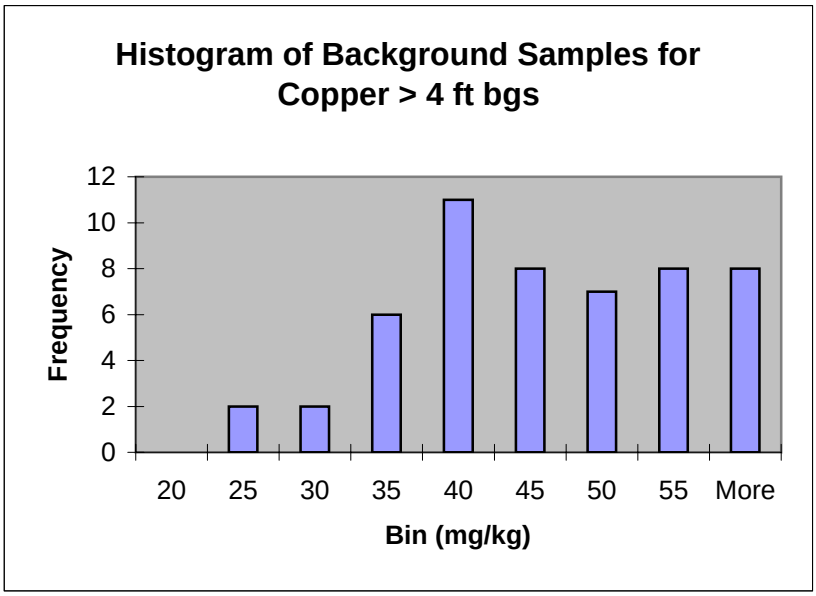
15
10
5
0
40
50
60
70
80
90
More
Bin (mg/kg)
Frequency


Histogram of Background Samples for Copper > 4 ft bgs
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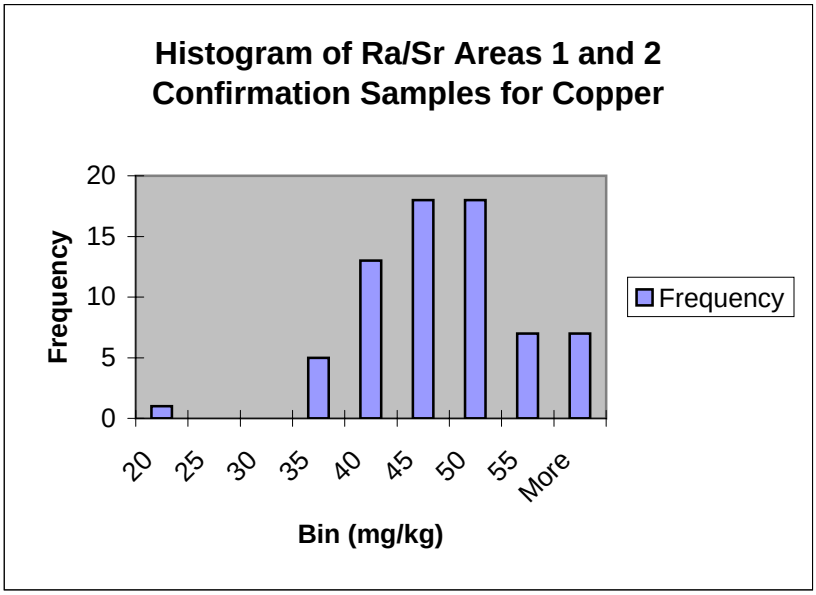
8
6
4
2
0
20
25
30
35
40
45
50
55
More
Bin (mg/kg)


Histogram of Ra/Sr Areas 1 and 2 Confirmation Samples for Copper
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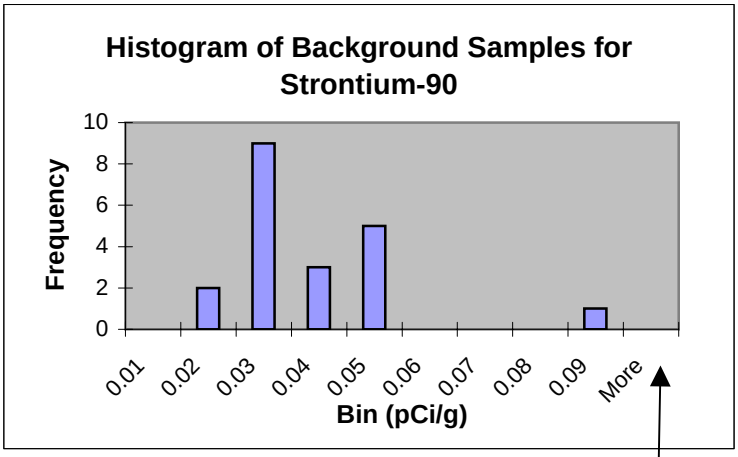
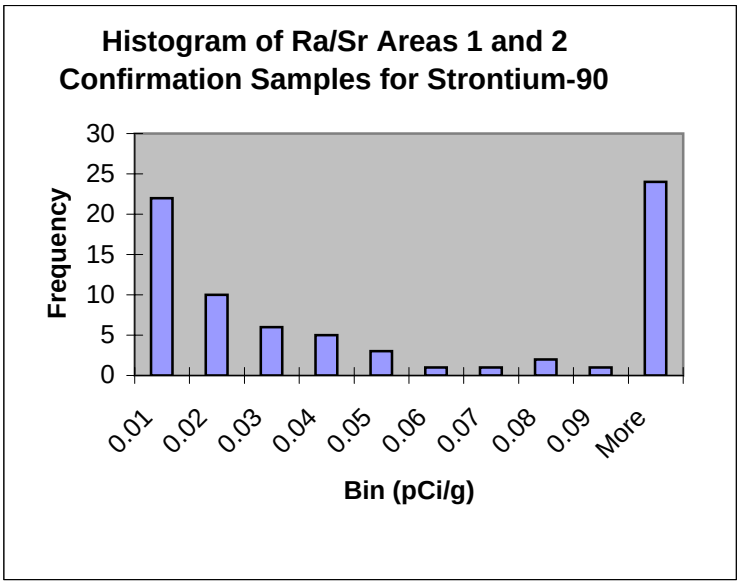
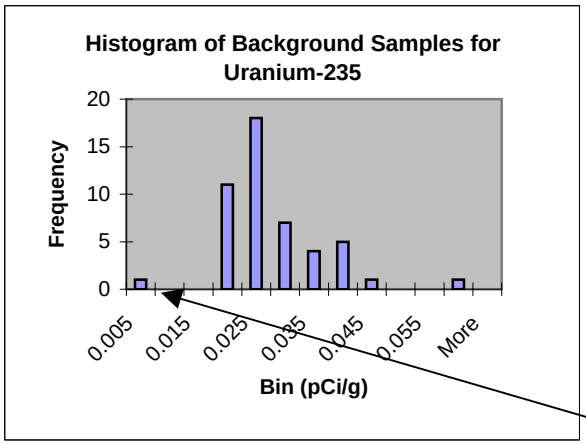
20
25
30
35
40
45
50
55
More
Bin (mg/kg)
Frequency

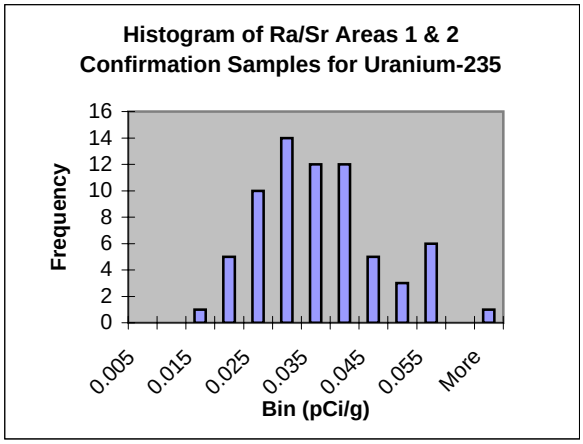


Outlier removed from data set based on visual inspection of histogram.





note: result for LEHR-SS-BG-0098 set at 1/2 the detection limit. Not included in data analysis. Eliminated upon visual inspection of histograms.



APPENDIX D

DESIGNATED-LEVEL MODELING INPUT AND RESULTS

Table D-1. Vadose Zone Modeling Results, Radium/Strontium Area, Updated Radium Strontium Area Lithology, 10.8 centimeters per year Infiltration, LEHR Site, UC Davis, California

Constituent of Concern	NUFT Soil Result (mg/kg) or (pCi/g)	Depth Interval of Contamination	Half Life (years)	Time to peak at Ground Water Goal Level (years)	Ground Water Goal Conc. (ug/L or pCi/L)	Goal Reference
Mercuric Sulfide	1.23	0-10 ft	N/A	5,004	11	MCL
Mercuric Sulfide	1.44	10-15 ft	N/A	5,004	11	MCL
Mercuric Sulfide	0.0116	0-10 ft	N/A	5,004	0.10	1/2 L BG DL
Mercuric Sulfide	0.0133	10-15 ft	N/A	5,004	0.10	1/2 L BG DL
Cesium-137	554	0-25 ft	30.07	0	200	MCL
Cesium-137	2.77	0-25 ft	30.07	0	1.0	1/2 L BG DL
Nitrate (as Nitrogen)	1.73	0-25 ft	N/A	10	10000	MCL
Nitrate (as Nitrogen)	4.05	0-25 ft	N/A	10	25144	BG
Hexavalent Chromium	0.912	0-25 ft	N/A	500	50	MCL
Hexavalent Chromium	0.719	0-25 ft	N/A	500	39	BG
C-14 Methanol	2.34	5-14 ft	5730	15	2,000	MCL
C-14 Methanol	4.10E-03	5-14 ft	5730	20	3.5	1/2 L BG DL

Notes

MCL	State of California Primary Maximum Contaminant Level for Ground Water
BG	Background value based on concentrations detected in well UCD1-18 samples.
1/2 L BG DL	One half of the lowest reported background detection limit for well UCD1-18 samples. Applies to constituents of concern whose UCD1-18 results were all ND.

Abbreviations

C-14	Carbon-14
Conc.	Concentrate
ft	feet
mg/kg	milligrams per kilogram
N/A	Not Available
NUFT	Non-isothermal, Unsaturated Flow and Transport model
pCi/g	picoCuries per gram

Table D-2. Representative Soil Profile, Radium/Strontium Leach Field Area, LEHR Site, UC Davis, California

elem#	dz(m)	depth (m)	dz (ft)	depth (ft)	Material	ElementName	BC
30	1.00	0.00	3.28	0.00	ATM		atmospheric element
29	1.00	0.00	3.28	0.00	ATM		recharge element
28	0.15	0.15	0.50	0.50	NCLYSLT		
27	0.15	0.31	0.50	1.00	NCLYSLT		
26	0.31	0.61	1.00	2.00	NCLYSLT		
25	0.31	0.92	1.00	3.00	NCLYSLT		
24	0.15	1.07	0.50	3.50	NCLYSLT		
23	0.15	1.22	0.50	4.00	NCLYSLT		
22	0.15	1.37	0.50	4.50	NCLYSLT		
21	0.15	1.53	0.50	5.00	NCLYSLT		
20	0.31	1.83	1.00	6.00	NCLYSLT		
19	0.31	2.14	1.00	7.00	NCLYSLT		
18	0.31	2.44	1.00	8.01	NCLYSLT		
17	0.31	2.75	1.00	9.01	NCLYSLT		
16	0.31	3.05	1.00	10.01	NCLYSLT		
15	0.31	3.36	1.00	11.01	NCLYSLT		
14	0.31	3.66	1.00	12.01	NCLYSLT		
13	0.31	3.97	1.00	13.01	NCLYSLT		
12	0.31	4.27	1.00	14.01	NCLYSLT		
11	0.31	4.58	1.00	15.01	NCLYSLT		
10	0.31	4.88	1.00	16.01	NCLYSLT		
9	0.31	5.19	1.00	17.01	NCLYSLT		
8	0.31	5.49	1.00	18.01	NCLYSLT		
7	0.31	5.80	1.00	19.01	NCLYSLT		
6	0.31	6.10	1.00	20.01	NCLYSLT		water table 20 ft-bgs
5	0.31	6.41	1.00	21.01	NCLYSLT		
4	0.31	6.71	1.00	22.01	NCLYSLT		
3	0.31	7.02	1.00	23.02	NCLYSLT		
2	0.31	7.32	1.00	24.02	NCLYSLT		
1	0.31	7.63	1.00	25.02	NCLYSLT		1.98 m of H2O

nz = 30

Table D-3. Summary of Physical and Hydraulic Properties for Representative Vadose Zone Model Soil Types at the Radium/Strontium Area, LEHR Site, UC Davis, California

Chemical Specific Parameters		
COC	**Kd (ml/g)**	**Mol Wt**
Mercury Sulfide	52	232.68
Cesium-137	100	136.91
Nitrate	0	14.00
Hexavalent Chromium	19	52.00
Carbon-14 (in methanol)	0	34.00

Formulas
Normalized Kd = rB.kd / f
Tortuosity Factor $= S^{(7/3)} . f^{(1/3)}$

Unit	**Porosity**	**Hydr. Cond. (cm/s)**	**Dry Bulk Density (g/cm3)**	**Van Genuten Parameter**	
				alpha (1/cm)	**m**
clayey sandy silt	0.35	1.00E-06	1.7	0.021	0.23

APPENDIX E

RISK-BASED ACTION STANDARD RECALCULATION FOR MERCURY

E. RISK-BASED ACTION STANDARD RECALCULATION FOR MERCURY

The general site-wide risk-based action standard (RBAS) value for mercury (0.22 milligrams per kilogram) was calculated in the Draft Determination for Risk-Based Action Standards for DOE Areas (WA, 1997). The site-wide mercury RBAS value was based on an assumed 0- to 15-foot (ft) mercury contamination depth interval that does not apply to the former Radium/Strontium (Ra/Sr) Treatment Systems area after the removal action (RA) was completed. After the Ra/Sr Treatment Systems RA, imported fill was installed in the RA excavation. RA confirmation data show that the residual mercury contamination exists between 0 and 10 ft below ground surface (bgs). Therefore, the model estimating mercury migration to ground water was updated to incorporate Ra/Sr Treatment Systems area-specific lithology and the post-RA 0 to 10 ft bgs mercury contamination interval. The mercury RBAS value was then re-calculated for this area, as discussed below.

E.1 Approach

The Ra/Sr Treatment Systems mercury RBAS value was recalculated using the same approach used in the Draft Final Determination of Risk-Based Action Standards for DOE Areas (WA, 1997). The calculations were performed for the non-carcinogenic effects related to mercury under Risk Scenario 2 (East Residential Farmer). Calculations were not performed for Risk Scenarios 1 (On-Site Researcher) and 3 (South Residential Farmer) because ground water ingestion, the pathway that poses the greatest mercury exposure risk, is closed under these scenarios. The transport mechanisms included in the Risk Scenario 2 RBAS calculation include migration to ground water, atmospheric dispersion, and precipitation and surface water runoff. The exposure pathway analysis is shown in Table E-1.

The soil profile used for the recalculations is specific to the Ra/Sr Treatment Systems area and is shown in Table D-2. As discussed above, the contamination interval is assumed to be 0 to 10 ft bgs based on the Ra/Sr Treatment Systems RA confirmation sample results. The physical parameters used to model mercury migration from the vadose zone to ground water are shown in Table E-2. Mercury chemical-specific and toxicological parameters are shown in Table E-3.

The RBAS values were recalculated using chemical properties and toxicity information from the US EPA Superfund Chemical Data Matrix (US EPA, 1996) and Integrated Risk Information System, respectively (Table E-4). Mercury was assumed to exist in the form of mercuric sulfide. Because no US EPA-approved reference dose (RfDo) or soil/water distribution coefficient (K_d) is available for mercuric sulfide, the values for mercuric chloride were used. Because mercuric sulfide is known to be less toxic and less soluble than mercuric chloride, the revised RBAS for mercuric sulfide is still very conservative. Toxicological studies performed for Oak Ridge National

Laboratory (ORNL) indicate mercuric sulfide adsorption by the human gastro-intestinal tract is five times less than mercuric chloride. The RfDo developed for mercuric sulfide at ORNL is 133 times the mercuric chloride RfDo.

E.2 RBAS Calculation Result

The mercury RBAS re-calculation is shown in Table E-4. The revised mercury RBAS specific to the Ra/Sr Treatment Systems area lithology and contaminated interval is 0.90 milligram per kilogram. The vadose zone modeling results are shown in Table E-5.

Table E-1. Risk Scenario 2—East Residential Farmer

Source	Transport Mechanism	Exposure Route	Pathway Complete?	Rationale
Ra/Sr Area Post RA Soil Contamination	Direct contact	Dermal exposure	No	No direct access to on-site soil assumed.
		Direct ingestion	No	Resident assumed not to cross LEHR Site boundary and ingest source soil directly.
	Migration in saturated/unsaturated zone via diffusion, advection, etc.	Ground water ingestion	Yes	Ground water ingestion from residential well assumed. Receptor is assumed downgradient of contamination source.
	Subsurface diffusion/volatilization	Inhalation	No	Mercury is in a non-volatile form
	Dispersion and deposition of particulates in air	Inhalation of particulates	Yes	Assumed off-site transport of particulates generated on-site.
		Deposition with dermal exposure/Direct ingestion	Yes	Assumed off-site transport of particulates followed by direct exposure.
		Deposition with impacted food ingestion	Yes	Assumed off-site transport and deposition of particulates followed by food pathway uptake.
	Precipitation and surface water runoff	Incidental ingestion of surface water	Yes	Incidental ingestion while swimming assumed possible.
		Dermal exposure to surface water	Yes	Dermal contact during swimming assumed.
		Aquatic food ingestion	Yes	Residents assumed to ingest aquatic food from Putah Creek.
	Direct exposure	External radiation	No	Mercury is not a radiological constituent

Table E-2. One-Dimensional Vadose Zone Modeling Physical Parameters

Soil Type Parameter	Units	Clayey Sandy Silt
Solid density (ρs)	kg/m^3	2,570
Bulk density (ρB)	kg/m^3	1,700
Vertical hydraulic conductivity (Kz)	cm/sec	7.08E-05
Intrinsic permeability	m^2	7.22E-14
Porosity (f)	%	0.354

Abbreviations

% percent
cm/sec centimeter per second
kg/m^3 kilogram per cubic meter
m^2 square meter

Table E-3. Mercury Chemical-Specific and Toxicological Parameters

Parameter	Unit	Value
MCL	mg/l	0.002[j]
Mol. Wt.	g/mole	232.68[h]
RfD_o	mg/kg-day	0.0003[f]
RfD_i	mg/kg-day	none
Sf_o	1/(mg/kg-day)	none
Sf_i	1/(mg/kg-day)	none
K_d	ml/g	52[h]

Abbreviations

K_d	adsorption coefficient
g/mole	grams per mole
MCL	maximum contaminant level
mg/kg-day	milligrams per kilogram per day
mg/l	milligrams per liter
Mol.	molecular
RfD_0	reference dose
RfDi	reference dose inhalation
Sf_i	slope factor inhalation
Sf_o	slope factor oral
Wt.	Weight
None	No toxicity thresholds or slope factors area exist

References

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b State of California Environmental Protection Agency, Department of Toxic Substances Control, 1994, Preliminary Endangerment Assessment Guidance Manual, January 1994.

c Stephens, D.B., 1996, Vadose Zone Hydrology, CRC Lewis Publishers, Boca Raton, Florida.

d Thibault, D.H., Sheppard, M.I., and Smith, P.A., 1990, A Critical Compilation and Review of Default Soil Solid/Liquid Partition Coefficients, Kd, for use in Environmental Assessments, March 1990.

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f US Environmental Protection Agency (EPA), 2000, Region 9 Preliminary Remediation Goal (PRG) Table, November 2000.

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h US EPA, 1998, Superfund Chemical Data Matrix

i Weiss Associates, 1997, Draft Final One-Dimensional Vadose Zone Modeling for the Laboratory for Energy-Related Health Research (LEHR), University of California at Davis, California, April 1997.

j California EPA Regional Water Quality Control Board Central Valley Region, 2000, A Compilation of Water Quality Goals, August 2000.

Table E-4. Radium/Strontium Area Risk-Based Action Standard Calculation, Mercury

Scenario 2, Summary of Soil Action Standard and Pathway-Specific Hazard Quotients for Chemical Non-Carcinogens at a Hazard Quotient of 1.0.

Analyte	Ra/Sr Area Mercury Action Standard mg/kg	Pathway-Specific Hazard Quotient at Action Standard											HQ Across Pathways
		Ground Water Ingestion	Swimming Ingestion	Dermal Swimming	Dermal Showering	Soil Ingestion	Dermal Soil	Inhalation	Fish Ingestion	Plant Ingestion	Meat Ingestion	Milk Ingestion	
Mercury (Hg)	**0.90**	8.54E-01	3.68E-05	3.26E-06	4.18E-03	3.35E-09	9.29E-11	1.83E-09	1.41E-01	1.32E-07	1.57E-06	2.58E-08	1.000E+00

Ground Water Ingestion Pathway

Scenario 2, Soil to Off-site Ground Water to Receptor.

Soil to Off-Site Ground Water Conversion Factor (mg/L)/(mg/kg)
3.12E-03

See Table E-5 for Conversion Factor Determination

Scenario 2, Conversion of On-Site Soil Concentration to Off-Site Ground Water Concentration.

Analyte	Soil Concentration (0-10 ft bgs) (mg/kg)	Ground Water/Soil Conversion Factor (mg/L)/(mg/kg)	Ground Water Concentration (mg/L)
Mercury (Hg)	0.90	3.12E-03	2.81E-03

Summary Table

Scenario 2, HQ Calculation - Ingestion of chemicals in drinking water.

Chemical	CW (mg/L)	Child IR (L/d)	Adult IR (L/d)	EF (d/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	I (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	2.81E-03	1.0	2	350	6	24	15	70	2190	8760	2.56E-04	**0.0003**	8.54E-01

CW = Chemical Concentration in Water (mg/L)
IR = Ingestion Rate (L/d)
EF = Exposure Frequency (d/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
I = Intake (mg/kg-day) = $CW \times IR_{child} \times EF \times ED_{child} / BW_{child} / AT_{child} + CW \times IR_{adult} \times EF \times ED_{adult} / BW_{adult} / AT_{adult}$
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = I / RfDo

Table E-4. Radium/Strontium Area Risk-Based Action Standard Calculation, Mercury (continued)

Surface Water Conversion Factor Calculation

Storm Water Runoff Modeling from Draft Final Determination of Risk Based Action Standards for DOE Areas (WA, 1997b).

Scenario 2, HQ Calculation - Possible LEHR Impact of Non-Radionuclides to Putah Creek Surface Water

Contaminant of Concern	OU1/OU2 Surface Soil Concentration		SWL 1/SWL 2 Storm Water Concentration		Dilution Factor		Putah Creek Conc. PCU/PCD Only		Putah Creek Conc. Contributed by LEHR		Putah Creek Conc. From LEHR/ Surface Soil Conc.	
	MAX	AVERAGE	MAX	AVERAGE	MIN	AVERAGE	MAX	AVERAGE	MAX	AVERAGE	MAX	AVERAGE
	(mg/kg)	(mg/kg)	(mg/L)	(mg/L)	(-)	(-)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)/(mg/kg)	(mg/L)/(mg/kg)
Mercury	5.70E-01	3.10E-01	<2.00E-04	<2.00E-04	3.65E+01	1.37E+02	9.00E-04	5.00E-04	5.48E-06	1.46E-06	9.61E-06	4.72E-06

The following Contract Reporting Detection Limits were used because the particular analyte was not reported to have been detected in the particular set of samples:
Detection limit of 0.0002 mg/L used for Storm Water Concentration of Mercury.
Calculations:
Dilution Factor = Creek Flow/Storm Runoff Flow
Putah Creek Concentration Contributed by LEHR = Storm Water Concentration/Dilution Factor

Scenario 2, Conversion of On-Site Soil Concentration to Concentration in Putah Creek

Chemical	C_{soil} mg/kg	Cpw/Csoil, on-site [mg/kg(pw)]/[mg/kg(soil)]	Cpw mg/kg
Mercury (Hg)	0.90	4.72E-06	4.25E-06

Swimming Ingestion/Dermal Pathways

Summary Table

Scenario 2, HQ Calculation - Ingestion of Chemicals in Surface Water While Swimming.

Chemical	CW (mg/L)	CR (L/d)	EF (d/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	I (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	4.25E-06	0.13	90	6	24	15	70	2190	8760	1.10393E-08	0.0003	3.68E-05

CW = Chemical Concentration in Water (mg/L)
CR = Contact Rate (L/d)
EF = Exposure Frequency (d/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
I = Intake (mg/kg-day) = $CW \times CR_{child} \times EF \times ED_{child} / BW_{child} / AT_{child} + CW \times CR_{adult} \times EF \times ED_{adult} / BW_{adult} / AT_{adult}$
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = I / RfDo

Summary Table

Scenario 2, HQ Calculation - Dermal Contact With Chemicals in Surface Water While Swimming

Chemical	CW (mg/L)	SA (cm2)	PC (cm/hr)	ET (hr/d)	EF (d/yr)	Child ED (yr)	Adult ED (yr)	CF (1L/1000cm3)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	AD (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	4.25E-06	23,000	0.001	0.5	90	6	24	0.001	15	70	2190	8760	9.76533E-10	0.0003	3.26E-06

CW = Chemical Concentration in Surface Water (mg/L)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Dermal Permeability Constant (cm/hr) - chemical specific. Values from Table I-1.
ET = Exposure Time (hr/d)
EF = Exposure Frequency (d/yr)
ED = Exposure Duration (yr)
CF = Volumetric Conversion Factor for Water ($1L/1000cm^3$)
BW = Body Weight (Kg)
AT = Averaging Time (days)
AD = Absorbed Dose (mg/kg-day) = $CW \times SA \times PC \times ET \times EF \times ED_{child} \times CF / BW_{child} / AT_{child} + CW \times SA \times PC \times ET \times EF \times ED_{adult} \times CF / BW_{adult} / AT_{adult}$
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = AD / RfDo

Table E-4. Radium/Strontium Area Risk-Based Action Standard Calculation, Mercury (continued)

Showering - Dermal Pathway

Scenario 2, HQ Calculation - Dermal Contact With Chemicals in Water While Showering.

From GW ingestion

Summary Table

Chemical	CW (mg/L)	SA (cm^2)	PC (cm/hr)	ET (hr/d)	EF (d/yr)	Child ED (yr)	Adult ED (yr)	CF ($1L/1000cm^3$)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	AD (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	2.81E-03	23,000	0.001	0.25	350	6	24	0.001	15	70	2190	8760	1.22E-06	0.0003	4.18E-03

CW = Chemical Concentration in Water (mg/L)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Dermal Permeability Constant (cm/hr) - chemical specific. Values from Table I-1.
ET = Exposure Time (hr/d)
EF = Exposure Frequency (d/yr)
ED = Exposure Duration (yr)
CF = Volumetric Conversion Factor for Water ($1L/1000cm^3$)
BW = Body Weight (Kg)
AT = Averaging Time (days)
AD = Absorbed Dose (mg/kg-day) = $CW \times SA \times PC \times ET \times EF \times ED_{adt} \times CF / BW_{adt} / AT_{adt} + CW \times SA \times PC \times ET \times EF \times ED_{ahh} \times CF / BW_{ahh} / AT_{ahh}$
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = AD / RfDo

Soil Pathways

Scenario 2, On-site to Off-site Soil Concentration Calculation

ISCST3 Modeling from Draft Final Determination of Risk Based Action Standards for DOE Areas (WA 1997b).

Scenario 2, Conversion of On-Site Soil Concentration to Off-site Soil Concentration

Analyte	On-site Soil Concentration (mg/kg)	Off-site Soil/On-site Soil Concentration Ratio (mg/kg)/(mg/kg)	Off-site Soil Concentration (mg/kg)
Mercury (Hg)	0.90	7.88E-08	7.10E-08

Summary Table

Scenario 2, HQ Calculation - Ingestion of Chemicals in Soil

Chemical	CS (mg/kg)	Child IR (mg/d)	Adult IR (mg/d)	CF (10^{-6} kg/mg)	FI (unitless)	EF (d/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	I (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	7.10E-08	200	100	1.00E-06	1	350	6	24	15	70	2190	8760	1.00E-12	0.0003	3.35E-09

CS = Chemical Concentration in Soil (mg/kg)
IR = Ingestion Rate (mg/d)
CF = Conversion Factor (10^{-6} kg/mg)
FI = Fraction Ingested From Contaminated Source (unitless)
EF = Exposure Frequency (d/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
I = Intake (mg/kg-day) = $CS \times IR_{adt} \times CF \times FI \times EF \times ED_{adt} / BW_{adt} / AT_{adt} + CS \times IR_{ahh} \times CF \times FI \times EF \times ED_{ahh} / BW_{ahh} / AT_{ahh}$
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = I / RfDo

Summary Table

Scenario 2, HQ Calculation - Dermal Contact With Chemicals in Soil

Chemical	CS (mg/kg)	CF (10^{-6} kg/mg)	Child SA (cm^2)	Adult SA (cm^2)	AF (mg/cm^2)	ABS (unitless)	EF (d/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	AD (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	7.10E-08	1.00E-06	2,000	5,000	0.2	0.01	350	6	24	15	70	2190	8760	2.79E-14	0.0003	9.29E-11

CS = Chemical Concentration in Soil (mg/kg)
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact (cm^2)
AF = Soil to Skin Adherence Factor (mg/cm^2)
ABS = Absorption Factor (unitless)
EF = Exposure Frequency (d/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
AD = Absorbed Dose (mg/kg-day) = $CS \times CF \times SA_{adt} \times AF \times ABS \times EF \times ED_{adt} / BW_{adt} / AT_{adt} + CS \times CF \times SA_{ahh} \times AF \times ABS \times EF \times ED_{ahh} / BW_{ahh} / AT_{ahh}$
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = AD / RfDo

Table E-4. Radium/Strontium Area Risk-Based Action Standard Calculation, Mercury (continued)

Inhalation Pathway

Scenario 2, Indoor and Outdoor Air Conversion Factor Calculations from Draft Final Determination of Risk Based Action Standards for DOE Areas (WA, 1997b).

Scenario 2, Conversion of On-Site Soil Concentration to Indoor and Outdoor Air Concentration

Analyte	Soil Conc (mg/kg)	Indoor Air Conversion Factor ($(mg/m^3)/(mg/kg)$)	Outdoor Air Conversion Factor ($(mg/m^3)/(mg/kg)$)	Indoor Air Conc. (mg/m^3)	Outdoor Air Conc. (mg/m^3)
Non-Carcinogens					
Mercury (Hg)	0.90		5.80E-13	0.000E+00	5.225E-13

Scenario 2, HQ Calculation -Inhalation of Airborne (Vapor Phase) Chemicals

Summary

Chemical	Indoor CA_i (mg/m^3)	Outdoor CA_o (mg/m^3)	Child IR (m^3/hr)	Adult IR (m^3/hr)	Indoor ET (hr/d)	Outdoor ET (hr/d)	EF (d/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	Indoor I (mg/kg-day)	Outdoor I (mg/kg-day)	RfDi (mg/kg-day)	HQ (unitless)
Mercury (Hg)	0.000E+00	5.225E-13	0.416666667	0.833333333	16.08	7.92	350	6	24	15	70	2190	8760	0	1.57E-13	0.0000086	0

CA_i = Chemical Concentration in Indoor Air (mg/m^3)
CA_o = Chemical Concentration in Outdoor Air (mg/m^3)
IR = Inhalation Rate (m^3/hr)
ET = Exposure Time (hr/d)
EF = Exposure Frequency (d/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
I_{indoor} = Indoor Air Intake (mg/kg-day) = $CA_{indoor} \times IR_{child} \times ET_{indoor} \times EF \times ED_{child} / BW_{child} / AT_{child} + CA_{indoor} \times IR_{adult} \times ET_{indoor} \times EF \times ED_{adult} / BW_{adult} / AT_{adult}$
$I_{outdoor}$ = Outdoor Air Intake (mg/kg-day) = $CA_{outdoor} \times IR_{child} \times ET_{outdoor} \times EF \times ED_{child} / BW_{child} / AT_{child} + CA_{outdoor} \times IR_{adult} \times ET_{outdoor} \times EF \times ED_{adult} / BW_{adult} / AT_{adult}$
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = $(I_{indoor} + I_{outdoor}) / RfDo$

Fish Ingestion

Scenario 2. Fish Conversion Factor Calculation from Draft Final Determination of Risk Based Action Standards for DOE Areas (WA, 1997b)

Surface Water

Inorganic Chemical	Cw mg/L	Bcf L/kg	Cfish mg/kg	Cwil mg/kg	Cfish/Cwil, on-site g/kg(fish)/[mg/kg(soil)]
Non-Carcinogens					
Mercury (Hg)	4.3E-06	64000	3.02E+01	100	3.02E-01

Kow = Octanol/water partition coefficient.
Bcf = Bioconcentration factor for fish (L/kg)
Cw = Chemical concentration in surface water contributed by the LEHR site (mg/L)
CFish = COC concentration in fish (mg/kg).

a = Values from Fetter, 1993; Lyman et al, 1990; CalEPA, 1994; Stephens, 1996; USDOE, 1996; Weiss Associates, 1997.
b = Log(Bcf) = 0.76 Log(Kow) - 1.23, Veith et al., 1980.
c = Cfish = Cw x Bcf, CalEPA, 1993.
d = Values from Aquire database, USEPA, 1996. Chromium, barium, molybdenum, thallium and vanadium from PNNL, 1996.

Scenario 2. Conversion of On-Site Soil Concentration to Concentration in Off-site Fish Media

Organic Chemical	Cwil, on-site mg/kg	Cfish/Cwil, on-site [mg/kg(fish)]/[mg/kg(soil)]	Cfish mg/kg
Non-Carcinogens			
Mercury (Hg)	0.90	3.02E-01	2.72E-01

Summary Table

Scenario 2, HQ Calculation - Ingestion of Chemicals in Fish

Chemical	CF (mg/kg)	IR (kg/day)	FI (unitless)	EF (days/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	I (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	2.72E-01	0.054	0.5	26	6	24	15	70	2190	8760	4.23909E-05	0.0003	1.41E-01

CF = Chemical Concentration in Fish (mg/kg)
IR = Ingestion Rate (kg/meal)
FI = Fraction Ingested From Contaminated Source (unitless)
EF = Exposure Frequency (meals/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
I = Intake (mg/kg-day) = $CF \times IR \times FI \times EF \times ED_{child} / BW_{child} / AT_{child} + CF \times IR \times FI \times EF \times ED_{adult} / BW_{adult} / AT_{adult}$
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = I / RfDo

Table E-4. Radium/Strontium Area Risk-Based Action Standard Calculation, Mercury (continued)

Fruit and Vegetable Ingestion

Scenario 2. Vegetable and Fruit Media Conversion Factor Calculation from Draft Final Determination of Risk Based Action Standards for DOE Areas (WA, 1997b).

Inorganic Chemical	Csoil mg/kg	Cap mg/m3	Css mg/Kg	Kpapt m3/Kg(fm)	Kps Kg/Kg(dm) e	biodim Kg(dm)/Kg(fm) f	Cveg mg/Kg(fm) g	Cveg/Csoil [mg/kg(fm)]/ [mg/kg(soil)]
Non-Carcinogens								
Mercury (Hg)	100	5.8E-11	0.00000788	3300	0.9	0.2	1.42E-06	1.42E-08

Kow = Octanol/Water partition coefficient.
Cap = COC concentration in particulate phase of ambient outdoor air at exposure location from chemical deposition calculation (ug/m3) or (pCi/m3).
Css = COC concentration in surface soil at exposure location from chemical deposition calculation (mg/kg) or (pCi/kg).
Kpapt = Plant-air partition coefficient for particle bound contamination (m3-air / kg-plant fresh mass).
Kps = Plant-soil partition coefficient ((mg/kg-plant fresh mass)/(mg/kg-soil)) = (kg-soil/kg-plant fresh mass).
biodim = Ratio of vegetable/fruit dry mass to fresh mass (kg-dry mass)/(kg-fresh mass).
Cveg = COC concentration in vegetable/fruit media (mg/kg-fresh mass) or (pCi/kg-fresh mass).

a = Values from Fetter, 1993; Lyman et al, 1990; CalEPA, 1994; Stephens, 1996; USDOE, 1996; Weiss Associates, 1997.
b = Value from McKone and Ryan, 1989.
c = Organic compounds: Kps (Kg/Kgfm) = 7.7 Kow-0.58 Travis and Arms, 1988.
d = Calculation for organic compounds: Cveg = Cap x Kpapt + Css x Kps. Cal EPA, 1993.
e = Values from Baes et al., 1984.
f = Value from Cal EPA, 1993.
g = Calculation for inorganic compounds and radionuclides: Cveg = Cap x Kpapt + Css x Kps x biodim. Cal EPA, 1993.

Scenario 2. Conversion of On-Site Soil Concentration to Concentration in Off-site Vegetation

Chemical	Csoil mg/kg	Cveg/Csoil [mg/kg(fm)]/[mg/kg(soil)]	Cveg mg/kg(fm)
Non-Carcinogens			
Mercuy (Hg)	0.90	1.42E-08	1.28E-08

Summary Table

Scenario 2, HQ Calculation - Ingestion of Chemicals in Fruits and Vegetables

Chemical	CF (mg/kg)	IR (kg/day)	FI (unitless)	EF (days/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	I (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercuy (Hg)	1.28E-08	0.08	0.5	350	6	24	15	70	2190	8760	3.97E-11	0.0003	1.32E-07

CF = Chemical Concentration in Food (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested From Contaminated Source (unitless)
EF = Exposure Frequency (days/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
I = Intake (mg/kg-day) = CF x IR x FI x EF x ED_{child} / BW_{child} / AT_{child} + CF x IR x FI x EF x ED_{adult} / BW_{adult} / AT_{adult}
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = I / RfDo

Table E-4. Radium/Strontium Area Risk-Based Action Standard Calculation, Mercury (continued)

Meat Ingestion

Scenario 2. Beef Conversion Factor Calculation from Draft Final Determination of Risk Based Action Standards for DOE Areas (WA, 1997b).

Inorganic Chemical	Bt (inorganics) d/kg f	Cap mg/m3	Css mg/kg	Inhc m3/d	Kpapt m3/kg	Ivbc kg(fm)/d	Isc kg/d	Kps kg/kg[dm] g	biodim kg(dm)/kg(fm) h	Cbeef mg/kg	Csoil, on-site mg/kg	Cbeef/Csoil, on-site (mg/kg)/(mg/kg)
Non-Carcinogens												
Mercury (Hg)	0.027	5.8E-11	0.00000788	122	3300	60	0.4	0.9	0.2	2.69317E-06	100	2.69E-08

Kow = Octanol/water partition coefficient.
Bt = Biotransfer factor for beef cattle (d/kg).
Cap = COC concentration in particulate phase of ambient outdoor air at exposure location from chemical deposition calculation (ug/m3).
Css = COC concentration in surface soil at exposure location from chemical deposition calculation (mg/kg).
Inhc = Daily inhalation rate of cattle (m3/d)
Kpapt = Plant-air partition coefficient for particle-bound contamination (m3-air / kg-plant fresh mass).
Ivbc = Ingestion of pasture by beef cattle (kg-fresh mass/day).
Isc = Ingestion of soil by cattle (kg/day)
Kps = Plant-soil partition coefficient ((mg/kg-plant dry mass)/(mg/kg-soil)) = (kg-soil/kg-plant dry mass).
biodim = Ratio of vegetable/fruit dry mass to fresh mass (kg-dry mass)/(kg-fresh mass).
Cbeef = COC concentration in beef media (mg/kg)

a = Values from Fetter, 1993; Lyman et al, 1990; CalEPA, 1994; Stephens, 1996; USDOE, 1996; Weiss Associates, 1997.
b = Log(Bt) = Log(Kow) - 7.6, Travis and Arms, 1988.
c = Value from McKone and Ryan, 1989.
d = Organic compounds: Kps = 7.7 Kow-0.58 (Travis and Arms, 1988).
e = Calculation: Cbeef = Cap x (Inhc + Kpapt x Ivbc) x Bt + Css x (Isc + Kps x biodim x Ivbc) x Bt. (Cal EPA, 1993).
f = Values from Ng et al., 1982. Except arsenic, beryllium, antimony, selenium, thallium and vanadium from Baes et al., 1984.
g = Values from Baes et al., 1984.
h = Value from Cal EPA, 1993.

Scenario 2. Conversion of On-Site Soil Concentration to Concentration in Off-site Beef Media

Organic Chemical	Csoil, on-site mg/kg	Cbeef/Csoil, on-site [mg/kg(beef)]/[mg/kg(soil)]	Cbeef mg/kg(fm)
Non-Carcinogens			
Mercury (Hg)	0.90	2.69E-08	2.43E-08

Summary Table

Scenario 2, HQ Calculation - Ingestion of Chemicals in Meat

Chemical	CF (mg/kg)	IR (kg/day)	FI (unitless)	EF (days/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	I (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	2.43E-08	0.25	1	350	6	24	15	70	2190	8760	4.71E-10	0.0003	1.57E-06

CF = Chemical Concentration in Food (mg/kg)
IR = Ingestion Rate (kg/day)
FI = Fraction Ingested From Contaminated Source (unitless)
EF = Exposure Frequency (days/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
I = Intake (mg/kg-day) = CF x IR x FI x EF x ED_{child} / BW_{child} / AT_{child} + CF x IR x FI x EF x ED_{adult} / BW_{adult} / AT_{adult}
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = I / RfDo

Table E-4. Radium/Strontium Area Risk-Based Action Standard Calculation, Mercury (continued)

Scenario 2. Milk Media Conversion Factor Calculation from Draft Final Determination of Risk Based Action Standards for DOE Areas (WA, 1997b).

Inorganic Chemical	Bk d/Kg f	Cap mg/m3	Css mg/kg	Inhc m3/d	Kpapt m3/kg(fm)	Ivdc kg(fm)/d	Isc kg/d	Kps kg/kg(dm) g	biodim kg(dm)/kg(fm) h	Cmilk mg/kg I	Csoil, on-site mg/kg	Cmilk/Csoil, on-site (mg/kg)/(mg/kg)
Non-Carcinogens												
Mercury (Hg)	0.00045	5.8E-11	0.00000788	122	3300	85	0.4	0.9	0.2	6.30E-08	100	6.30E-10

Kow = Octanol/water partition coefficient.
Bk = Biotransfer factor for dairy cattle (d/kg).
Cap = COC concentration in particulate phase of ambient outdoor air at exposure location from chemical deposition calculation (ug/m3) or (pCi/m3).
Css = COC concentration in surface soil at exposure location from chemical deposition calculation (mg/kg) or (pCi/kg).
Inhc = Daily inhalation rate for cattle (m3/d)
Kpapt = Plant-air partition coefficient for particle-bound contamination (m3-air / kg-plant fresh mass).
Ivdc = Ingestion of pasture by dairy cattle (kg-fresh mass/day).
Isc = Ingestion of soil by cattle (kg/day)
Kps = Plant-soil partition coefficient ((mg/kg-plant fresh mass)/(mg/kg-soil)) = (kg-soil/kg-plant fresh mass).
biodim = Ratio of pasture dry mass to fresh mass (kg-dry mass)/(kg-fresh mass).
Cmilk = COC concentration in dairy milk media (mg/kg) or (pCi/kg).

a = Values from Fetter, 1993; Lyman et al, 1990; CalEPA, 1994; Stephens, 1996; USDOE, 1996; Weiss Associates, 1997.
b = Log(Bk) = Log(Kow) - 8.1, Travis and Arms 1988.
c = Value from McKone and Ryan 1989.
d = Organic compounds: Kps (Kg/Kgfm) = 7.7 Kow-0.58 Travis and Arms, 1988.
e = Calculation for organic compounds: Cmilk = Cap x (Inhc + Kpapt x Ivdc) x Bk + Css x (Isc + Kps x Ivdc) x Bk. Cal EPA, 1993.
f = Values from Baes et al., 1984.
g = Values from Baes et al., 1984.
h = Value from Cal EPA, 1993.
i = Calculation for inorganic compounds and radionuclides: Cmilk = Cap x (Inhc + Kpapt x Ivdc) x Bk + Css x (Isc + Kps x Ivdc x biodim) x Bk. Cal EPA 1993.

Scenario 2. Conversion of On-Site Soil Concentration to Concentration in Off-site Milk Media

Organic Chemical	Csoil mg/kg	Cmilk/Csoil, on-site [mg/kg(milk)/(mg/kg(soil)]	Cmilk mg/kg
Non-Carcinogens			
Mercury (Hg)	0.90	6.30E-10	5.67E-10

Summary Table

Scenario 2, HQ Calculation - Ingestion of Chemicals in Milk

Chemical	CF (mg/kg)	unit conv CF (mg/L)	IR (L/d)	FI (unitless)	EF (d/yr)	Child ED (yr)	Adult ED (yr)	Child BW (Kg)	Adult BW (Kg)	Child AT (days)	Adult AT (days)	I (mg/kg-day)	RfDo (mg/kg-day)	HQ (unitless)
Mercury (Hg)	5.67E-10	5.87348E-10	0.17	1	350	6	24	15	70	2190	8760	7.75085E-12	0.0003	2.58E-08

CF = Chemical Concentration in Milk (mg/kg)
unit conv for CF = CFmg/kg(milk) x 1.035 kg(milk)/L(milk) = CF mg/L
IR = Ingestion Rate (L/d)
FI = Fraction Ingested From Contaminated Source (unitless)
EF = Exposure Frequency (d/yr)
ED = Exposure Duration (yr)
BW = Body Weight (Kg)
AT = Averaging Time (days)
I = Intake (mg/kg-day) = CF x IR x FI x EF x ED_{child} / BW_{child} / AT_{child} + CF x IR x FI x EF x ED_{adult} / BW_{adult} / AT_{adult}
RfDo = Oral Reference Dose (mg/kg-d)
HQ = Calculated Hazard Quotient (unitless) = I / RfDo

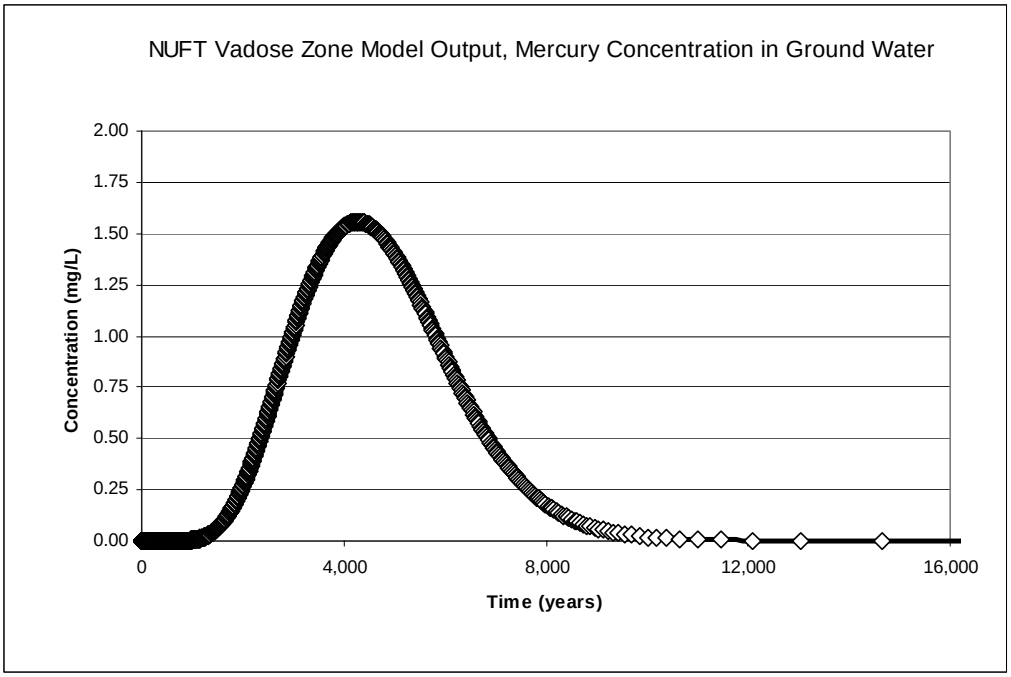
End of Calculations

Table E-5. Non-Isothermal, Unsaturated Flow and Transport Results and Soil-to-Off-Site Ground Water Conversion Factor for Mercury, Radium/Strontium Area

Time (years)	Concentration (mg/l)	Time (years)	Concentration (mg/l)	Time (years)	Concentration (mg/l)
0.0000000	0.00E+00	0.000066	1.45E-90	13.9	1.08E-21
0.0000000	1.04E-122	0.000092	4.10E-89	14.7	2.00E-21
0.0000001	1.40E-118	0.00015	5.57E-86	15.0	2.51E-21
0.0000003	1.30E-114	0.00028	2.45E-82	15.8	4.46E-21
0.0000006	1.07E-110	0.00058	1.48E-78	16.6	7.72E-21
0.0000014	8.31E-107	0.0012	9.99E-75	17.4	1.31E-20
0.000003	6.30E-103	0.0027	6.97E-71	18.2	2.16E-20
0.000007	4.71E-99	0.0027	7.01E-71	19.0	3.50E-20
0.000017	3.47E-95	0.0061	4.80E-67	19.9	5.56E-20
0.000037	2.50E-91	0.013	3.05E-63	20.0	5.97E-20
0.000037	2.50E-91	0.030	1.63E-59	20.8	9.32E-20
0.000037	2.50E-91	0.1	6.02E-56	21.7	1.43E-19
0.000037	2.51E-91	0.1	1.11E-52	22.5	2.17E-19
0.000037	2.51E-91	0.2	9.34E-50	23.4	3.24E-19
0.000037	2.51E-91	0.3	1.18E-49	24.2	4.79E-19
0.000037	2.52E-91	0.5	6.15E-47	25.1	7.00E-19
0.000037	2.52E-91	0.8	1.71E-44	25.9	1.01E-18
0.000037	2.53E-91	1.0	3.33E-44	26.8	1.45E-18
0.000038	2.54E-91	1.5	1.89E-42	27.7	2.05E-18
0.000038	2.54E-91	2.0	2.03E-41	28.5	2.88E-18
0.000038	2.55E-91	2.6	6.39E-39	29.4	4.01E-18
0.000038	2.57E-91	3.3	2.59E-33	30.0	4.91E-18
0.000038	2.58E-91	3.9	8.79E-30	30.9	6.74E-18
0.000038	2.60E-91	4.7	5.97E-28	31.8	9.20E-18
0.000038	2.62E-91	5.0	1.21E-27	32.7	1.25E-17
0.000038	2.64E-91	5.7	1.67E-26	33.6	1.68E-17
0.000039	2.67E-91	6.5	1.08E-25	34.6	2.25E-17
0.000039	2.70E-91	7.2	4.83E-25	35.5	3.00E-17
0.000039	2.75E-91	8.0	1.72E-24		
0.000040	2.82E-91	8.7	5.26E-24		
0.000040	2.91E-91	9.5	1.43E-23		
0.000041	3.03E-91	10.0	2.54E-23		
0.000043	3.24E-91	10.8	6.01E-23		
0.000045	3.58E-91	11.5	1.33E-22		
0.000048	4.27E-91	12.3	2.80E-22		
0.000054	6.05E-91	13.1	5.62E-22		

Table E-5. Non-Isothermal, Unsaturated Flow and Transport Results and Soil-to-Off-Site Ground Water Conversion Factor for Mercury, Radium/Strontium Area (continued)

Soil to Off-Site Ground Water Conversion Factor	
Peak concentration in ground water	1.558 mg/l
Arbitrary initial concentration in soil	100 mg/kg
Vadose zone conversion factor1 (V)	0.01558(mg/l)/(mg/kg)
Saturated zone conversion factor2 (S)	0.2(mg/l)/(mg/l)
Total conversion factor (V x S)	**0.003116** (mg/l)/(mg/kg)



Notes

[1] Vadose zone conversion factor is the peak concentration in ground water divided by the arbitrary initial concentration in soil.

[2] Saturated zone conversion factor is the off-site ground water concentration divided by the on-site ground water concentration previously modeled for RBAS determination (WA, 1997b).

Abbreviations

mg/L milligrams per liter
mg/kg milligrams per kilogram
NUFT Non-Isothermal Unsaturated Flow and Transport
RBAS risk-based action standard

APPENDIX F

RADIUM/STRONTIUM AREA 1 REMOVAL ACTION OVERBURDEN SOIL DATA

Appendix A. Ra/Sr Area 1 RA Overburden Soil Data

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC025	Actinium-228	0.402	0.0618	0.0148	PCI/G		
CWRSC025	Americium-241	0.0009	0.0018	0.0056	PCI/G		
CWRSC025	Bismuth-212	0.233	0.0491	0.0332	PCI/G		
CWRSC025	Bismuth-214	0.33	0.0384	0.00757	PCI/G		
CWRSC025	Carbon-14	-0.0369	0.047	0.0733	PCI/G		
CWRSC025	Cesium-137	0.0062	0.0046	0.00445	PCI/G		
CWRSC025	Cobalt-60	0.00101	0.00272	0.00489	PCI/G		
CWRSC025	Gross Alpha	10.2	2.51	1.53	PCI/G		
CWRSC025	Lead-210	0.464	0.759	0.95	PCI/G		
CWRSC025	Lead-212	0.409	0.0432	0.00699	PCI/G		
CWRSC025	Lead-214	0.369	0.0423	0.00802	PCI/G		
CWRSC025	Nonvolatile Beta	11	1.59	2	PCI/G		
CWRSC025	Plutonium-241	-0.141	0.169	0.314	PCI/G		
CWRSC025	Potassium-40	8.46	0.978	0.034	PCI/G		
CWRSC025	Radium-223	-0.0389	0.0454	0.0765	PCI/G		
CWRSC025	Radium-226	0.379	0.056	0.0239	PCI/G		
CWRSC025	Radium-228	0.402	0.0618	0.0148	PCI/G		
CWRSC025	Strontium-90	0.0236	0.0151	0.0301	PCI/G	UJ	c
CWRSC025	Thallium-208	0.128	0.0147	0.00419	PCI/G		
CWRSC025	Thorium-228	0.479	0.171	0.178	PCI/G		
CWRSC025	Thorium-230	0.586	0.168	0.0571	PCI/G		
CWRSC025	Thorium-232	0.405	0.134	0.0571	PCI/G		
CWRSC025	Thorium-234	0.477	0.271	0.231	PCI/G		
CWRSC025	Tritium	0.236	0.449	0.768	PCI/G		
CWRSC025	Uranium-233/234	0.382	0.0503	0.0146	PCI/G		
CWRSC025	Uranium-235	0.0172	0.00776	0.00686	PCI/G		
CWRSC025	Uranium-238	0.421	0.0538	0.00684	PCI/G		
CWRSC025	Antimony			6.1	MG/KG	R	m
CWRSC025	Arsenic	7.1		1	MG/KG		
CWRSC025	Barium	143		20.2	MG/KG		
CWRSC025	Beryllium	0.31		0.5	MG/KG		
CWRSC025	Cadmium			0.5	MG/KG		
CWRSC025	Chromium	122		1	MG/KG		
CWRSC025	Cobalt	17.8		5	MG/KG		
CWRSC025	Copper	30.2		2.5	MG/KG		
CWRSC025	Lead	7.4		0.3	MG/KG		
CWRSC025	Mercury	0.85		0.033	MG/KG	J	m
CWRSC025	Molybdenum	0.25		1	MG/KG	J	m
CWRSC025	Nickel	205		4	MG/KG		
CWRSC025	Selenium	1.2		0.5	MG/KG		
CWRSC025	Silver	0.17		1	MG/KG		
CWRSC025	Thallium			1	MG/KG		
CWRSC025	Vanadium	46.3		5	MG/KG		
CWRSC025	Zinc	60.6		2	MG/KG		
CWRSC025	Chromium, Hexavalent	0.144		0.206	MG/KG	J	md
CWRSC025	Nitrate	2.13		1	MG/KG		
CWRSC025	4,4'-DDD			13.7	UG/KG		
CWRSC025	4,4'-DDE			13.7	UG/KG		
CWRSC025	4,4'-DDT			13.7	UG/KG		
CWRSC025	Aldrin			6.9	UG/KG		
CWRSC025	Alpha-BHC			6.9	UG/KG		
CWRSC025	Alpha-Chlordane	1.5		6.9	UG/KG	J	q
CWRSC025	Arochlor-1016			34.4	UG/KG		
CWRSC025	Arochlor-1221			34.4	UG/KG		
CWRSC025	Arochlor-1232			34.4	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC025	Arochlor-1242			34.4	UG/KG		
CWRSC025	Arochlor-1248			34.4	UG/KG		
CWRSC025	Arochlor-1254			34.4	UG/KG		
CWRSC025	Arochlor-1260			34.4	UG/KG		
CWRSC025	Beta-BHC			6.9	UG/KG		
CWRSC025	Chlordane	10.9		344	UG/KG	J	q
CWRSC025	Delta-BHC			6.9	UG/KG		
CWRSC025	Dieldrin			13.7	UG/KG		
CWRSC025	Endosulfan I			6.9	UG/KG		
CWRSC025	Endosulfan II			13.7	UG/KG		
CWRSC025	Endosulfan Sulfate			13.7	UG/KG		
CWRSC025	Endrin			13.7	UG/KG		
CWRSC025	Endrin Aldehyde			13.7	UG/KG		
CWRSC025	Endrin Ketone			13.7	UG/KG		
CWRSC025	Gamma-BHC			6.9	UG/KG		
CWRSC025	gamma-Chlordane	2.1		6.9	UG/KG	J	qv
CWRSC025	Heptachlor			6.9	UG/KG		
CWRSC025	Heptachlor Epoxide			6.9	UG/KG		
CWRSC025	Methoxychlor			68.7	UG/KG		
CWRSC025	Toxaphene			344	UG/KG		
CWRSC025	1,1,1-Trichloroethane			1	UG/KG		
CWRSC025	1,1,2,2-Tetrachloroethane			1	UG/KG		
CWRSC025	1,1,2-Trichloroethane			1	UG/KG		
CWRSC025	1,1-Dichloroethane			1	UG/KG		
CWRSC025	1,1-Dichloroethene			1	UG/KG		
CWRSC025	1,2-Dichloroethane			1	UG/KG		
CWRSC025	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC025	1,2-Dichloropropane			1	UG/KG		
CWRSC025	2-Butanone	42.4		5.2	UG/KG	J	c
CWRSC025	2-Hexanone			5.2	UG/KG		
CWRSC025	4-Methyl-2-Pentanone			5.2	UG/KG		
CWRSC025	Acetone			25.8	UG/KG		
CWRSC025	Benzene			1	UG/KG		
CWRSC025	Bromoform			1	UG/KG		
CWRSC025	Carbon Disulfide			5.2	UG/KG		
CWRSC025	Carbon Tetrachloride			1	UG/KG		
CWRSC025	Chlorobenzene			1	UG/KG		
CWRSC025	Chlorodibromomethane			1	UG/KG		
CWRSC025	Chloroethane			1	UG/KG		
CWRSC025	Chloroform			1	UG/KG		
CWRSC025	cis-1,3-Dichloropropylene			1	UG/KG		
CWRSC025	Dichlorobromomethane			1	UG/KG		
CWRSC025	Ethylbenzene	0.8		1	UG/KG	J	q
CWRSC025	Methyl Bromide			1	UG/KG		
CWRSC025	Methyl Chloride			1	UG/KG		
CWRSC025	Methylene Chloride	1.2		5.2	UG/KG	J	q
CWRSC025	Styrene			1	UG/KG		
CWRSC025	Tetrachloroethene			1	UG/KG		
CWRSC025	Trans-1,3-Dichloropropene			1	UG/KG		
CWRSC025	Trichloroethene			1	UG/KG		
CWRSC025	Vinyl Chloride			1	UG/KG		
CWRSC025	Xylenes (Total)	3.1		3.1	UG/KG		
CWRSC025	1,2,4-Trichlorobenzene			1370	UG/KG		
CWRSC025	1,2-Dichlorobenzene			1370	UG/KG		
CWRSC025	1,3-Dichlorobenzene			1370	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC025	1,4-Dichlorobenzene			1370	UG/KG		
CWRSC025	2,2'-oxybis(1-Chloropropane)			1370	UG/KG		
CWRSC025	2,4,5-Trichlorophenol			1370	UG/KG		
CWRSC025	2,4,6-Trichlorophenol			1370	UG/KG		
CWRSC025	2,4-Dichlorophenol			1370	UG/KG		
CWRSC025	2,4-Dimethylphenol			1370	UG/KG		
CWRSC025	2,4-Dinitrophenol			2750	UG/KG		
CWRSC025	2,4-Dinitrotoluene			1370	UG/KG		
CWRSC025	2,6-Dinitrotoluene			1370	UG/KG		
CWRSC025	2-Chloronaphthalene			1370	UG/KG		
CWRSC025	2-Chlorophenol			1370	UG/KG		
CWRSC025	2-Methyl-4,6-dinitrophenol			1370	UG/KG		
CWRSC025	2-Methylnaphthalene			1370	UG/KG		
CWRSC025	2-Nitroaniline			1370	UG/KG	UJ	c
CWRSC025	2-Nitrophenol			1370	UG/KG		
CWRSC025	3,3'-Dichlorobenzidine			2750	UG/KG		
CWRSC025	3-Nitroaniline			1370	UG/KG		
CWRSC025	4-Bromophenyl Phenyl Ether			1370	UG/KG		
CWRSC025	4-Chloro-3-Methylphenol			1370	UG/KG		
CWRSC025	4-Chloroaniline			2750	UG/KG		
CWRSC025	4-Chlorophenyl Phenyl Ether			1370	UG/KG		
CWRSC025	4-Nitroaniline			1370	UG/KG		
CWRSC025	4-Nitrophenol			1370	UG/KG		
CWRSC025	Acenaphthene			1370	UG/KG		
CWRSC025	Acenaphthylene			1370	UG/KG		
CWRSC025	Anthracene			1370	UG/KG		
CWRSC025	Benzo(a)anthracene			1370	UG/KG		
CWRSC025	Benzo(a)pyrene			1370	UG/KG		
CWRSC025	Benzo(b)fluoranthene			1370	UG/KG		
CWRSC025	Benzo(g,h,i)perylene			1370	UG/KG		
CWRSC025	Benzo(k)fluoranthene			1370	UG/KG		
CWRSC025	Bis(2-Chloroethoxy)methane			1370	UG/KG		
CWRSC025	Bis(2-Chloroethyl)ether			1370	UG/KG		
CWRSC025	Bis(2-Ethylhexyl)phthalate			1370	UG/KG		
CWRSC025	Butyl Benzyl Phthalate			1370	UG/KG		
CWRSC025	Carbazole			1370	UG/KG		
CWRSC025	Chrysene			1370	UG/KG	UJ	c
CWRSC025	Di-n-Butyl Phthalate			1370	UG/KG		
CWRSC025	Di-n-Octyl Phthalate			1370	UG/KG		
CWRSC025	Dibenzo(a,h)anthracene			1370	UG/KG		
CWRSC025	Dibenzofuran			1370	UG/KG		
CWRSC025	Diethyl Phthalate			1370	UG/KG		
CWRSC025	Dimethyl Phthalate			1370	UG/KG		
CWRSC025	Diphenylamine			1370	UG/KG		
CWRSC025	Fluoranthene			1370	UG/KG		
CWRSC025	Fluorene			1370	UG/KG		
CWRSC025	Hexachlorobenzene			1370	UG/KG		
CWRSC025	Hexachlorobutadiene			1370	UG/KG		
CWRSC025	Hexachlorocyclopentadiene			1370	UG/KG		
CWRSC025	Hexachloroethane			1370	UG/KG		
CWRSC025	Indeno(1,2,3-cd)pyrene			1370	UG/KG		
CWRSC025	Isophorone			1370	UG/KG		
CWRSC025	M,P-CRESOL			1370	UG/KG		
CWRSC025	N-Nitrosodipropylamine			1370	UG/KG		
CWRSC025	Naphthalene			1370	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC025	Nitrobenzene			1370	UG/KG		
CWRSC025	O-Cresol			1370	UG/KG		
CWRSC025	Pentachlorophenol			2750	UG/KG		
CWRSC025	Phenanthrene			1370	UG/KG		
CWRSC025	Phenol			1370	UG/KG		
CWRSC025	Pyrene			1370	UG/KG		
CWRSC025DL	Toluene	77.5		2.1	UG/KG		
CWRSC026	Actinium-228	0.351	0.0564	0.0134	PCI/G		
CWRSC026	Americium-241	0	0	0.0023	PCI/G		
CWRSC026	Bismuth-212	0.219	0.0384	0.0286	PCI/G		
CWRSC026	Bismuth-214	0.292	0.0333	0.00656	PCI/G		
CWRSC026	Carbon-14	-0.0605	0.0565	0.1	PCI/G		
CWRSC026	Cesium-137	0.00925	0.00339	0.00362	PCI/G		
CWRSC026	Cobalt-60	-0.000694	0.0025	0.00421	PCI/G		
CWRSC026	Gross Alpha	5.59	2.11	2.46	PCI/G		
CWRSC026	Lead-210	0.299	0.585	0.987	PCI/G		
CWRSC026	Lead-212	0.383	0.0406	0.00618	PCI/G		
CWRSC026	Lead-214	0.346	0.0383	0.00689	PCI/G		
CWRSC026	Nonvolatile Beta	11.1	1.78	2.44	PCI/G		
CWRSC026	Plutonium-241	-0.0334	0.216	0.393	PCI/G		
CWRSC026	Potassium-40	7.96	0.928	0.0309	PCI/G		
CWRSC026	Radium-223	-0.033	0.046	0.0684	PCI/G		
CWRSC026	Radium-226	0.436	0.0698	0.0232	PCI/G		
CWRSC026	Radium-228	0.351	0.0564	0.0134	PCI/G		
CWRSC026	Strontium-90	0.013	0.0138	0.0247	PCI/G	UJ	c
CWRSC026	Thallium-208	0.113	0.0124	0.00373	PCI/G		
CWRSC026	Thorium-228	0.375	0.142	0.167	PCI/G		
CWRSC026	Thorium-230	0.455	0.131	0.065	PCI/G		
CWRSC026	Thorium-232	0.385	0.117	0.0459	PCI/G		
CWRSC026	Thorium-234	0.587	0.297	0.21	PCI/G		
CWRSC026	Tritium	0.461	0.452	0.751	PCI/G		
CWRSC026	Uranium-233/234	0.363	0.0489	0.0133	PCI/G		
CWRSC026	Uranium-235	0.0203	0.00887	0.00832	PCI/G		
CWRSC026	Uranium-238	0.428	0.0551	0.00225	PCI/G		
CWRSC026	Antimony			6.1	MG/KG	R	m
CWRSC026	Arsenic	6.6		1	MG/KG		
CWRSC026	Barium	141		20.4	MG/KG		
CWRSC026	Beryllium	0.32		0.51	MG/KG		
CWRSC026	Cadmium			0.51	MG/KG		
CWRSC026	Chromium	107		1	MG/KG		
CWRSC026	Cobalt	17.2		5.1	MG/KG		
CWRSC026	Copper	29.7		2.6	MG/KG		
CWRSC026	Lead	6.8		0.31	MG/KG		
CWRSC026	Mercury	0.91		0.03	MG/KG	J	m
CWRSC026	Molybdenum	0.27		1	MG/KG	J	m
CWRSC026	Nickel	199		4.1	MG/KG		
CWRSC026	Selenium	1.2		0.51	MG/KG		
CWRSC026	Silver	0.15		1	MG/KG		
CWRSC026	Thallium			1	MG/KG		
CWRSC026	Vanadium	48.7		5.1	MG/KG		
CWRSC026	Zinc	57.7		2	MG/KG		
CWRSC026	Chromium, Hexavalent	0.153		0.204	MG/KG	J	md
CWRSC026	Nitrate	3.13		1	MG/KG		
CWRSC026	4,4'-DDD			13.6	UG/KG		
CWRSC026	4,4'-DDE			13.6	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC026	4,4'-DDT			13.6	UG/KG		
CWRSC026	Aldrin			6.8	UG/KG		
CWRSC026	Alpha-BHC			6.8	UG/KG		
CWRSC026	Alpha-Chlordane			6.8	UG/KG		
CWRSC026	Arochlor-1016			34	UG/KG		
CWRSC026	Arochlor-1221			34	UG/KG		
CWRSC026	Arochlor-1232			34	UG/KG		
CWRSC026	Arochlor-1242			34	UG/KG		
CWRSC026	Arochlor-1248			34	UG/KG		
CWRSC026	Arochlor-1254			34	UG/KG		
CWRSC026	Arochlor-1260			34	UG/KG		
CWRSC026	Beta-BHC			6.8	UG/KG		
CWRSC026	Chlordane			340	UG/KG		
CWRSC026	Delta-BHC			6.8	UG/KG		
CWRSC026	Dieldrin			13.6	UG/KG		
CWRSC026	Endosulfan I			6.8	UG/KG		
CWRSC026	Endosulfan II			13.6	UG/KG		
CWRSC026	Endosulfan Sulfate			13.6	UG/KG		
CWRSC026	Endrin			13.6	UG/KG		
CWRSC026	Endrin Aldehyde			13.6	UG/KG		
CWRSC026	Endrin Ketone			13.6	UG/KG		
CWRSC026	Gamma-BHC			6.8	UG/KG		
CWRSC026	gamma-Chlordane			6.8	UG/KG		
CWRSC026	Heptachlor			6.8	UG/KG		
CWRSC026	Heptachlor Epoxide			6.8	UG/KG		
CWRSC026	Methoxychlor			68	UG/KG		
CWRSC026	Toxaphene			340	UG/KG		
CWRSC026	1,1,1-Trichloroethane			1	UG/KG		
CWRSC026	1,1,2,2-Tetrachloroethane			1	UG/KG		
CWRSC026	1,1,2-Trichloroethane			1	UG/KG		
CWRSC026	1,1-Dichloroethane			1	UG/KG		
CWRSC026	1,1-Dichloroethene			1	UG/KG		
CWRSC026	1,2-Dichloroethane			1	UG/KG		
CWRSC026	1,2-Dichloroethene (total)			2	UG/KG		
CWRSC026	1,2-Dichloropropane			1	UG/KG		
CWRSC026	2-Butanone	15		5.1	UG/KG	J	c
CWRSC026	2-Hexanone			5.1	UG/KG		
CWRSC026	4-Methyl-2-Pentanone			5.1	UG/KG		
CWRSC026	Acetone			25.5	UG/KG		
CWRSC026	Benzene			1	UG/KG		
CWRSC026	Bromoform			1	UG/KG		
CWRSC026	Carbon Disulfide			5.1	UG/KG		
CWRSC026	Carbon Tetrachloride			1	UG/KG		
CWRSC026	Chlorobenzene			1	UG/KG		
CWRSC026	Chlorodibromomethane			1	UG/KG		
CWRSC026	Chloroethane			1	UG/KG		
CWRSC026	Chloroform			1	UG/KG		
CWRSC026	cis-1,3-Dichloropropylene			1	UG/KG		
CWRSC026	Dichlorobromomethane			1	UG/KG		
CWRSC026	Ethylbenzene			1	UG/KG		
CWRSC026	Methyl Bromide			1	UG/KG		
CWRSC026	Methyl Chloride			1	UG/KG		
CWRSC026	Methylene Chloride	0.68		5.1	UG/KG	J	q
CWRSC026	Styrene			1	UG/KG		
CWRSC026	Tetrachloroethene			1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC026	Toluene	83		1	UG/KG		
CWRSC026	Trans-1,3-Dichloropropene			1	UG/KG		
CWRSC026	Trichloroethene			1	UG/KG		
CWRSC026	Vinyl Chloride			1	UG/KG		
CWRSC026	Xylenes (Total)	1.1		3.1	UG/KG	J	q
CWRSC026	1,2,4-Trichlorobenzene			3400	UG/KG		
CWRSC026	1,2-Dichlorobenzene			3400	UG/KG		
CWRSC026	1,3-Dichlorobenzene			3400	UG/KG		
CWRSC026	1,4-Dichlorobenzene			3400	UG/KG		
CWRSC026	2,2'-oxybis(1-Chloropropane)			3400	UG/KG		
CWRSC026	2,4,5-Trichlorophenol			3400	UG/KG		
CWRSC026	2,4,6-Trichlorophenol			3400	UG/KG		
CWRSC026	2,4-Dichlorophenol			3400	UG/KG		
CWRSC026	2,4-Dimethylphenol			3400	UG/KG		
CWRSC026	2,4-Dinitrophenol			6800	UG/KG		
CWRSC026	2,4-Dinitrotoluene			3400	UG/KG		
CWRSC026	2,6-Dinitrotoluene			3400	UG/KG		
CWRSC026	2-Chloronaphthalene			3400	UG/KG		
CWRSC026	2-Chlorophenol			3400	UG/KG		
CWRSC026	2-Methyl-4,6-dinitrophenol			3400	UG/KG		
CWRSC026	2-Methylnaphthalene			3400	UG/KG		
CWRSC026	2-Nitroaniline			3400	UG/KG	UJ	c
CWRSC026	2-Nitrophenol			3400	UG/KG		
CWRSC026	3,3'-Dichlorobenzidine			6800	UG/KG		
CWRSC026	3-Nitroaniline			3400	UG/KG		
CWRSC026	4-Bromophenyl Phenyl Ether			3400	UG/KG		
CWRSC026	4-Chloro-3-Methylphenol			3400	UG/KG		
CWRSC026	4-Chloroaniline			6800	UG/KG		
CWRSC026	4-Chlorophenyl Phenyl Ether			3400	UG/KG		
CWRSC026	4-Nitroaniline			3400	UG/KG		
CWRSC026	4-Nitrophenol			3400	UG/KG		
CWRSC026	Acenaphthene			3400	UG/KG		
CWRSC026	Acenaphthylene			3400	UG/KG		
CWRSC026	Anthracene			3400	UG/KG		
CWRSC026	Benzo(a)anthracene			3400	UG/KG		
CWRSC026	Benzo(a)pyrene			3400	UG/KG		
CWRSC026	Benzo(b)fluoranthene			3400	UG/KG		
CWRSC026	Benzo(g,h,i)perylene			3400	UG/KG		
CWRSC026	Benzo(k)fluoranthene			3400	UG/KG		
CWRSC026	Bis(2-Chloroethoxy)methane			3400	UG/KG		
CWRSC026	Bis(2-Chloroethyl)ether			3400	UG/KG		
CWRSC026	Bis(2-Ethylhexyl)phthalate			3400	UG/KG		
CWRSC026	Butyl Benzyl Phthalate			3400	UG/KG		
CWRSC026	Carbazole			3400	UG/KG		
CWRSC026	Chrysene			3400	UG/KG	UJ	c
CWRSC026	Di-n-Butyl Phthalate			3400	UG/KG		
CWRSC026	Di-n-Octyl Phthalate			3400	UG/KG		
CWRSC026	Dibenzo(a,h)anthracene			3400	UG/KG		
CWRSC026	Dibenzofuran			3400	UG/KG		
CWRSC026	Diethyl Phthalate			3400	UG/KG		
CWRSC026	Dimethyl Phthalate			3400	UG/KG		
CWRSC026	Diphenylamine			3400	UG/KG		
CWRSC026	Fluoranthene			3400	UG/KG		
CWRSC026	Fluorene			3400	UG/KG		
CWRSC026	Hexachlorobenzene			3400	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC026	Hexachlorobutadiene			3400	UG/KG		
CWRSC026	Hexachlorocyclopentadiene			3400	UG/KG		
CWRSC026	Hexachloroethane			3400	UG/KG		
CWRSC026	Indeno(1,2,3-cd)pyrene			3400	UG/KG		
CWRSC026	Isophorone			3400	UG/KG		
CWRSC026	M,P-CRESOL			3400	UG/KG		
CWRSC026	N-Nitrosodipropylamine			3400	UG/KG		
CWRSC026	Naphthalene			3400	UG/KG		
CWRSC026	Nitrobenzene			3400	UG/KG		
CWRSC026	O-Cresol			3400	UG/KG		
CWRSC026	Pentachlorophenol			6800	UG/KG		
CWRSC026	Phenanthrene			3400	UG/KG		
CWRSC026	Phenol			3400	UG/KG		
CWRSC026	Pyrene			3400	UG/KG		
CWRSC027	Actinium-228	0.325	0.0446	0.0125	PCI/G		
CWRSC027	Americium-241	0	0	0.00254	PCI/G		
CWRSC027	Bismuth-212	0.222	0.0449	0.0267	PCI/G		
CWRSC027	Bismuth-214	0.31	0.0425	0.00602	PCI/G		
CWRSC027	Carbon-14	-0.0616	0.0559	0.0994	PCI/G		
CWRSC027	Cesium-137	0.00177	0.00322	0.00356	PCI/G		
CWRSC027	Cobalt-60	0.000106	0.00204	0.00365	PCI/G		
CWRSC027	Gross Alpha	7	2.14	1.43	PCI/G		
CWRSC027	Lead-210	0.334	0.0701	0.0558	PCI/G		
CWRSC027	Lead-212	0.357	0.0389	0.00544	PCI/G		
CWRSC027	Lead-214	0.349	0.0384	0.0063	PCI/G		
CWRSC027	Nonvolatile Beta	11.5	1.74	2.34	PCI/G		
CWRSC027	Plutonium-241	-0.228	0.159	0.3	PCI/G		
CWRSC027	Potassium-40	7.11	0.692	0.0281	PCI/G		
CWRSC027	Radium-223	-0.00318	0.0385	0.0605	PCI/G		
CWRSC027	Radium-226	0.385	0.0649	0.0291	PCI/G		
CWRSC027	Radium-228	0.325	0.0446	0.0125	PCI/G		
CWRSC027	Strontium-90	0.0238	0.0104	0.0175	PCI/G	J	c
CWRSC027	Thallium-208	0.114	0.0148	0.00341	PCI/G		
CWRSC027	Thorium-228	0.476	0.156	0.16	PCI/G		
CWRSC027	Thorium-230	0.428	0.125	0.0456	PCI/G		
CWRSC027	Thorium-232	0.362	0.116	0.0714	PCI/G		
CWRSC027	Thorium-234	0.333	0.0977	0.0661	PCI/G		
CWRSC027	Tritium	0.239	0.455	0.778	PCI/G		
CWRSC027	Uranium-233/234	0.35	0.0472	0.00996	PCI/G		
CWRSC027	Uranium-235	0.0283	0.0109	0.0107	PCI/G		
CWRSC027	Uranium-238	0.355	0.0476	0.00712	PCI/G		
CWRSC027	Antimony			6.2	MG/KG	R	m
CWRSC027	Arsenic	6.4		1	MG/KG		
CWRSC027	Barium	128		20.6	MG/KG		
CWRSC027	Beryllium	0.3		0.52	MG/KG		
CWRSC027	Cadmium			0.52	MG/KG		
CWRSC027	Chromium	88.7		1	MG/KG		
CWRSC027	Cobalt	15.8		5.2	MG/KG		
CWRSC027	Copper	27.2		2.6	MG/KG		
CWRSC027	Lead	5.6		0.31	MG/KG		
CWRSC027	Mercury	0.87		0.031	MG/KG	J	m
CWRSC027	Molybdenum	0.27		1	MG/KG	J	m
CWRSC027	Nickel	171		4.1	MG/KG		
CWRSC027	Selenium	1		0.52	MG/KG		
CWRSC027	Silver			1	MG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC027	Thallium			1	MG/KG		
CWRSC027	Vanadium	44.5		5.2	MG/KG		
CWRSC027	Zinc	51.9		2.1	MG/KG		
CWRSC027	Chromium, Hexavalent			0.206	MG/KG	UJ	md
CWRSC027	Nitrate	5.48		1	MG/KG		
CWRSC027	4,4'-DDD			6.9	UG/KG		
CWRSC027	4,4'-DDE			6.9	UG/KG		
CWRSC027	4,4'-DDT			6.9	UG/KG		
CWRSC027	Aldrin			3.4	UG/KG		
CWRSC027	Alpha-BHC			3.4	UG/KG		
CWRSC027	Alpha-Chlordane			3.4	UG/KG		
CWRSC027	Arochlor-1016			17.2	UG/KG		
CWRSC027	Arochlor-1221			17.2	UG/KG		
CWRSC027	Arochlor-1232			17.2	UG/KG		
CWRSC027	Arochlor-1242			17.2	UG/KG		
CWRSC027	Arochlor-1248			17.2	UG/KG		
CWRSC027	Arochlor-1254			17.2	UG/KG		
CWRSC027	Arochlor-1260			17.2	UG/KG		
CWRSC027	Beta-BHC			3.4	UG/KG		
CWRSC027	Chlordane			172	UG/KG		
CWRSC027	Delta-BHC			3.4	UG/KG		
CWRSC027	Dieldrin			6.9	UG/KG		
CWRSC027	Endosulfan I			3.4	UG/KG		
CWRSC027	Endosulfan II			6.9	UG/KG		
CWRSC027	Endosulfan Sulfate			6.9	UG/KG		
CWRSC027	Endrin			6.9	UG/KG		
CWRSC027	Endrin Aldehyde			6.9	UG/KG		
CWRSC027	Endrin Ketone			6.9	UG/KG		
CWRSC027	Gamma-BHC			3.4	UG/KG		
CWRSC027	gamma-Chlordane			3.4	UG/KG		
CWRSC027	Heptachlor			3.4	UG/KG		
CWRSC027	Heptachlor Epoxide			3.4	UG/KG		
CWRSC027	Methoxychlor			34.4	UG/KG		
CWRSC027	Toxaphene			172	UG/KG		
CWRSC027	1,1,1-Trichloroethane			1	UG/KG		
CWRSC027	1,1,2,2-Tetrachloroethane			1	UG/KG		
CWRSC027	1,1,2-Trichloroethane			1	UG/KG		
CWRSC027	1,1-Dichloroethane			1	UG/KG		
CWRSC027	1,1-Dichloroethene			1	UG/KG		
CWRSC027	1,2-Dichloroethane			1	UG/KG		
CWRSC027	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC027	1,2-Dichloropropane			1	UG/KG		
CWRSC027	2-Butanone	21		5.2	UG/KG	J	c
CWRSC027	2-Hexanone			5.2	UG/KG		
CWRSC027	4-Methyl-2-Pentanone			5.2	UG/KG		
CWRSC027	Acetone			25.8	UG/KG		
CWRSC027	Benzene			1	UG/KG		
CWRSC027	Bromoform			1	UG/KG		
CWRSC027	Carbon Disulfide			5.2	UG/KG		
CWRSC027	Carbon Tetrachloride			1	UG/KG		
CWRSC027	Chlorobenzene			1	UG/KG		
CWRSC027	Chlorodibromomethane			1	UG/KG		
CWRSC027	Chloroethane			1	UG/KG		
CWRSC027	Chloroform			1	UG/KG		
CWRSC027	cis-1,3-Dichloropropylene			1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC027	Dichlorobromomethane			1	UG/KG		
CWRSC027	Ethylbenzene			1	UG/KG		
CWRSC027	Methyl Bromide			1	UG/KG		
CWRSC027	Methyl Chloride			1	UG/KG		
CWRSC027	Methylene Chloride	0.9		5.2	UG/KG	J	q
CWRSC027	Styrene			1	UG/KG		
CWRSC027	Tetrachloroethene			1	UG/KG		
CWRSC027	Toluene	81.2		1	UG/KG		
CWRSC027	Trans-1,3-Dichloropropene			1	UG/KG		
CWRSC027	Trichloroethene			1	UG/KG		
CWRSC027	Vinyl Chloride			1	UG/KG		
CWRSC027	Xylenes (Total)	1.3		3.1	UG/KG	J	q
CWRSC027	1,2,4-Trichlorobenzene			1370	UG/KG		
CWRSC027	1,2-Dichlorobenzene			1370	UG/KG		
CWRSC027	1,3-Dichlorobenzene			1370	UG/KG		
CWRSC027	1,4-Dichlorobenzene			1370	UG/KG		
CWRSC027	2,2'-oxybis(1-Chloropropane)			1370	UG/KG		
CWRSC027	2,4,5-Trichlorophenol			1370	UG/KG		
CWRSC027	2,4,6-Trichlorophenol			1370	UG/KG		
CWRSC027	2,4-Dichlorophenol			1370	UG/KG		
CWRSC027	2,4-Dimethylphenol			1370	UG/KG		
CWRSC027	2,4-Dinitrophenol			2750	UG/KG		
CWRSC027	2,4-Dinitrotoluene			1370	UG/KG		
CWRSC027	2,6-Dinitrotoluene			1370	UG/KG		
CWRSC027	2-Chloronaphthalene			1370	UG/KG		
CWRSC027	2-Chlorophenol			1370	UG/KG		
CWRSC027	2-Methyl-4,6-dinitrophenol			1370	UG/KG		
CWRSC027	2-Methylnaphthalene			1370	UG/KG		
CWRSC027	2-Nitroaniline			1370	UG/KG	UJ	c
CWRSC027	2-Nitrophenol			1370	UG/KG		
CWRSC027	3,3'-Dichlorobenzidine			2750	UG/KG		
CWRSC027	3-Nitroaniline			1370	UG/KG		
CWRSC027	4-Bromophenyl Phenyl Ether			1370	UG/KG		
CWRSC027	4-Chloro-3-Methylphenol			1370	UG/KG		
CWRSC027	4-Chloroaniline			2750	UG/KG		
CWRSC027	4-Chlorophenyl Phenyl Ether			1370	UG/KG		
CWRSC027	4-Nitroaniline			1370	UG/KG		
CWRSC027	4-Nitrophenol			1370	UG/KG		
CWRSC027	Acenaphthene			1370	UG/KG		
CWRSC027	Acenaphthylene			1370	UG/KG		
CWRSC027	Anthracene			1370	UG/KG		
CWRSC027	Benzo(a)anthracene			1370	UG/KG		
CWRSC027	Benzo(a)pyrene			1370	UG/KG		
CWRSC027	Benzo(b)fluoranthene			1370	UG/KG		
CWRSC027	Benzo(g,h,i)perylene			1370	UG/KG		
CWRSC027	Benzo(k)fluoranthene			1370	UG/KG		
CWRSC027	Bis(2-Chloroethoxy)methane			1370	UG/KG		
CWRSC027	Bis(2-Chloroethyl)ether			1370	UG/KG		
CWRSC027	Bis(2-Ethylhexyl)phthalate			1370	UG/KG		
CWRSC027	Butyl Benzyl Phthalate			1370	UG/KG		
CWRSC027	Carbazole			1370	UG/KG		
CWRSC027	Chrysene			1370	UG/KG	UJ	c
CWRSC027	Di-n-Butyl Phthalate			1370	UG/KG		
CWRSC027	Di-n-Octyl Phthalate			1370	UG/KG		
CWRSC027	Dibenzo(a,h)anthracene			1370	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC027	Dibenzofuran			1370	UG/KG		
CWRSC027	Diethyl Phthalate			1370	UG/KG		
CWRSC027	Dimethyl Phthalate			1370	UG/KG		
CWRSC027	Diphenylamine			1370	UG/KG		
CWRSC027	Fluoranthene			1370	UG/KG		
CWRSC027	Fluorene			1370	UG/KG		
CWRSC027	Hexachlorobenzene			1370	UG/KG		
CWRSC027	Hexachlorobutadiene			1370	UG/KG		
CWRSC027	Hexachlorocyclopentadiene			1370	UG/KG		
CWRSC027	Hexachloroethane			1370	UG/KG		
CWRSC027	Indeno(1,2,3-cd)pyrene			1370	UG/KG		
CWRSC027	Isophorone			1370	UG/KG		
CWRSC027	M,P-CRESOL			1370	UG/KG		
CWRSC027	N-Nitrosodipropylamine			1370	UG/KG		
CWRSC027	Naphthalene			1370	UG/KG		
CWRSC027	Nitrobenzene			1370	UG/KG		
CWRSC027	O-Cresol			1370	UG/KG		
CWRSC027	Pentachlorophenol			2750	UG/KG		
CWRSC027	Phenanthrene			1370	UG/KG		
CWRSC027	Phenol			1370	UG/KG		
CWRSC027	Pyrene			1370	UG/KG		
CWRSC028	Actinium-228	0.437	0.0619	0.0222	PCI/G		
CWRSC028	Americium-241	0.00144	0.00283	0.00587	PCI/G		
CWRSC028	Bismuth-212	0.326	0.0758	0.0471	PCI/G		
CWRSC028	Bismuth-214	0.354	0.0535	0.0113	PCI/G		
CWRSC028	Carbon-14	-0.0304	0.057	0.0996	PCI/G		
CWRSC028	Cesium-137	0.00785	0.00432	0.00619	PCI/G		
CWRSC028	Cobalt-60	0.00108	0.00376	0.00662	PCI/G		
CWRSC028	Gross Alpha	7.89	2.3	2.25	PCI/G		
CWRSC028	Lead-210	0.171	0.529	0.678	PCI/G		
CWRSC028	Lead-212	0.463	0.0508	0.00938	PCI/G		
CWRSC028	Lead-214	0.39	0.0486	0.0113	PCI/G		
CWRSC028	Nonvolatile Beta	13.4	1.64	1.99	PCI/G		
CWRSC028	Plutonium-241	-0.0593	0.191	0.349	PCI/G		
CWRSC028	Potassium-40	9.29	1	0.051	PCI/G		
CWRSC028	Radium-223	0.0128	0.0724	0.109	PCI/G		
CWRSC028	Radium-226	0.426	0.0917	0.0497	PCI/G		
CWRSC028	Radium-228	0.437	0.0619	0.0222	PCI/G		
CWRSC028	Strontium-90	0.0207	0.0133	0.0233	PCI/G	UJ	c
CWRSC028	Thallium-208	0.159	0.0235	0.00613	PCI/G		
CWRSC028	Thorium-228	0.333	0.172	0.23	PCI/G		
CWRSC028	Thorium-230	0.407	0.148	0.0685	PCI/G		
CWRSC028	Thorium-232	0.299	0.123	0.0685	PCI/G		
CWRSC028	Thorium-234	0.705	0.329	0.281	PCI/G		
CWRSC028	Tritium	0.117	0.438	0.761	PCI/G		
CWRSC028	Uranium-233/234	0.407	0.0538	0.0135	PCI/G		
CWRSC028	Uranium-235	0.0299	0.0103	0.00587	PCI/G		
CWRSC028	Uranium-238	0.44	0.0568	0.00733	PCI/G		
CWRSC028	Antimony			6	MG/KG	R	m
CWRSC028	Arsenic	7.4		1	MG/KG		
CWRSC028	Barium	151		20.1	MG/KG		
CWRSC028	Beryllium	0.35		0.5	MG/KG		
CWRSC028	Cadmium			0.5	MG/KG		
CWRSC028	Chromium	117		1	MG/KG		
CWRSC028	Cobalt	18.9		5	MG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC028	Copper	32.3		2.5	MG/KG		
CWRSC028	Lead	6.3		0.3	MG/KG		
CWRSC028	Mercury	0.43		0.034	MG/KG	J	m
CWRSC028	Molybdenum	0.29		1	MG/KG	J	m
CWRSC028	Nickel	216		4	MG/KG		
CWRSC028	Selenium	1.5		0.5	MG/KG		
CWRSC028	Silver			1	MG/KG		
CWRSC028	Thallium			1	MG/KG		
CWRSC028	Vanadium	50.8		5	MG/KG		
CWRSC028	Zinc	60.3		2	MG/KG		
CWRSC028	Chromium, Hexavalent			0.212	MG/KG	UJ	md
CWRSC028	Nitrate	7.82		1	MG/KG		
CWRSC028	4,4'-DDD			7.1	UG/KG		
CWRSC028	4,4'-DDE			7.1	UG/KG		
CWRSC028	4,4'-DDT			7.1	UG/KG		
CWRSC028	Aldrin			3.5	UG/KG		
CWRSC028	Alpha-BHC			3.5	UG/KG		
CWRSC028	Alpha-Chlordane			3.5	UG/KG		
CWRSC028	Arochlor-1016			17.7	UG/KG		
CWRSC028	Arochlor-1221			17.7	UG/KG		
CWRSC028	Arochlor-1232			17.7	UG/KG		
CWRSC028	Arochlor-1242			17.7	UG/KG		
CWRSC028	Arochlor-1248			17.7	UG/KG		
CWRSC028	Arochlor-1254			17.7	UG/KG		
CWRSC028	Arochlor-1260			17.7	UG/KG		
CWRSC028	Beta-BHC			3.5	UG/KG		
CWRSC028	Chlordane			177	UG/KG		
CWRSC028	Delta-BHC			3.5	UG/KG		
CWRSC028	Dieldrin			7.1	UG/KG		
CWRSC028	Endosulfan I			3.5	UG/KG		
CWRSC028	Endosulfan II			7.1	UG/KG		
CWRSC028	Endosulfan Sulfate			7.1	UG/KG		
CWRSC028	Endrin			7.1	UG/KG		
CWRSC028	Endrin Aldehyde			7.1	UG/KG		
CWRSC028	Endrin Ketone			7.1	UG/KG		
CWRSC028	Gamma-BHC			3.5	UG/KG		
CWRSC028	gamma-Chlordane			3.5	UG/KG		
CWRSC028	Heptachlor			3.5	UG/KG		
CWRSC028	Heptachlor Epoxide			3.5	UG/KG		
CWRSC028	Methoxychlor			35.5	UG/KG		
CWRSC028	Toxaphene			177	UG/KG		
CWRSC028	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC028	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC028	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC028	1,1-Dichloroethane			1.1	UG/KG		
CWRSC028	1,1-Dichloroethene			1.1	UG/KG		
CWRSC028	1,2-Dichloroethane			1.1	UG/KG		
CWRSC028	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC028	1,2-Dichloropropane			1.1	UG/KG		
CWRSC028	2-Butanone	26.2		5.3	UG/KG	J	c
CWRSC028	2-Hexanone			5.3	UG/KG		
CWRSC028	4-Methyl-2-Pentanone			5.3	UG/KG		
CWRSC028	Acetone			26.6	UG/KG		
CWRSC028	Benzene			1.1	UG/KG		
CWRSC028	Bromoform			1.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC028	Carbon Disulfide			5.3	UG/KG		
CWRSC028	Carbon Tetrachloride			1.1	UG/KG		
CWRSC028	Chlorobenzene			1.1	UG/KG		
CWRSC028	Chlorodibromomethane			1.1	UG/KG		
CWRSC028	Chloroethane			1.1	UG/KG		
CWRSC028	Chloroform			1.1	UG/KG		
CWRSC028	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC028	Dichlorobromomethane			1.1	UG/KG		
CWRSC028	Ethylbenzene			1.1	UG/KG		
CWRSC028	Methyl Bromide			1.1	UG/KG		
CWRSC028	Methyl Chloride			1.1	UG/KG		
CWRSC028	Methylene Chloride	0.95		5.3	UG/KG	J	q
CWRSC028	Styrene			1.1	UG/KG		
CWRSC028	Tetrachloroethene			1.1	UG/KG		
CWRSC028	Toluene	104		1.1	UG/KG		
CWRSC028	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC028	Trichloroethene			1.1	UG/KG		
CWRSC028	Vinyl Chloride			1.1	UG/KG		
CWRSC028	Xylenes (Total)	1.4		3.2	UG/KG	J	q
CWRSC028	1,2,4-Trichlorobenzene			3550	UG/KG		
CWRSC028	1,2-Dichlorobenzene			3550	UG/KG		
CWRSC028	1,3-Dichlorobenzene			3550	UG/KG		
CWRSC028	1,4-Dichlorobenzene			3550	UG/KG		
CWRSC028	2,2'-oxybis(1-Chloropropane)			3550	UG/KG		
CWRSC028	2,4,5-Trichlorophenol			3550	UG/KG		
CWRSC028	2,4,6-Trichlorophenol			3550	UG/KG		
CWRSC028	2,4-Dichlorophenol			3550	UG/KG		
CWRSC028	2,4-Dimethylphenol			3550	UG/KG		
CWRSC028	2,4-Dinitrophenol			7090	UG/KG		
CWRSC028	2,4-Dinitrotoluene			3550	UG/KG		
CWRSC028	2,6-Dinitrotoluene			3550	UG/KG		
CWRSC028	2-Chloronaphthalene			3550	UG/KG		
CWRSC028	2-Chlorophenol			3550	UG/KG		
CWRSC028	2-Methyl-4,6-dinitrophenol			3550	UG/KG		
CWRSC028	2-Methylnaphthalene			3550	UG/KG		
CWRSC028	2-Nitroaniline			3550	UG/KG	UJ	c
CWRSC028	2-Nitrophenol			3550	UG/KG		
CWRSC028	3,3'-Dichlorobenzidine			7090	UG/KG		
CWRSC028	3-Nitroaniline			3550	UG/KG		
CWRSC028	4-Bromophenyl Phenyl Ether			3550	UG/KG		
CWRSC028	4-Chloro-3-Methylphenol			3550	UG/KG		
CWRSC028	4-Chloroaniline			7090	UG/KG		
CWRSC028	4-Chlorophenyl Phenyl Ether			3550	UG/KG		
CWRSC028	4-Nitroaniline			3550	UG/KG		
CWRSC028	4-Nitrophenol			3550	UG/KG		
CWRSC028	Acenaphthene			3550	UG/KG		
CWRSC028	Acenaphthylene			3550	UG/KG		
CWRSC028	Anthracene			3550	UG/KG		
CWRSC028	Benzo(a)anthracene			3550	UG/KG		
CWRSC028	Benzo(a)pyrene			3550	UG/KG		
CWRSC028	Benzo(b)fluoranthene			3550	UG/KG		
CWRSC028	Benzo(g,h,i)perylene			3550	UG/KG	UJ	c
CWRSC028	Benzo(k)fluoranthene			3550	UG/KG		
CWRSC028	Bis(2-Chloroethoxy)methane			3550	UG/KG		
CWRSC028	Bis(2-Chloroethyl)ether			3550	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC028	Bis(2-Ethylhexyl)phthalate			3550	UG/KG		
CWRSC028	Butyl Benzyl Phthalate			3550	UG/KG		
CWRSC028	Carbazole			3550	UG/KG		
CWRSC028	Chrysene			3550	UG/KG		
CWRSC028	Di-n-Butyl Phthalate			3550	UG/KG		
CWRSC028	Di-n-Octyl Phthalate			3550	UG/KG		
CWRSC028	Dibenzo(a,h)anthracene			3550	UG/KG	UJ	c
CWRSC028	Dibenzofuran			3550	UG/KG		
CWRSC028	Diethyl Phthalate			3550	UG/KG		
CWRSC028	Dimethyl Phthalate			3550	UG/KG		
CWRSC028	Diphenylamine			3550	UG/KG		
CWRSC028	Fluoranthene			3550	UG/KG		
CWRSC028	Fluorene			3550	UG/KG		
CWRSC028	Hexachlorobenzene			3550	UG/KG		
CWRSC028	Hexachlorobutadiene			3550	UG/KG		
CWRSC028	Hexachlorocyclopentadiene			3550	UG/KG		
CWRSC028	Hexachloroethane			3550	UG/KG		
CWRSC028	Indeno(1,2,3-cd)pyrene			3550	UG/KG	UJ	c
CWRSC028	Isophorone			3550	UG/KG		
CWRSC028	M,P-CRESOL			3550	UG/KG		
CWRSC028	N-Nitrosodipropylamine			3550	UG/KG		
CWRSC028	Naphthalene			3550	UG/KG		
CWRSC028	Nitrobenzene			3550	UG/KG		
CWRSC028	O-Cresol			3550	UG/KG		
CWRSC028	Pentachlorophenol			7090	UG/KG		
CWRSC028	Phenanthrene			3550	UG/KG		
CWRSC028	Phenol			3550	UG/KG		
CWRSC028	Pyrene			3550	UG/KG		
CWRSC029	Actinium-228	0.524	0.0792	0.0159	PCI/G		
CWRSC029	Americium-241	0.00186	0.00264	0.00279	PCI/G		
CWRSC029	Carbon-14	-0.0379	0.0566	0.0994	PCI/G		
CWRSC029	Cesium-137	0.00115	0.00295	0.00461	PCI/G		
CWRSC029	Cobalt-60	0.000926	0.00297	0.00525	PCI/G		
CWRSC029	Lead-210	0.676	1.21	1.98	PCI/G		
CWRSC029	Lead-212	0.532	0.0588	0.00765	PCI/G		
CWRSC029	Potassium-40	11	1.25	0.033	PCI/G		
CWRSC029	Radium-223	0.0266	0.0554	0.0858	PCI/G		
CWRSC029	Radium-226	0.527	0.0704	0.0289	PCI/G		
CWRSC029	Radium-228	0.524	0.0792	0.0159	PCI/G		
CWRSC029	Strontium-90	0.00927	0.0145	0.0263	PCI/G	UJ	c
CWRSC029	Uranium-233/234	0.436	0.0559	0.0107	PCI/G		
CWRSC029	Uranium-235	0.0254	0.00952	0.00714	PCI/G		
CWRSC029	Uranium-238	0.457	0.0579	0.00569	PCI/G		
CWRSC029	Antimony			6.4	MG/KG	R	m
CWRSC029	Arsenic	7.2		1.1	MG/KG		
CWRSC029	Cadmium			0.53	MG/KG		
CWRSC029	Lead	6.4		0.32	MG/KG		
CWRSC029	Mercury	9		0.35	MG/KG	J	m
CWRSC029	Selenium	1.3		0.53	MG/KG		
CWRSC029	Silver			1.1	MG/KG		
CWRSC029	Thallium			1.1	MG/KG		
CWRSC029	Nitrate	5.29		1	MG/KG		
CWRSC029	4,4'-DDD			1.4	UG/KG		
CWRSC029	4,4'-DDE			1.4	UG/KG		
CWRSC029	4,4'-DDT			1.4	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC029	Aldrin			0.72	UG/KG		
CWRSC029	Alpha-BHC			0.72	UG/KG		
CWRSC029	Alpha-Chlordane	0.23		0.72	UG/KG	J	qv
CWRSC029	Arochlor-1016			3.6	UG/KG		
CWRSC029	Arochlor-1221			3.6	UG/KG		
CWRSC029	Arochlor-1232			3.6	UG/KG		
CWRSC029	Arochlor-1242			3.6	UG/KG		
CWRSC029	Arochlor-1248			3.6	UG/KG		
CWRSC029	Arochlor-1254			3.6	UG/KG		
CWRSC029	Arochlor-1260			3.6	UG/KG		
CWRSC029	Beta-BHC			0.72	UG/KG		
CWRSC029	Chlordane	1.5		35.8	UG/KG	J	q
CWRSC029	Delta-BHC			0.72	UG/KG		
CWRSC029	Dieldrin			1.4	UG/KG		
CWRSC029	Endosulfan I			0.72	UG/KG		
CWRSC029	Endosulfan II			1.4	UG/KG		
CWRSC029	Endosulfan Sulfate			1.4	UG/KG		
CWRSC029	Endrin			1.4	UG/KG		
CWRSC029	Endrin Aldehyde			1.4	UG/KG		
CWRSC029	Endrin Ketone			1.4	UG/KG		
CWRSC029	Gamma-BHC			0.72	UG/KG		
CWRSC029	gamma-Chlordane	0.27		0.72	UG/KG	J	qv
CWRSC029	Heptachlor			0.72	UG/KG		
CWRSC029	Heptachlor Epoxide			0.72	UG/KG		
CWRSC029	Methoxychlor			7.2	UG/KG		
CWRSC029	Toxaphene			35.8	UG/KG		
CWRSC029	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC029	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC029	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC029	1,1-Dichloroethane			1.1	UG/KG		
CWRSC029	1,1-Dichloroethene			1.1	UG/KG		
CWRSC029	1,2-Dichloroethane			1.1	UG/KG		
CWRSC029	1,2-Dichloroethene (total)			2.2	UG/KG		
CWRSC029	1,2-Dichloropropane			1.1	UG/KG		
CWRSC029	2-Hexanone			5.4	UG/KG		
CWRSC029	4-Methyl-2-Pentanone			5.4	UG/KG		
CWRSC029	Acetone			26.9	UG/KG		
CWRSC029	Benzene			1.1	UG/KG		
CWRSC029	Bromoform			1.1	UG/KG		
CWRSC029	Carbon Disulfide			5.4	UG/KG		
CWRSC029	Carbon Tetrachloride			1.1	UG/KG		
CWRSC029	Chlorobenzene			1.1	UG/KG		
CWRSC029	Chlorodibromomethane			1.1	UG/KG		
CWRSC029	Chloroethane			1.1	UG/KG		
CWRSC029	Chloroform			1.1	UG/KG		
CWRSC029	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC029	Dichlorobromomethane			1.1	UG/KG		
CWRSC029	Methyl Bromide			1.1	UG/KG		
CWRSC029	Methyl Chloride			1.1	UG/KG		
CWRSC029	Methylene Chloride	1.1		5.4	UG/KG	J	q
CWRSC029	Styrene			1.1	UG/KG		
CWRSC029	Tetrachloroethene			1.1	UG/KG		
CWRSC029	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC029	Trichloroethene			1.1	UG/KG		
CWRSC029	Vinyl Chloride			1.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC029	1,2,4-Trichlorobenzene			358	UG/KG		
CWRSC029	1,2-Dichlorobenzene			358	UG/KG		
CWRSC029	1,3-Dichlorobenzene			358	UG/KG		
CWRSC029	1,4-Dichlorobenzene			358	UG/KG		
CWRSC029	2,2'-oxybis(1-Chloropropane)			358	UG/KG		
CWRSC029	2,4,5-Trichlorophenol			358	UG/KG		
CWRSC029	2,4,6-Trichlorophenol			358	UG/KG		
CWRSC029	2,4-Dichlorophenol			358	UG/KG		
CWRSC029	2,4-Dimethylphenol			358	UG/KG		
CWRSC029	2,4-Dinitrophenol			717	UG/KG		
CWRSC029	2,4-Dinitrotoluene			358	UG/KG		
CWRSC029	2,6-Dinitrotoluene			358	UG/KG		
CWRSC029	2-Chloronaphthalene			358	UG/KG		
CWRSC029	2-Chlorophenol			358	UG/KG		
CWRSC029	2-Methyl-4,6-dinitrophenol			358	UG/KG		
CWRSC029	2-Methylnaphthalene			358	UG/KG		
CWRSC029	2-Nitroaniline			358	UG/KG	UJ	c
CWRSC029	2-Nitrophenol			358	UG/KG		
CWRSC029	3,3'-Dichlorobenzidine			717	UG/KG		
CWRSC029	3-Nitroaniline			358	UG/KG		
CWRSC029	4-Bromophenyl Phenyl Ether			358	UG/KG		
CWRSC029	4-Chloro-3-Methylphenol			358	UG/KG		
CWRSC029	4-Chloroaniline			717	UG/KG		
CWRSC029	4-Chlorophenyl Phenyl Ether			358	UG/KG		
CWRSC029	4-Nitroaniline			358	UG/KG		
CWRSC029	4-Nitrophenol			358	UG/KG		
CWRSC029	Acenaphthene			358	UG/KG		
CWRSC029	Acenaphthylene			358	UG/KG		
CWRSC029	Anthracene			358	UG/KG		
CWRSC029	Benzo(a)anthracene			358	UG/KG		
CWRSC029	Benzo(a)pyrene			358	UG/KG		
CWRSC029	Benzo(b)fluoranthene			358	UG/KG		
CWRSC029	Benzo(g,h,i)perylene			358	UG/KG	UJ	c
CWRSC029	Benzo(k)fluoranthene			358	UG/KG		
CWRSC029	Bis(2-Chloroethoxy)methane			358	UG/KG		
CWRSC029	Bis(2-Chloroethyl)ether			358	UG/KG		
CWRSC029	Bis(2-Ethylhexyl)phthalate			358	UG/KG		
CWRSC029	Butyl Benzyl Phthalate			358	UG/KG		
CWRSC029	Carbazole			358	UG/KG		
CWRSC029	Chrysene			358	UG/KG	UJ	c
CWRSC029	Di-n-Butyl Phthalate			358	UG/KG		
CWRSC029	Di-n-Octyl Phthalate			358	UG/KG		
CWRSC029	Dibenzo(a,h)anthracene			358	UG/KG	UJ	c
CWRSC029	Dibenzofuran			358	UG/KG		
CWRSC029	Diethyl Phthalate			358	UG/KG	UJ	c
CWRSC029	Dimethyl Phthalate			358	UG/KG		
CWRSC029	Diphenylamine			358	UG/KG		
CWRSC029	Fluoranthene			358	UG/KG		
CWRSC029	Fluorene			358	UG/KG		
CWRSC029	Hexachlorobenzene			358	UG/KG		
CWRSC029	Hexachlorobutadiene			358	UG/KG		
CWRSC029	Hexachlorocyclopentadiene			358	UG/KG		
CWRSC029	Hexachloroethane			358	UG/KG		
CWRSC029	Indeno(1,2,3-cd)pyrene			358	UG/KG	UJ	c
CWRSC029	Isophorone			358	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC029	M,P-CRESOL			358	UG/KG		
CWRSC029	N-Nitrosodipropylamine			358	UG/KG		
CWRSC029	Naphthalene			358	UG/KG		
CWRSC029	Nitrobenzene			358	UG/KG		
CWRSC029	O-Cresol			358	UG/KG		
CWRSC029	Pentachlorophenol			717	UG/KG		
CWRSC029	Phenanthrene			358	UG/KG		
CWRSC029	Phenol			358	UG/KG		
CWRSC029	Pyrene			358	UG/KG	UJ	c
CWRSC030	Bismuth-212	0.351	0.0746	0.0382	PCI/G		
CWRSC030	Bismuth-214	0.432	0.0784	0.00884	PCI/G		
CWRSC030	Gross Alpha	9.79	2.58	2	PCI/G		
CWRSC030	Lead-214	0.472	0.0624	0.00889	PCI/G		
CWRSC030	Nonvolatile Beta	12.4	1.71	2.07	PCI/G		
CWRSC030	Plutonium-241	0.0986	0.216	0.387	PCI/G		
CWRSC030	Thallium-208	0.176	0.0306	0.00495	PCI/G		
CWRSC030	Thorium-228	0.547	0.228	0.261	PCI/G		
CWRSC030	Thorium-230	0.436	0.164	0.0792	PCI/G		
CWRSC030	Thorium-232	0.433	0.162	0.0342	PCI/G		
CWRSC030	Thorium-234	0.743	0.311	0.234	PCI/G		
CWRSC030	Tritium	0.256	0.487	0.833	PCI/G		
CWRSC030	Uranium-235	0.0253	0.01	0.0101	PCI/G		
CWRSC030	Uranium-238	0.457	0.0571	0.00939	PCI/G		
CWRSC030	Barium	172		20.9	MG/KG		
CWRSC030	Beryllium	0.39		0.52	MG/KG		
CWRSC030	Chromium	111		1	MG/KG		
CWRSC030	Cobalt	20.4		5.2	MG/KG		
CWRSC030	Copper	35.3		2.6	MG/KG		
CWRSC030	Molybdenum	0.31		1	MG/KG	J	m
CWRSC030	Nickel	222		4.2	MG/KG		
CWRSC030	Vanadium	51.6		5.2	MG/KG		
CWRSC030	Zinc	62.4		2.1	MG/KG		
CWRSC030	Chromium, Hexavalent	0.107		0.214	MG/KG	J	md
CWRSC030	2-Butanone	37.2		5.4	UG/KG	J	c
CWRSC030	Ethylbenzene	0.8		1.1	UG/KG	J	q
CWRSC030DL	Toluene	39		2.2	UG/KG		
CWRSC031	Actinium-228	0.407	0.0603	0.0141	PCI/G		
CWRSC031	Americium-241	0.000795	0.00159	0.00239	PCI/G		
CWRSC031	Bismuth-212	0.239	0.0442	0.0299	PCI/G		
CWRSC031	Bismuth-214	0.332	0.0377	0.00708	PCI/G		
CWRSC031	Carbon-14	-0.0479	0.0565	0.0998	PCI/G		
CWRSC031	Cesium-137	0.00795	0.00379	0.00387	PCI/G		
CWRSC031	Cobalt-60	0.00226	0.0026	0.00464	PCI/G		
CWRSC031	Gross Alpha	8.19	2.47	2.92	PCI/G		
CWRSC031	Lead-210	0.479	0.594	0.604	PCI/G		
CWRSC031	Lead-212	0.425	0.0442	0.00645	PCI/G		
CWRSC031	Lead-214	0.389	0.0431	0.0076	PCI/G		
CWRSC031	Nonvolatile Beta	11.9	1.71	2.28	PCI/G		
CWRSC031	Plutonium-241	-0.101	0.192	0.354	PCI/G		
CWRSC031	Potassium-40	9.16	0.94	0.034	PCI/G		
CWRSC031	Radium-223	0.0186	0.0421	0.0734	PCI/G		
CWRSC031	Radium-226	0.477	0.0812	0.0325	PCI/G		
CWRSC031	Radium-228	0.407	0.0603	0.0141	PCI/G		
CWRSC031	Strontium-90	1.13	0.0322	0.0176	PCI/G	J	c
CWRSC031	Thallium-208	0.131	0.0145	0.00383	PCI/G		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC031	Thorium-228	0.5	0.152	0.112	PCI/G		
CWRSC031	Thorium-230	0.441	0.131	0.0492	PCI/G		
CWRSC031	Thorium-232	0.326	0.108	0.0212	PCI/G		
CWRSC031	Thorium-234	0.511	0.244	0.186	PCI/G		
CWRSC031	Tritium	-0.13	0.473	0.848	PCI/G		
CWRSC031	Uranium-233/234	0.392	0.0517	0.0115	PCI/G		
CWRSC031	Uranium-235	0.0249	0.0104	0.0109	PCI/G		
CWRSC031	Uranium-238	0.404	0.0527	0.00721	PCI/G		
CWRSC031	Antimony			5.8	MG/KG	R	m
CWRSC031	Arsenic	6.9		0.97	MG/KG		
CWRSC031	Barium	142		19.5	MG/KG		
CWRSC031	Beryllium	0.31		0.49	MG/KG		
CWRSC031	Cadmium			0.49	MG/KG		
CWRSC031	Chromium	103		0.97	MG/KG		
CWRSC031	Cobalt	15.6		4.9	MG/KG		
CWRSC031	Copper	32.3		2.4	MG/KG		
CWRSC031	Lead	5.9		0.29	MG/KG		
CWRSC031	Mercury	0.61		0.034	MG/KG	J	m
CWRSC031	Molybdenum	0.23		0.97	MG/KG	J	m
CWRSC031	Nickel	179		3.9	MG/KG		
CWRSC031	Selenium	1.1		0.49	MG/KG		
CWRSC031	Silver			0.97	MG/KG		
CWRSC031	Thallium			0.97	MG/KG		
CWRSC031	Vanadium	46.8		4.9	MG/KG		
CWRSC031	Zinc	56.9		1.9	MG/KG		
CWRSC031	Chromium, Hexavalent	0.104		0.208	MG/KG	J	md
CWRSC031	Nitrate	8.43		1	MG/KG		
CWRSC031	4,4'-DDD			13.9	UG/KG		
CWRSC031	4,4'-DDE			13.9	UG/KG		
CWRSC031	4,4'-DDT			13.9	UG/KG	UJ	c
CWRSC031	Aldrin			6.9	UG/KG		
CWRSC031	Alpha-BHC			6.9	UG/KG		
CWRSC031	Alpha-Chlordane			6.9	UG/KG		
CWRSC031	Arochlor-1016			34.7	UG/KG		
CWRSC031	Arochlor-1221			34.7	UG/KG		
CWRSC031	Arochlor-1232			34.7	UG/KG		
CWRSC031	Arochlor-1242			34.7	UG/KG		
CWRSC031	Arochlor-1248			34.7	UG/KG		
CWRSC031	Arochlor-1254			34.7	UG/KG		
CWRSC031	Arochlor-1260			34.7	UG/KG		
CWRSC031	Beta-BHC			6.9	UG/KG		
CWRSC031	Chlordane			347	UG/KG		
CWRSC031	Delta-BHC			6.9	UG/KG		
CWRSC031	Dieldrin			13.9	UG/KG		
CWRSC031	Endosulfan I			6.9	UG/KG		
CWRSC031	Endosulfan II			13.9	UG/KG		
CWRSC031	Endosulfan Sulfate			13.9	UG/KG		
CWRSC031	Endrin			13.9	UG/KG		
CWRSC031	Endrin Aldehyde			13.9	UG/KG		
CWRSC031	Endrin Ketone			13.9	UG/KG		
CWRSC031	Gamma-BHC			6.9	UG/KG		
CWRSC031	gamma-Chlordane			6.9	UG/KG		
CWRSC031	Heptachlor			6.9	UG/KG		
CWRSC031	Heptachlor Epoxide			6.9	UG/KG		
CWRSC031	Methoxychlor			69.4	UG/KG	UJ	c

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC031	Toxaphene			347	UG/KG		
CWRSC031	1,1,1-Trichloroethane			1	UG/KG		
CWRSC031	1,1,2,2-Tetrachloroethane			1	UG/KG		
CWRSC031	1,1,2-Trichloroethane			1	UG/KG		
CWRSC031	1,1-Dichloroethane			1	UG/KG		
CWRSC031	1,1-Dichloroethene			1	UG/KG		
CWRSC031	1,2-Dichloroethane			1	UG/KG		
CWRSC031	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC031	1,2-Dichloropropane			1	UG/KG		
CWRSC031	2-Butanone	26.2		5.2	UG/KG	J	c
CWRSC031	2-Hexanone			5.2	UG/KG		
CWRSC031	4-Methyl-2-Pentanone			5.2	UG/KG		
CWRSC031	Acetone			26	UG/KG		
CWRSC031	Benzene			1	UG/KG		
CWRSC031	Bromoform			1	UG/KG		
CWRSC031	Carbon Disulfide			5.2	UG/KG		
CWRSC031	Carbon Tetrachloride			1	UG/KG		
CWRSC031	Chlorobenzene			1	UG/KG		
CWRSC031	Chlorodibromomethane			1	UG/KG		
CWRSC031	Chloroethane			1	UG/KG		
CWRSC031	Chloroform			1	UG/KG		
CWRSC031	cis-1,3-Dichloropropylene			1	UG/KG		
CWRSC031	Dichlorobromomethane			1	UG/KG		
CWRSC031	Ethylbenzene	0.71		1	UG/KG	J	q
CWRSC031	Methyl Bromide			1	UG/KG		
CWRSC031	Methyl Chloride			1	UG/KG		
CWRSC031	Methylene Chloride	0.87		5.2	UG/KG	J	q
CWRSC031	Styrene			1	UG/KG		
CWRSC031	Tetrachloroethene			1	UG/KG		
CWRSC031	Trans-1,3-Dichloropropene			1	UG/KG		
CWRSC031	Trichloroethene			1	UG/KG		
CWRSC031	Vinyl Chloride			1	UG/KG		
CWRSC031	Xylenes (Total)	2.9		3.1	UG/KG	J	q
CWRSC031	1,2,4-Trichlorobenzene			3470	UG/KG		
CWRSC031	1,2-Dichlorobenzene			3470	UG/KG		
CWRSC031	1,3-Dichlorobenzene			3470	UG/KG		
CWRSC031	1,4-Dichlorobenzene			3470	UG/KG		
CWRSC031	2,2'-oxybis(1-Chloropropane)			3470	UG/KG		
CWRSC031	2,4,5-Trichlorophenol			3470	UG/KG		
CWRSC031	2,4,6-Trichlorophenol			3470	UG/KG		
CWRSC031	2,4-Dichlorophenol			3470	UG/KG		
CWRSC031	2,4-Dimethylphenol			3470	UG/KG		
CWRSC031	2,4-Dinitrophenol			6940	UG/KG		
CWRSC031	2,4-Dinitrotoluene			3470	UG/KG		
CWRSC031	2,6-Dinitrotoluene			3470	UG/KG		
CWRSC031	2-Chloronaphthalene			3470	UG/KG		
CWRSC031	2-Chlorophenol			3470	UG/KG		
CWRSC031	2-Methyl-4,6-dinitrophenol			3470	UG/KG		
CWRSC031	2-Methylnaphthalene			3470	UG/KG		
CWRSC031	2-Nitroaniline			3470	UG/KG	UJ	c
CWRSC031	2-Nitrophenol			3470	UG/KG		
CWRSC031	3,3'-Dichlorobenzidine			6940	UG/KG		
CWRSC031	3-Nitroaniline			3470	UG/KG		
CWRSC031	4-Bromophenyl Phenyl Ether			3470	UG/KG		
CWRSC031	4-Chloro-3-Methylphenol			3470	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC031	4-Chloroaniline			6940	UG/KG		
CWRSC031	4-Chlorophenyl Phenyl Ether			3470	UG/KG		
CWRSC031	4-Nitroaniline			3470	UG/KG		
CWRSC031	4-Nitrophenol			3470	UG/KG		
CWRSC031	Acenaphthene			3470	UG/KG		
CWRSC031	Acenaphthylene			3470	UG/KG		
CWRSC031	Anthracene			3470	UG/KG		
CWRSC031	Benzo(a)anthracene			3470	UG/KG		
CWRSC031	Benzo(a)pyrene			3470	UG/KG		
CWRSC031	Benzo(b)fluoranthene			3470	UG/KG		
CWRSC031	Benzo(g,h,i)perylene			3470	UG/KG		
CWRSC031	Benzo(k)fluoranthene			3470	UG/KG		
CWRSC031	Bis(2-Chloroethoxy)methane			3470	UG/KG		
CWRSC031	Bis(2-Chloroethyl)ether			3470	UG/KG		
CWRSC031	Bis(2-Ethylhexyl)phthalate			3470	UG/KG		
CWRSC031	Butyl Benzyl Phthalate			3470	UG/KG		
CWRSC031	Carbazole			3470	UG/KG		
CWRSC031	Chrysene			3470	UG/KG	UJ	c
CWRSC031	Di-n-Butyl Phthalate			3470	UG/KG		
CWRSC031	Di-n-Octyl Phthalate			3470	UG/KG		
CWRSC031	Dibenzo(a,h)anthracene			3470	UG/KG		
CWRSC031	Dibenzofuran			3470	UG/KG		
CWRSC031	Diethyl Phthalate			3470	UG/KG		
CWRSC031	Dimethyl Phthalate			3470	UG/KG		
CWRSC031	Diphenylamine			3470	UG/KG		
CWRSC031	Fluoranthene			3470	UG/KG		
CWRSC031	Fluorene			3470	UG/KG		
CWRSC031	Hexachlorobenzene			3470	UG/KG		
CWRSC031	Hexachlorobutadiene			3470	UG/KG		
CWRSC031	Hexachlorocyclopentadiene			3470	UG/KG		
CWRSC031	Hexachloroethane			3470	UG/KG		
CWRSC031	Indeno(1,2,3-cd)pyrene			3470	UG/KG		
CWRSC031	Isophorone			3470	UG/KG		
CWRSC031	M,P-CRESOL			3470	UG/KG		
CWRSC031	N-Nitrosodipropylamine			3470	UG/KG		
CWRSC031	Naphthalene			3470	UG/KG		
CWRSC031	Nitrobenzene			3470	UG/KG		
CWRSC031	O-Cresol			3470	UG/KG		
CWRSC031	Pentachlorophenol			6940	UG/KG		
CWRSC031	Phenanthrene			3470	UG/KG		
CWRSC031	Phenol			3470	UG/KG		
CWRSC031	Pyrene			3470	UG/KG		
CWRSC031DL	Bromoform			2.1	UG/KG		
CWRSC031DL	Toluene	44.9		2.1	UG/KG		
CWRSC032	Actinium-228	0.399	0.0588	0.015	PCI/G		
CWRSC032	Americium-241	0.00077	0.00154	0.00231	PCI/G		
CWRSC032	Bismuth-212	0.265	0.0507	0.0312	PCI/G		
CWRSC032	Bismuth-214	0.34	0.0388	0.0073	PCI/G		
CWRSC032	Carbon-14	-0.0331	0.0574	0.101	PCI/G		
CWRSC032	Cesium-137	0.012	0.00421	0.00411	PCI/G		
CWRSC032	Cobalt-60	-0.00136	0.00269	0.00462	PCI/G		
CWRSC032	Gross Alpha	6.89	2.27	2.63	PCI/G		
CWRSC032	Lead-210	0.994	0.917	0.856	PCI/G		
CWRSC032	Lead-212	0.433	0.0483	0.00695	PCI/G		
CWRSC032	Lead-214	0.396	0.0439	0.0076	PCI/G		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC032	Nonvolatile Beta	10.4	1.54	1.92	PCI/G		
CWRSC032	Plutonium-241	-0.0763	0.17	0.312	PCI/G		
CWRSC032	Potassium-40	9.6	1.06	0.034	PCI/G		
CWRSC032	Radium-223	-0.0133	0.05	0.0759	PCI/G		
CWRSC032	Radium-226	0.435	0.0627	0.0261	PCI/G		
CWRSC032	Radium-228	0.399	0.0588	0.015	PCI/G		
CWRSC032	Strontium-90	0.0149	0.0199	0.0359	PCI/G	UJ	c
CWRSC032	Thallium-208	0.134	0.015	0.00391	PCI/G		
CWRSC032	Thorium-228	0.38	0.15	0.17	PCI/G		
CWRSC032	Thorium-230	0.327	0.115	0.066	PCI/G		
CWRSC032	Thorium-232	0.281	0.106	0.066	PCI/G		
CWRSC032	Thorium-234	0.525	0.235	0.211	PCI/G		
CWRSC032	Tritium	0.359	0.463	0.78	PCI/G		
CWRSC032	Uranium-233/234	0.384	0.0505	0.0106	PCI/G		
CWRSC032	Uranium-235	0.0229	0.00851	0.00221	PCI/G		
CWRSC032	Uranium-238	0.374	0.0492	0.00221	PCI/G		
CWRSC032	Antimony			6.2	MG/KG	R	m
CWRSC032	Arsenic	6.8		1	MG/KG		
CWRSC032	Barium	138		20.6	MG/KG		
CWRSC032	Beryllium	0.31		0.52	MG/KG		
CWRSC032	Cadmium			0.52	MG/KG		
CWRSC032	Chromium	108		1	MG/KG		
CWRSC032	Cobalt	18.5		5.2	MG/KG		
CWRSC032	Copper	31.2		2.6	MG/KG		
CWRSC032	Lead	6.3		0.31	MG/KG		
CWRSC032	Mercury	0.75		0.034	MG/KG	J	m
CWRSC032	Molybdenum	0.2		1	MG/KG	J	m
CWRSC032	Nickel	218		4.1	MG/KG		
CWRSC032	Selenium	1.3		0.52	MG/KG		
CWRSC032	Silver			1	MG/KG		
CWRSC032	Thallium			1	MG/KG		
CWRSC032	Vanadium	48.7		5.2	MG/KG		
CWRSC032	Zinc	58.1		2.1	MG/KG		
CWRSC032	Chromium, Hexavalent	0.0742		0.212	MG/KG	J	md
CWRSC032	Nitrate	19.8		1	MG/KG		
CWRSC032	4,4'-DDD			7.1	UG/KG		
CWRSC032	4,4'-DDE			7.1	UG/KG		
CWRSC032	4,4'-DDT			7.1	UG/KG	UJ	c
CWRSC032	Aldrin			3.5	UG/KG		
CWRSC032	Alpha-BHC			3.5	UG/KG		
CWRSC032	Alpha-Chlordane	0.72		3.5	UG/KG	J	q
CWRSC032	Arochlor-1016			17.7	UG/KG		
CWRSC032	Arochlor-1221			17.7	UG/KG		
CWRSC032	Arochlor-1232			17.7	UG/KG		
CWRSC032	Arochlor-1242			17.7	UG/KG		
CWRSC032	Arochlor-1248			17.7	UG/KG		
CWRSC032	Arochlor-1254			17.7	UG/KG		
CWRSC032	Arochlor-1260			17.7	UG/KG		
CWRSC032	Beta-BHC			3.5	UG/KG		
CWRSC032	Chlordane	4.5		177	UG/KG	J	qv
CWRSC032	Delta-BHC			3.5	UG/KG		
CWRSC032	Dieldrin			7.1	UG/KG		
CWRSC032	Endosulfan I			3.5	UG/KG		
CWRSC032	Endosulfan II			7.1	UG/KG		
CWRSC032	Endosulfan Sulfate			7.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC032	Endrin			7.1	UG/KG		
CWRSC032	Endrin Aldehyde			7.1	UG/KG		
CWRSC032	Endrin Ketone			7.1	UG/KG		
CWRSC032	Gamma-BHC			3.5	UG/KG		
CWRSC032	gamma-Chlordane	1.1		3.5	UG/KG	J	qv
CWRSC032	Heptachlor			3.5	UG/KG		
CWRSC032	Heptachlor Epoxide			3.5	UG/KG		
CWRSC032	Methoxychlor			35.5	UG/KG	UJ	c
CWRSC032	Toxaphene			177	UG/KG		
CWRSC032	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC032	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC032	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC032	1,1-Dichloroethane			1.1	UG/KG		
CWRSC032	1,1-Dichloroethene			1.1	UG/KG		
CWRSC032	1,2-Dichloroethane			1.1	UG/KG		
CWRSC032	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC032	1,2-Dichloropropane			1.1	UG/KG		
CWRSC032	2-Butanone	1.4		5.3	UG/KG	J	qc
CWRSC032	2-Hexanone			5.3	UG/KG		
CWRSC032	4-Methyl-2-Pentanone			5.3	UG/KG		
CWRSC032	Acetone			26.6	UG/KG		
CWRSC032	Benzene			1.1	UG/KG		
CWRSC032	Bromoform			1.1	UG/KG		
CWRSC032	Carbon Disulfide			5.3	UG/KG		
CWRSC032	Carbon Tetrachloride			1.1	UG/KG		
CWRSC032	Chlorobenzene			1.1	UG/KG		
CWRSC032	Chlorodibromomethane			1.1	UG/KG		
CWRSC032	Chloroethane			1.1	UG/KG		
CWRSC032	Chloroform			1.1	UG/KG		
CWRSC032	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC032	Dichlorobromomethane			1.1	UG/KG		
CWRSC032	Ethylbenzene	0.62		1.1	UG/KG	J	q
CWRSC032	Methyl Bromide			1.1	UG/KG		
CWRSC032	Methyl Chloride			1.1	UG/KG		
CWRSC032	Methylene Chloride	1		5.3	UG/KG	J	q
CWRSC032	Styrene			1.1	UG/KG		
CWRSC032	Tetrachloroethene			1.1	UG/KG		
CWRSC032	Toluene	117		1.1	UG/KG	J	q
CWRSC032	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC032	Trichloroethene			1.1	UG/KG		
CWRSC032	Vinyl Chloride			1.1	UG/KG		
CWRSC032	Xylenes (Total)	1.8		3.2	UG/KG	J	q
CWRSC032	1,2,4-Trichlorobenzene			355	UG/KG		
CWRSC032	1,2-Dichlorobenzene			355	UG/KG		
CWRSC032	1,3-Dichlorobenzene			355	UG/KG		
CWRSC032	1,4-Dichlorobenzene			355	UG/KG		
CWRSC032	2,2'-oxybis(1-Chloropropane)			355	UG/KG		
CWRSC032	2,4,5-Trichlorophenol			355	UG/KG		
CWRSC032	2,4,6-Trichlorophenol			355	UG/KG		
CWRSC032	2,4-Dichlorophenol			355	UG/KG		
CWRSC032	2,4-Dimethylphenol			355	UG/KG		
CWRSC032	2,4-Dinitrophenol			709	UG/KG		
CWRSC032	2,4-Dinitrotoluene			355	UG/KG		
CWRSC032	2,6-Dinitrotoluene			355	UG/KG		
CWRSC032	2-Chloronaphthalene			355	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC032	2-Chlorophenol			355	UG/KG		
CWRSC032	2-Methyl-4,6-dinitrophenol			355	UG/KG		
CWRSC032	2-Methylnaphthalene			355	UG/KG		
CWRSC032	2-Nitroaniline			355	UG/KG	UJ	c
CWRSC032	2-Nitrophenol			355	UG/KG		
CWRSC032	3,3'-Dichlorobenzidine			709	UG/KG		
CWRSC032	3-Nitroaniline			355	UG/KG		
CWRSC032	4-Bromophenyl Phenyl Ether			355	UG/KG		
CWRSC032	4-Chloro-3-Methylphenol			355	UG/KG		
CWRSC032	4-Chloroaniline			709	UG/KG		
CWRSC032	4-Chlorophenyl Phenyl Ether			355	UG/KG		
CWRSC032	4-Nitroaniline			355	UG/KG		
CWRSC032	4-Nitrophenol			355	UG/KG		
CWRSC032	Acenaphthene			355	UG/KG		
CWRSC032	Acenaphthylene			355	UG/KG		
CWRSC032	Anthracene			355	UG/KG		
CWRSC032	Benzo(a)anthracene			355	UG/KG		
CWRSC032	Benzo(a)pyrene			355	UG/KG		
CWRSC032	Benzo(b)fluoranthene			355	UG/KG		
CWRSC032	Benzo(g,h,i)perylene			355	UG/KG	UJ	c
CWRSC032	Benzo(k)fluoranthene			355	UG/KG		
CWRSC032	Bis(2-Chloroethoxy)methane			355	UG/KG		
CWRSC032	Bis(2-Chloroethyl)ether			355	UG/KG		
CWRSC032	Bis(2-Ethylhexyl)phthalate			355	UG/KG		
CWRSC032	Butyl Benzyl Phthalate			355	UG/KG		
CWRSC032	Carbazole			355	UG/KG		
CWRSC032	Chrysene			355	UG/KG	UJ	c
CWRSC032	Di-n-Butyl Phthalate			355	UG/KG		
CWRSC032	Di-n-Octyl Phthalate			355	UG/KG		
CWRSC032	Dibenzo(a,h)anthracene			355	UG/KG	UJ	c
CWRSC032	Dibenzofuran			355	UG/KG		
CWRSC032	Diethyl Phthalate			355	UG/KG	UJ	c
CWRSC032	Dimethyl Phthalate			355	UG/KG		
CWRSC032	Diphenylamine			355	UG/KG		
CWRSC032	Fluoranthene			355	UG/KG		
CWRSC032	Fluorene			355	UG/KG		
CWRSC032	Hexachlorobenzene			355	UG/KG		
CWRSC032	Hexachlorobutadiene			355	UG/KG		
CWRSC032	Hexachlorocyclopentadiene			355	UG/KG		
CWRSC032	Hexachloroethane			355	UG/KG		
CWRSC032	Indeno(1,2,3-cd)pyrene			355	UG/KG	UJ	c
CWRSC032	Isophorone			355	UG/KG		
CWRSC032	M,P-CRESOL			355	UG/KG		
CWRSC032	N-Nitrosodipropylamine			355	UG/KG		
CWRSC032	Naphthalene			355	UG/KG		
CWRSC032	Nitrobenzene			355	UG/KG		
CWRSC032	O-Cresol			355	UG/KG		
CWRSC032	Pentachlorophenol			709	UG/KG		
CWRSC032	Phenanthrene			355	UG/KG		
CWRSC032	Phenol			355	UG/KG		
CWRSC032	Pyrene			355	UG/KG	UJ	c
CWRSC033	Actinium-228	0.4	0.0645	0.0137	PCI/G		
CWRSC033	Americium-241	0.00121	0.00243	0.00764	PCI/G		
CWRSC033	Bismuth-212	0.244	0.0442	0.0307	PCI/G		
CWRSC033	Bismuth-214	0.321	0.0368	0.00704	PCI/G		

Appendix A. Ra/Sr Area 1 RA Overburden Soil Data

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC033	Carbon-14	-0.053	0.0563	0.0997	PCI/G		
CWRSC033	Cesium-137	0.00855	0.00364	0.00381	PCI/G		
CWRSC033	Cobalt-60	-0.00024	0.00252	0.00445	PCI/G		
CWRSC033	Gross Alpha	6.96	2.26	2.34	PCI/G		
CWRSC033	Lead-210	0.457	0.985	1.21	PCI/G		
CWRSC033	Lead-212	0.419	0.0451	0.00724	PCI/G		
CWRSC033	Lead-214	0.379	0.0423	0.00733	PCI/G		
CWRSC033	Nonvolatile Beta	12	1.64	2.03	PCI/G		
CWRSC033	Plutonium-241	-0.102	0.179	0.33	PCI/G		
CWRSC033	Potassium-40	9.89	1.2	0.0325	PCI/G		
CWRSC033	Radium-223	0.00371	0.0405	0.0712	PCI/G		
CWRSC033	Radium-226	0.471	0.0695	0.0248	PCI/G		
CWRSC033	Radium-228	0.4	0.0645	0.0137	PCI/G		
CWRSC033	Strontium-90	0.0114	0.00855	0.015	PCI/G	UJ	c
CWRSC033	Thallium-208	0.13	0.0146	0.00362	PCI/G		
CWRSC033	Thorium-228	0.38	0.113	0.101	PCI/G		
CWRSC033	Thorium-230	0.441	0.112	0.0332	PCI/G		
CWRSC033	Thorium-232	0.277	0.0829	0.0143	PCI/G		
CWRSC033	Thorium-234	0.479	0.254	0.238	PCI/G		
CWRSC033	Tritium	0.458	0.449	0.746	PCI/G		
CWRSC033	Uranium-233/234	0.315	0.0414	0.00989	PCI/G		
CWRSC033	Uranium-235	0.0203	0.00752	0.0047	PCI/G		
CWRSC033	Uranium-238	0.344	0.0441	0.00586	PCI/G		
CWRSC033	Antimony			5.8	MG/KG	R	m
CWRSC033	Arsenic	6.9		0.97	MG/KG		
CWRSC033	Barium	131		19.4	MG/KG		
CWRSC033	Beryllium	0.31		0.49	MG/KG		
CWRSC033	Cadmium			0.49	MG/KG		
CWRSC033	Chromium	131		0.97	MG/KG		
CWRSC033	Cobalt	19.2		4.9	MG/KG		
CWRSC033	Copper	28.5		2.4	MG/KG		
CWRSC033	Lead	7.4		0.29	MG/KG		
CWRSC033	Mercury	2.2		0.15	MG/KG	J	m
CWRSC033	Molybdenum	0.27		0.97	MG/KG	J	m
CWRSC033	Nickel	251		3.9	MG/KG		
CWRSC033	Selenium	1.2		0.49	MG/KG		
CWRSC033	Silver			0.97	MG/KG		
CWRSC033	Thallium			0.97	MG/KG		
CWRSC033	Vanadium	47.6		4.9	MG/KG		
CWRSC033	Zinc	57.3		1.9	MG/KG		
CWRSC033	Chromium, Hexavalent			0.206	MG/KG	UJ	md
CWRSC033	Nitrate	33.8		1	MG/KG		
CWRSC033	4,4'-DDD			6.9	UG/KG		
CWRSC033	4,4'-DDE			6.9	UG/KG		
CWRSC033	4,4'-DDT			6.9	UG/KG	UJ	c
CWRSC033	Aldrin			3.4	UG/KG		
CWRSC033	Alpha-BHC			3.4	UG/KG		
CWRSC033	Alpha-Chlordane	1.3		3.4	UG/KG	J	q
CWRSC033	Arochlor-1016			17.2	UG/KG		
CWRSC033	Arochlor-1221			17.2	UG/KG		
CWRSC033	Arochlor-1232			17.2	UG/KG		
CWRSC033	Arochlor-1242			17.2	UG/KG		
CWRSC033	Arochlor-1248			17.2	UG/KG		
CWRSC033	Arochlor-1254			17.2	UG/KG		
CWRSC033	Arochlor-1260			17.2	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC033	Beta-BHC			3.4	UG/KG		
CWRSC033	Chlordane	9.2		172	UG/KG	J	qv
CWRSC033	Delta-BHC			3.4	UG/KG		
CWRSC033	Dieldrin			6.9	UG/KG		
CWRSC033	Endosulfan I			3.4	UG/KG		
CWRSC033	Endosulfan II			6.9	UG/KG		
CWRSC033	Endosulfan Sulfate			6.9	UG/KG		
CWRSC033	Endrin			6.9	UG/KG		
CWRSC033	Endrin Aldehyde			6.9	UG/KG		
CWRSC033	Endrin Ketone			6.9	UG/KG		
CWRSC033	Gamma-BHC			3.4	UG/KG		
CWRSC033	gamma-Chlordane	2.4		3.4	UG/KG	J	qv
CWRSC033	Heptachlor			3.4	UG/KG		
CWRSC033	Heptachlor Epoxide			3.4	UG/KG		
CWRSC033	Methoxychlor			34.4	UG/KG	UJ	c
CWRSC033	Toxaphene			172	UG/KG		
CWRSC033	1,1,1-Trichloroethane			1	UG/KG		
CWRSC033	1,1,2,2-Tetrachloroethane			1	UG/KG		
CWRSC033	1,1,2-Trichloroethane			1	UG/KG		
CWRSC033	1,1-Dichloroethane			1	UG/KG		
CWRSC033	1,1-Dichloroethene			1	UG/KG		
CWRSC033	1,2-Dichloroethane			1	UG/KG		
CWRSC033	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC033	1,2-Dichloropropane			1	UG/KG		
CWRSC033	2-Butanone	33.6		5.2	UG/KG	J	c
CWRSC033	2-Hexanone			5.2	UG/KG		
CWRSC033	4-Methyl-2-Pentanone			5.2	UG/KG		
CWRSC033	Acetone			25.8	UG/KG		
CWRSC033	Benzene			1	UG/KG		
CWRSC033	Bromoform			1	UG/KG		
CWRSC033	Carbon Disulfide			5.2	UG/KG		
CWRSC033	Carbon Tetrachloride			1	UG/KG		
CWRSC033	Chlorobenzene			1	UG/KG		
CWRSC033	Chlorodibromomethane			1	UG/KG		
CWRSC033	Chloroethane			1	UG/KG		
CWRSC033	Chloroform			1	UG/KG		
CWRSC033	cis-1,3-Dichloropropylene			1	UG/KG		
CWRSC033	Dichlorobromomethane			1	UG/KG		
CWRSC033	Ethylbenzene	0.74		1	UG/KG	J	q
CWRSC033	Methyl Bromide			1	UG/KG		
CWRSC033	Methyl Chloride			1	UG/KG		
CWRSC033	Methylene Chloride			5.2	UG/KG		
CWRSC033	Styrene			1	UG/KG		
CWRSC033	Tetrachloroethene			1	UG/KG		
CWRSC033	Trans-1,3-Dichloropropene			1	UG/KG		
CWRSC033	Trichloroethene			1	UG/KG		
CWRSC033	Vinyl Chloride			1	UG/KG		
CWRSC033	Xylenes (Total)	3.1		3.1	UG/KG		
CWRSC033	1,2,4-Trichlorobenzene			1370	UG/KG		
CWRSC033	1,2-Dichlorobenzene			1370	UG/KG		
CWRSC033	1,3-Dichlorobenzene			1370	UG/KG		
CWRSC033	1,4-Dichlorobenzene			1370	UG/KG		
CWRSC033	2,2'-oxybis(1-Chloropropane)			1370	UG/KG		
CWRSC033	2,4,5-Trichlorophenol			1370	UG/KG		
CWRSC033	2,4,6-Trichlorophenol			1370	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC033	2,4-Dichlorophenol			1370	UG/KG		
CWRSC033	2,4-Dimethylphenol			1370	UG/KG		
CWRSC033	2,4-Dinitrophenol			2750	UG/KG		
CWRSC033	2,4-Dinitrotoluene			1370	UG/KG		
CWRSC033	2,6-Dinitrotoluene			1370	UG/KG		
CWRSC033	2-Chloronaphthalene			1370	UG/KG		
CWRSC033	2-Chlorophenol			1370	UG/KG		
CWRSC033	2-Methyl-4,6-dinitrophenol			1370	UG/KG		
CWRSC033	2-Methylnaphthalene			1370	UG/KG		
CWRSC033	2-Nitroaniline			1370	UG/KG	UJ	c
CWRSC033	2-Nitrophenol			1370	UG/KG		
CWRSC033	3,3'-Dichlorobenzidine			2750	UG/KG		
CWRSC033	3-Nitroaniline			1370	UG/KG		
CWRSC033	4-Bromophenyl Phenyl Ether			1370	UG/KG		
CWRSC033	4-Chloro-3-Methylphenol			1370	UG/KG		
CWRSC033	4-Chloroaniline			2750	UG/KG		
CWRSC033	4-Chlorophenyl Phenyl Ether			1370	UG/KG		
CWRSC033	4-Nitroaniline			1370	UG/KG		
CWRSC033	4-Nitrophenol			1370	UG/KG		
CWRSC033	Acenaphthene			1370	UG/KG		
CWRSC033	Acenaphthylene			1370	UG/KG		
CWRSC033	Anthracene			1370	UG/KG		
CWRSC033	Benzo(a)anthracene			1370	UG/KG		
CWRSC033	Benzo(a)pyrene			1370	UG/KG		
CWRSC033	Benzo(b)fluoranthene			1370	UG/KG		
CWRSC033	Benzo(g,h,i)perylene			1370	UG/KG		
CWRSC033	Benzo(k)fluoranthene			1370	UG/KG		
CWRSC033	Bis(2-Chloroethoxy)methane			1370	UG/KG		
CWRSC033	Bis(2-Chloroethyl)ether			1370	UG/KG		
CWRSC033	Bis(2-Ethylhexyl)phthalate			1370	UG/KG		
CWRSC033	Butyl Benzyl Phthalate			1370	UG/KG		
CWRSC033	Carbazole			1370	UG/KG		
CWRSC033	Chrysene			1370	UG/KG	UJ	c
CWRSC033	Di-n-Butyl Phthalate			1370	UG/KG		
CWRSC033	Di-n-Octyl Phthalate			1370	UG/KG		
CWRSC033	Dibenzo(a,h)anthracene			1370	UG/KG		
CWRSC033	Dibenzofuran			1370	UG/KG		
CWRSC033	Diethyl Phthalate			1370	UG/KG		
CWRSC033	Dimethyl Phthalate			1370	UG/KG		
CWRSC033	Diphenylamine			1370	UG/KG		
CWRSC033	Fluoranthene			1370	UG/KG		
CWRSC033	Fluorene			1370	UG/KG		
CWRSC033	Hexachlorobenzene			1370	UG/KG		
CWRSC033	Hexachlorobutadiene			1370	UG/KG		
CWRSC033	Hexachlorocyclopentadiene			1370	UG/KG		
CWRSC033	Hexachloroethane			1370	UG/KG		
CWRSC033	Indeno(1,2,3-cd)pyrene			1370	UG/KG		
CWRSC033	Isophorone			1370	UG/KG		
CWRSC033	M,P-CRESOL			1370	UG/KG		
CWRSC033	N-Nitrosodipropylamine			1370	UG/KG		
CWRSC033	Naphthalene			1370	UG/KG		
CWRSC033	Nitrobenzene			1370	UG/KG		
CWRSC033	O-Cresol			1370	UG/KG		
CWRSC033	Pentachlorophenol			2750	UG/KG		
CWRSC033	Phenanthrene			1370	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC033	Phenol			1370	UG/KG		
CWRSC033	Pyrene			1370	UG/KG		
CWRSC033DL	Toluene	75.3		2.1	UG/KG		
CWRSC034	Actinium-228	0.408	0.0618	0.0134	PCI/G		
CWRSC034	Americium-241	0.00095	0.0019	0.00285	PCI/G		
CWRSC034	Bismuth-212	0.254	0.0455	0.0278	PCI/G		
CWRSC034	Bismuth-214	0.329	0.0371	0.00659	PCI/G		
CWRSC034	Carbon-14	-0.0557	0.0482	0.0658	PCI/G		
CWRSC034	Cesium-137	0.00627	0.00376	0.00383	PCI/G		
CWRSC034	Cobalt-60	0.00105	0.00282	0.00414	PCI/G		
CWRSC034	Gross Alpha	8.7	2.42	1.97	PCI/G		
CWRSC034	Lead-210	1.08	0.929	1.57	PCI/G		
CWRSC034	Lead-212	0.442	0.0487	0.00676	PCI/G		
CWRSC034	Lead-214	0.408	0.0458	0.00735	PCI/G		
CWRSC034	Nonvolatile Beta	10	1.59	2.07	PCI/G		
CWRSC034	Plutonium-241	-0.146	0.185	0.343	PCI/G		
CWRSC034	Potassium-40	9.88	1.19	0.0341	PCI/G		
CWRSC034	Radium-223	0.0276	0.0525	0.0717	PCI/G		
CWRSC034	Radium-226	0.464	0.0709	0.0262	PCI/G		
CWRSC034	Radium-228	0.408	0.0618	0.0134	PCI/G		
CWRSC034	Strontium-90	0.0201	0.0103	0.0177	PCI/G	J	c
CWRSC034	Thallium-208	0.135	0.0146	0.00362	PCI/G		
CWRSC034	Thorium-228	0.368	0.15	0.182	PCI/G		
CWRSC034	Thorium-230	0.537	0.155	0.0822	PCI/G		
CWRSC034	Thorium-232	0.515	0.149	0.0524	PCI/G		
CWRSC034	Thorium-234	0.537	0.28	0.252	PCI/G		
CWRSC034	Tritium	0.189	0.36	0.616	PCI/G		
CWRSC034	Uranium-233/234	0.4	0.0518	0.00804	PCI/G		
CWRSC034	Uranium-235	0.019	0.00767	0.00219	PCI/G		
CWRSC034	Uranium-238	0.387	0.0503	0.00218	PCI/G		
CWRSC034	Antimony			6.1	MG/KG	R	m
CWRSC034	Arsenic	6.5		1	MG/KG		
CWRSC034	Barium	149		20.4	MG/KG		
CWRSC034	Beryllium	0.33		0.51	MG/KG		
CWRSC034	Cadmium			0.51	MG/KG		
CWRSC034	Chromium	139		1	MG/KG		
CWRSC034	Cobalt	19.3		5.1	MG/KG		
CWRSC034	Copper	30		2.6	MG/KG		
CWRSC034	Lead	7		0.31	MG/KG		
CWRSC034	Mercury	1.7		0.064	MG/KG	J	m
CWRSC034	Molybdenum	0.23		1	MG/KG	J	m
CWRSC034	Nickel	222		4.1	MG/KG		
CWRSC034	Selenium	1.3		0.51	MG/KG		
CWRSC034	Silver			1	MG/KG		
CWRSC034	Thallium			1	MG/KG		
CWRSC034	Vanadium	48.2		5.1	MG/KG		
CWRSC034	Zinc	59.1		2	MG/KG		
CWRSC034	Chromium, Hexavalent	0.0624		0.208	MG/KG	J	md
CWRSC034	Nitrate	15.1		1	MG/KG		
CWRSC034	4,4'-DDD			6.9	UG/KG		
CWRSC034	4,4'-DDE			6.9	UG/KG		
CWRSC034	4,4'-DDT			6.9	UG/KG	UJ	c
CWRSC034	Aldrin			3.5	UG/KG		
CWRSC034	Alpha-BHC			3.5	UG/KG		
CWRSC034	Alpha-Chlordane	2.9		3.5	UG/KG	J	q

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC034	Arochlor-1016			17.4	UG/KG		
CWRSC034	Arochlor-1221			17.4	UG/KG		
CWRSC034	Arochlor-1232			17.4	UG/KG		
CWRSC034	Arochlor-1242			17.4	UG/KG		
CWRSC034	Arochlor-1248			17.4	UG/KG		
CWRSC034	Arochlor-1254			17.4	UG/KG		
CWRSC034	Arochlor-1260			17.4	UG/KG		
CWRSC034	Beta-BHC			3.5	UG/KG		
CWRSC034	Chlordane	21.8		174	UG/KG	J	qv
CWRSC034	Delta-BHC			3.5	UG/KG		
CWRSC034	Dieldrin			6.9	UG/KG		
CWRSC034	Endosulfan I			3.5	UG/KG		
CWRSC034	Endosulfan II			6.9	UG/KG		
CWRSC034	Endosulfan Sulfate			6.9	UG/KG		
CWRSC034	Endrin			6.9	UG/KG		
CWRSC034	Endrin Aldehyde			6.9	UG/KG		
CWRSC034	Endrin Ketone			6.9	UG/KG		
CWRSC034	Gamma-BHC			3.5	UG/KG		
CWRSC034	gamma-Chlordane	6.3		3.5	UG/KG	J	v
CWRSC034	Heptachlor			3.5	UG/KG		
CWRSC034	Heptachlor Epoxide			3.5	UG/KG		
CWRSC034	Methoxychlor			34.7	UG/KG	UJ	c
CWRSC034	Toxaphene			174	UG/KG		
CWRSC034	1,1,1-Trichloroethane			1	UG/KG		
CWRSC034	1,1,2,2-Tetrachloroethane			1	UG/KG		
CWRSC034	1,1,2-Trichloroethane			1	UG/KG		
CWRSC034	1,1-Dichloroethane			1	UG/KG		
CWRSC034	1,1-Dichloroethene			1	UG/KG		
CWRSC034	1,2-Dichloroethane			1	UG/KG		
CWRSC034	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC034	1,2-Dichloropropane			1	UG/KG		
CWRSC034	2-Butanone	27		5.2	UG/KG	J	c
CWRSC034	2-Hexanone			5.2	UG/KG		
CWRSC034	4-Methyl-2-Pentanone			5.2	UG/KG		
CWRSC034	Acetone			26	UG/KG		
CWRSC034	Benzene			1	UG/KG		
CWRSC034	Bromoform			1	UG/KG		
CWRSC034	Carbon Disulfide			5.2	UG/KG		
CWRSC034	Carbon Tetrachloride			1	UG/KG		
CWRSC034	Chlorobenzene			1	UG/KG		
CWRSC034	Chlorodibromomethane			1	UG/KG		
CWRSC034	Chloroethane			1	UG/KG		
CWRSC034	Chloroform			1	UG/KG		
CWRSC034	cis-1,3-Dichloropropylene			1	UG/KG		
CWRSC034	Dichlorobromomethane			1	UG/KG		
CWRSC034	Ethylbenzene	0.8		1	UG/KG	J	q
CWRSC034	Methyl Bromide			1	UG/KG		
CWRSC034	Methyl Chloride			1	UG/KG		
CWRSC034	Methylene Chloride	0.89		5.2	UG/KG	J	q
CWRSC034	Styrene			1	UG/KG		
CWRSC034	Tetrachloroethene			1	UG/KG		
CWRSC034	Trans-1,3-Dichloropropene			1	UG/KG		
CWRSC034	Trichloroethene			1	UG/KG		
CWRSC034	Vinyl Chloride			1	UG/KG		
CWRSC034	Xylenes (Total)	3.3		3.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC034	1,2,4-Trichlorobenzene			347	UG/KG		
CWRSC034	1,2-Dichlorobenzene			347	UG/KG		
CWRSC034	1,3-Dichlorobenzene			347	UG/KG		
CWRSC034	1,4-Dichlorobenzene			347	UG/KG		
CWRSC034	2,2'-oxybis(1-Chloropropane)			347	UG/KG		
CWRSC034	2,4,5-Trichlorophenol			347	UG/KG		
CWRSC034	2,4,6-Trichlorophenol			347	UG/KG		
CWRSC034	2,4-Dichlorophenol			347	UG/KG		
CWRSC034	2,4-Dimethylphenol			347	UG/KG		
CWRSC034	2,4-Dinitrophenol			694	UG/KG		
CWRSC034	2,4-Dinitrotoluene			347	UG/KG		
CWRSC034	2,6-Dinitrotoluene			347	UG/KG		
CWRSC034	2-Chloronaphthalene			347	UG/KG		
CWRSC034	2-Chlorophenol			347	UG/KG		
CWRSC034	2-Methyl-4,6-dinitrophenol			347	UG/KG		
CWRSC034	2-Methylnaphthalene			347	UG/KG		
CWRSC034	2-Nitroaniline			347	UG/KG	UJ	c
CWRSC034	2-Nitrophenol			347	UG/KG		
CWRSC034	3,3'-Dichlorobenzidine			694	UG/KG		
CWRSC034	3-Nitroaniline			347	UG/KG		
CWRSC034	4-Bromophenyl Phenyl Ether			347	UG/KG		
CWRSC034	4-Chloro-3-Methylphenol			347	UG/KG		
CWRSC034	4-Chloroaniline			694	UG/KG		
CWRSC034	4-Chlorophenyl Phenyl Ether			347	UG/KG		
CWRSC034	4-Nitroaniline			347	UG/KG		
CWRSC034	4-Nitrophenol			347	UG/KG		
CWRSC034	Acenaphthene			347	UG/KG		
CWRSC034	Acenaphthylene			347	UG/KG		
CWRSC034	Anthracene			347	UG/KG		
CWRSC034	Benzo(a)anthracene			347	UG/KG		
CWRSC034	Benzo(a)pyrene			347	UG/KG		
CWRSC034	Benzo(b)fluoranthene			347	UG/KG		
CWRSC034	Benzo(g,h,i)perylene			347	UG/KG	UJ	c
CWRSC034	Benzo(k)fluoranthene			347	UG/KG		
CWRSC034	Bis(2-Chloroethoxy)methane			347	UG/KG		
CWRSC034	Bis(2-Chloroethyl)ether			347	UG/KG		
CWRSC034	Bis(2-Ethylhexyl)phthalate			347	UG/KG		
CWRSC034	Butyl Benzyl Phthalate			347	UG/KG		
CWRSC034	Carbazole			347	UG/KG		
CWRSC034	Chrysene			347	UG/KG	UJ	c
CWRSC034	Di-n-Butyl Phthalate			347	UG/KG		
CWRSC034	Di-n-Octyl Phthalate			347	UG/KG		
CWRSC034	Dibenzo(a,h)anthracene			347	UG/KG	UJ	c
CWRSC034	Dibenzofuran			347	UG/KG		
CWRSC034	Diethyl Phthalate			347	UG/KG	UJ	c
CWRSC034	Dimethyl Phthalate			347	UG/KG		
CWRSC034	Diphenylamine			347	UG/KG		
CWRSC034	Fluoranthene			347	UG/KG		
CWRSC034	Fluorene			347	UG/KG		
CWRSC034	Hexachlorobenzene			347	UG/KG		
CWRSC034	Hexachlorobutadiene			347	UG/KG		
CWRSC034	Hexachlorocyclopentadiene			347	UG/KG		
CWRSC034	Hexachloroethane			347	UG/KG		
CWRSC034	Indeno(1,2,3-cd)pyrene			347	UG/KG	UJ	c
CWRSC034	Isophorone			347	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC034	M,P-CRESOL			347	UG/KG		
CWRSC034	N-Nitrosodipropylamine			347	UG/KG		
CWRSC034	Naphthalene			347	UG/KG		
CWRSC034	Nitrobenzene			347	UG/KG		
CWRSC034	O-Cresol			347	UG/KG		
CWRSC034	Pentachlorophenol			694	UG/KG		
CWRSC034	Phenanthrene			347	UG/KG		
CWRSC034	Phenol			347	UG/KG		
CWRSC034	Pyrene			347	UG/KG	UJ	c
CWRSC034DL	Toluene	50.9		2.1	UG/KG		
CWRSC035	Actinium-228	0.49	0.066	0.0149	PCI/G		
CWRSC035	Americium-241	0.00151	0.00214	0.00226	PCI/G		
CWRSC035	Bismuth-212	0.298	0.0556	0.032	PCI/G		
CWRSC035	Bismuth-214	0.387	0.0528	0.00731	PCI/G		
CWRSC035	Carbon-14	-0.0337	0.0532	0.0937	PCI/G		
CWRSC035	Cesium-137	0.0102	0.00487	0.00409	PCI/G		
CWRSC035	Cobalt-60	0.00291	0.00263	0.00479	PCI/G		
CWRSC035	Gross Alpha	6.14	1.83	1.65	PCI/G		
CWRSC035	Lead-210	0.431	0.0879	0.0641	PCI/G		
CWRSC035	Lead-212	0.511	0.0554	0.00636	PCI/G		
CWRSC035	Lead-214	0.424	0.0465	0.00729	PCI/G		
CWRSC035	Nonvolatile Beta	14	1.72	2.24	PCI/G		
CWRSC035	Plutonium-241	-0.031	0.23	0.395	PCI/G		
CWRSC035	Potassium-40	10.6	1.03	0.0307	PCI/G		
CWRSC035	Radium-223	0.00108	0.0449	0.0698	PCI/G		
CWRSC035	Radium-226	0.465	0.067	0.0285	PCI/G		
CWRSC035	Radium-228	0.49	0.066	0.0149	PCI/G		
CWRSC035	Strontium-90	0.0144	0.00879	0.0152	PCI/G	UJ	c
CWRSC035	Thallium-208	0.161	0.0206	0.004	PCI/G		
CWRSC035	Thorium-228	0.477	0.163	0.188	PCI/G		
CWRSC035	Thorium-230	0.44	0.131	0.09	PCI/G		
CWRSC035	Thorium-232	0.44	0.126	0.0441	PCI/G		
CWRSC035	Thorium-234	0.521	0.13	0.0788	PCI/G		
CWRSC035	Tritium	0.353	0.454	0.766	PCI/G		
CWRSC035	Uranium-233/234	0.461	0.0605	0.0112	PCI/G		
CWRSC035	Uranium-235	0.0261	0.01	0.00644	PCI/G		
CWRSC035	Uranium-238	0.443	0.0585	0.00804	PCI/G		
CWRSC035	Antimony			6	MG/KG	R	m
CWRSC035	Arsenic	7.1		1	MG/KG		
CWRSC035	Barium	155		19.9	MG/KG		
CWRSC035	Beryllium	0.36		0.5	MG/KG		
CWRSC035	Cadmium			0.5	MG/KG		
CWRSC035	Chromium	111		1	MG/KG		
CWRSC035	Cobalt	19.5		5	MG/KG		
CWRSC035	Copper	33.3		2.5	MG/KG		
CWRSC035	Lead	6.6		0.3	MG/KG		
CWRSC035	Mercury	1.3		0.035	MG/KG	J	m
CWRSC035	Molybdenum	0.23		1	MG/KG	J	m
CWRSC035	Nickel	215		4	MG/KG		
CWRSC035	Selenium	1.3		0.5	MG/KG		
CWRSC035	Silver			1	MG/KG		
CWRSC035	Thallium			1	MG/KG		
CWRSC035	Vanadium	53.5		5	MG/KG		
CWRSC035	Zinc	59.9		2	MG/KG		
CWRSC035	Chromium, Hexavalent	0.0642		0.214	MG/KG	J	md

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC035	Nitrate	11.3		1	MG/KG		
CWRSC035	4,4'-DDD			7.2	UG/KG		
CWRSC035	4,4'-DDE			7.2	UG/KG		
CWRSC035	4,4'-DDT			7.2	UG/KG	UJ	c
CWRSC035	Aldrin			3.6	UG/KG		
CWRSC035	Alpha-BHC			3.6	UG/KG		
CWRSC035	Alpha-Chlordane	0.59		3.6	UG/KG	J	q
CWRSC035	Arochlor-1016			17.9	UG/KG		
CWRSC035	Arochlor-1221			17.9	UG/KG		
CWRSC035	Arochlor-1232			17.9	UG/KG		
CWRSC035	Arochlor-1242			17.9	UG/KG		
CWRSC035	Arochlor-1248			17.9	UG/KG		
CWRSC035	Arochlor-1254			17.9	UG/KG		
CWRSC035	Arochlor-1260			17.9	UG/KG		
CWRSC035	Beta-BHC			3.6	UG/KG		
CWRSC035	Chlordane	4		179	UG/KG	J	q
CWRSC035	Delta-BHC			3.6	UG/KG		
CWRSC035	Dieldrin			7.2	UG/KG		
CWRSC035	Endosulfan I			3.6	UG/KG		
CWRSC035	Endosulfan II			7.2	UG/KG		
CWRSC035	Endosulfan Sulfate			7.2	UG/KG		
CWRSC035	Endrin			7.2	UG/KG		
CWRSC035	Endrin Aldehyde			7.2	UG/KG		
CWRSC035	Endrin Ketone			7.2	UG/KG		
CWRSC035	Gamma-BHC			3.6	UG/KG		
CWRSC035	gamma-Chlordane	1.1		3.6	UG/KG	J	qv
CWRSC035	Heptachlor			3.6	UG/KG		
CWRSC035	Heptachlor Epoxide			3.6	UG/KG		
CWRSC035	Methoxychlor			35.8	UG/KG	UJ	c
CWRSC035	Toxaphene			179	UG/KG		
CWRSC035	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC035	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC035	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC035	1,1-Dichloroethane			1.1	UG/KG		
CWRSC035	1,1-Dichloroethene			1.1	UG/KG		
CWRSC035	1,2-Dichloroethane			1.1	UG/KG		
CWRSC035	1,2-Dichloroethene (total)			2.2	UG/KG		
CWRSC035	1,2-Dichloropropane			1.1	UG/KG		
CWRSC035	2-Butanone			5.4	UG/KG	UJ	c
CWRSC035	2-Hexanone			5.4	UG/KG		
CWRSC035	4-Methyl-2-Pentanone			5.4	UG/KG		
CWRSC035	Acetone			26.9	UG/KG		
CWRSC035	Benzene			1.1	UG/KG		
CWRSC035	Bromoform			1.1	UG/KG		
CWRSC035	Carbon Disulfide			5.4	UG/KG		
CWRSC035	Carbon Tetrachloride			1.1	UG/KG		
CWRSC035	Chlorobenzene			1.1	UG/KG		
CWRSC035	Chlorodibromomethane			1.1	UG/KG		
CWRSC035	Chloroethane			1.1	UG/KG		
CWRSC035	Chloroform			1.1	UG/KG		
CWRSC035	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC035	Dichlorobromomethane			1.1	UG/KG		
CWRSC035	Ethylbenzene	0.67		1.1	UG/KG	J	q
CWRSC035	Methyl Bromide			1.1	UG/KG		
CWRSC035	Methyl Chloride			1.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC035	Methylene Chloride	0.8		5.4	UG/KG	J	q
CWRSC035	Styrene			1.1	UG/KG		
CWRSC035	Tetrachloroethene			1.1	UG/KG		
CWRSC035	Toluene	113		1.1	UG/KG	J	q
CWRSC035	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC035	Trichloroethene			1.1	UG/KG		
CWRSC035	Vinyl Chloride			1.1	UG/KG		
CWRSC035	Xylenes (Total)	1.9		3.2	UG/KG	J	q
CWRSC035	1,2,4-Trichlorobenzene			1430	UG/KG		
CWRSC035	1,2-Dichlorobenzene			1430	UG/KG		
CWRSC035	1,3-Dichlorobenzene			1430	UG/KG		
CWRSC035	1,4-Dichlorobenzene			1430	UG/KG		
CWRSC035	2,2'-oxybis(1-Chloropropane)			1430	UG/KG		
CWRSC035	2,4,5-Trichlorophenol			1430	UG/KG		
CWRSC035	2,4,6-Trichlorophenol			1430	UG/KG		
CWRSC035	2,4-Dichlorophenol			1430	UG/KG		
CWRSC035	2,4-Dimethylphenol			1430	UG/KG		
CWRSC035	2,4-Dinitrophenol			2870	UG/KG		
CWRSC035	2,4-Dinitrotoluene			1430	UG/KG		
CWRSC035	2,6-Dinitrotoluene			1430	UG/KG		
CWRSC035	2-Chloronaphthalene			1430	UG/KG		
CWRSC035	2-Chlorophenol			1430	UG/KG		
CWRSC035	2-Methyl-4,6-dinitrophenol			1430	UG/KG		
CWRSC035	2-Methylnaphthalene			1430	UG/KG		
CWRSC035	2-Nitroaniline			1430	UG/KG	UJ	c
CWRSC035	2-Nitrophenol			1430	UG/KG		
CWRSC035	3,3'-Dichlorobenzidine			2870	UG/KG		
CWRSC035	3-Nitroaniline			1430	UG/KG		
CWRSC035	4-Bromophenyl Phenyl Ether			1430	UG/KG		
CWRSC035	4-Chloro-3-Methylphenol			1430	UG/KG		
CWRSC035	4-Chloroaniline			2870	UG/KG		
CWRSC035	4-Chlorophenyl Phenyl Ether			1430	UG/KG		
CWRSC035	4-Nitroaniline			1430	UG/KG		
CWRSC035	4-Nitrophenol			1430	UG/KG		
CWRSC035	Acenaphthene			1430	UG/KG		
CWRSC035	Acenaphthylene			1430	UG/KG		
CWRSC035	Anthracene			1430	UG/KG		
CWRSC035	Benzo(a)anthracene			1430	UG/KG		
CWRSC035	Benzo(a)pyrene			1430	UG/KG		
CWRSC035	Benzo(b)fluoranthene			1430	UG/KG		
CWRSC035	Benzo(g,h,i)perylene			1430	UG/KG		
CWRSC035	Benzo(k)fluoranthene			1430	UG/KG		
CWRSC035	Bis(2-Chloroethoxy)methane			1430	UG/KG		
CWRSC035	Bis(2-Chloroethyl)ether			1430	UG/KG		
CWRSC035	Bis(2-Ethylhexyl)phthalate			1430	UG/KG		
CWRSC035	Butyl Benzyl Phthalate			1430	UG/KG		
CWRSC035	Carbazole			1430	UG/KG		
CWRSC035	Chrysene			1430	UG/KG	UJ	c
CWRSC035	Di-n-Butyl Phthalate			1430	UG/KG		
CWRSC035	Di-n-Octyl Phthalate			1430	UG/KG		
CWRSC035	Dibenzo(a,h)anthracene			1430	UG/KG		
CWRSC035	Dibenzofuran			1430	UG/KG		
CWRSC035	Diethyl Phthalate			1430	UG/KG		
CWRSC035	Dimethyl Phthalate			1430	UG/KG		
CWRSC035	Diphenylamine			1430	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC035	Fluoranthene			1430	UG/KG		
CWRSC035	Fluorene			1430	UG/KG		
CWRSC035	Hexachlorobenzene			1430	UG/KG		
CWRSC035	Hexachlorobutadiene			1430	UG/KG		
CWRSC035	Hexachlorocyclopentadiene			1430	UG/KG		
CWRSC035	Hexachloroethane			1430	UG/KG		
CWRSC035	Indeno(1,2,3-cd)pyrene			1430	UG/KG		
CWRSC035	Isophorone			1430	UG/KG		
CWRSC035	M,P-CRESOL			1430	UG/KG		
CWRSC035	N-Nitrosodipropylamine			1430	UG/KG		
CWRSC035	Naphthalene			1430	UG/KG		
CWRSC035	Nitrobenzene			1430	UG/KG		
CWRSC035	O-Cresol			1430	UG/KG		
CWRSC035	Pentachlorophenol			2870	UG/KG		
CWRSC035	Phenanthrene			1430	UG/KG		
CWRSC035	Phenol			1430	UG/KG		
CWRSC035	Pyrene			1430	UG/KG		
CWRSC036	Actinium-228	0.496	0.0708	0.0165	PCI/G		
CWRSC036	Americium-241	0.00163	0.00236	0.00411	PCI/G		
CWRSC036	Bismuth-212	0.266	0.0498	0.0337	PCI/G		
CWRSC036	Bismuth-214	0.35	0.0399	0.0078	PCI/G		
CWRSC036	Carbon-14	0.0224	0.058	0.0988	PCI/G		
CWRSC036	Cesium-137	0.015	0.00517	0.00477	PCI/G		
CWRSC036	Cobalt-60	0.000432	0.00373	0.00513	PCI/G		
CWRSC036	Gross Alpha	7.45	2.06	1.89	PCI/G		
CWRSC036	Lead-210	0.677	0.637	0.71	PCI/G		
CWRSC036	Lead-212	0.517	0.0537	0.0076	PCI/G		
CWRSC036	Lead-214	0.403	0.0446	0.00851	PCI/G		
CWRSC036	Nonvolatile Beta	13	1.7	2.17	PCI/G		
CWRSC036	Plutonium-241	-0.193	0.207	0.385	PCI/G		
CWRSC036	Potassium-40	10.7	1.1	0.0389	PCI/G		
CWRSC036	Radium-223	0.0268	0.0535	0.0836	PCI/G		
CWRSC036	Radium-226	0.498	0.0719	0.028	PCI/G		
CWRSC036	Radium-228	0.496	0.0708	0.0165	PCI/G		
CWRSC036	Strontium-90	0.0151	0.00861	0.0149	PCI/G	J	c
CWRSC036	Thallium-208	0.155	0.0172	0.00428	PCI/G		
CWRSC036	Thorium-228	0.735	0.23	0.222	PCI/G		
CWRSC036	Thorium-230	0.573	0.178	0.121	PCI/G		
CWRSC036	Thorium-232	0.784	0.21	0.0256	PCI/G		
CWRSC036	Thorium-234	0.741	0.309	0.218	PCI/G		
CWRSC036	Tritium	0.232	0.441	0.754	PCI/G		
CWRSC036	Uranium-233/234	0.412	0.0532	0.00565	PCI/G		
CWRSC036	Uranium-235	0.0185	0.0079	0.00566	PCI/G		
CWRSC036	Uranium-238	0.432	0.0552	0.00565	PCI/G		
CWRSC036	Antimony			5.9	MG/KG	R	m
CWRSC036	Arsenic	7		0.98	MG/KG		
CWRSC036	Barium	159		19.7	MG/KG		
CWRSC036	Beryllium	0.37		0.49	MG/KG		
CWRSC036	Cadmium			0.49	MG/KG		
CWRSC036	Chromium	136		0.98	MG/KG		
CWRSC036	Cobalt	19.8		4.9	MG/KG		
CWRSC036	Copper	34.7		2.5	MG/KG		
CWRSC036	Lead	7.4		0.3	MG/KG		
CWRSC036	Mercury	0.51		0.035	MG/KG	J	m
CWRSC036	Molybdenum	0.25		0.98	MG/KG	J	m

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC036	Nickel	226		3.9	MG/KG		
CWRSC036	Selenium	1.2		0.49	MG/KG		
CWRSC036	Silver	3		0.98	MG/KG		
CWRSC036	Thallium			0.98	MG/KG		
CWRSC036	Vanadium	50.1		4.9	MG/KG		
CWRSC036	Zinc	62.9		2	MG/KG		
CWRSC036	Chromium, Hexavalent	0.0742		0.212	MG/KG	J	md
CWRSC036	Nitrate	5.43		1	MG/KG		
CWRSC036	4,4'-DDD			14.2	UG/KG		
CWRSC036	4,4'-DDE			14.2	UG/KG		
CWRSC036	4,4'-DDT			14.2	UG/KG	UJ	c
CWRSC036	Aldrin			7.1	UG/KG		
CWRSC036	Alpha-BHC			7.1	UG/KG		
CWRSC036	Alpha-Chlordane	4.3		7.1	UG/KG	J	qv
CWRSC036	Arochlor-1016			35.5	UG/KG		
CWRSC036	Arochlor-1221			35.5	UG/KG		
CWRSC036	Arochlor-1232			35.5	UG/KG		
CWRSC036	Arochlor-1242			35.5	UG/KG		
CWRSC036	Arochlor-1248			35.5	UG/KG		
CWRSC036	Arochlor-1254			35.5	UG/KG		
CWRSC036	Arochlor-1260			35.5	UG/KG		
CWRSC036	Beta-BHC			7.1	UG/KG		
CWRSC036	Chlordane	28		355	UG/KG	J	q
CWRSC036	Delta-BHC			7.1	UG/KG		
CWRSC036	Dieldrin			14.2	UG/KG		
CWRSC036	Endosulfan I			7.1	UG/KG		
CWRSC036	Endosulfan II			14.2	UG/KG		
CWRSC036	Endosulfan Sulfate			14.2	UG/KG		
CWRSC036	Endrin			14.2	UG/KG		
CWRSC036	Endrin Aldehyde			14.2	UG/KG		
CWRSC036	Endrin Ketone			14.2	UG/KG		
CWRSC036	Gamma-BHC			7.1	UG/KG		
CWRSC036	gamma-Chlordane	5.5		7.1	UG/KG	J	qv
CWRSC036	Heptachlor			7.1	UG/KG		
CWRSC036	Heptachlor Epoxide			7.1	UG/KG		
CWRSC036	Methoxychlor			70.9	UG/KG	UJ	c
CWRSC036	Toxaphene			355	UG/KG		
CWRSC036	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC036	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC036	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC036	1,1-Dichloroethane			1.1	UG/KG		
CWRSC036	1,1-Dichloroethene			1.1	UG/KG		
CWRSC036	1,2-Dichloroethane			1.1	UG/KG		
CWRSC036	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC036	1,2-Dichloropropane			1.1	UG/KG		
CWRSC036	2-Butanone	12.3		5.3	UG/KG	J	c
CWRSC036	2-Hexanone			5.3	UG/KG		
CWRSC036	4-Methyl-2-Pentanone			5.3	UG/KG		
CWRSC036	Acetone			26.6	UG/KG		
CWRSC036	Benzene			1.1	UG/KG		
CWRSC036	Bromoform			1.1	UG/KG		
CWRSC036	Carbon Disulfide			5.3	UG/KG		
CWRSC036	Carbon Tetrachloride			1.1	UG/KG		
CWRSC036	Chlorobenzene			1.1	UG/KG		
CWRSC036	Chlorodibromomethane			1.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC036	Chloroethane			1.1	UG/KG		
CWRSC036	Chloroform			1.1	UG/KG		
CWRSC036	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC036	Dichlorobromomethane			1.1	UG/KG		
CWRSC036	Ethylbenzene	0.55		1.1	UG/KG	J	q
CWRSC036	Methyl Bromide			1.1	UG/KG		
CWRSC036	Methyl Chloride			1.1	UG/KG		
CWRSC036	Methylene Chloride	0.64		5.3	UG/KG	J	q
CWRSC036	Styrene			1.1	UG/KG		
CWRSC036	Tetrachloroethene			1.1	UG/KG		
CWRSC036	Toluene	109		1.1	UG/KG	J	q
CWRSC036	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC036	Trichloroethene			1.1	UG/KG		
CWRSC036	Vinyl Chloride			1.1	UG/KG		
CWRSC036	Xylenes (Total)	1.5		3.2	UG/KG	J	q
CWRSC036	1,2,4-Trichlorobenzene			1420	UG/KG		
CWRSC036	1,2-Dichlorobenzene			1420	UG/KG		
CWRSC036	1,3-Dichlorobenzene			1420	UG/KG		
CWRSC036	1,4-Dichlorobenzene			1420	UG/KG		
CWRSC036	2,2'-oxybis(1-Chloropropane)			1420	UG/KG		
CWRSC036	2,4,5-Trichlorophenol			1420	UG/KG		
CWRSC036	2,4,6-Trichlorophenol			1420	UG/KG		
CWRSC036	2,4-Dichlorophenol			1420	UG/KG		
CWRSC036	2,4-Dimethylphenol			1420	UG/KG		
CWRSC036	2,4-Dinitrophenol			2840	UG/KG		
CWRSC036	2,4-Dinitrotoluene			1420	UG/KG		
CWRSC036	2,6-Dinitrotoluene			1420	UG/KG		
CWRSC036	2-Chloronaphthalene			1420	UG/KG		
CWRSC036	2-Chlorophenol			1420	UG/KG		
CWRSC036	2-Methyl-4,6-dinitrophenol			1420	UG/KG		
CWRSC036	2-Methylnaphthalene			1420	UG/KG		
CWRSC036	2-Nitroaniline			1420	UG/KG	UJ	c
CWRSC036	2-Nitrophenol			1420	UG/KG		
CWRSC036	3,3'-Dichlorobenzidine			2840	UG/KG		
CWRSC036	3-Nitroaniline			1420	UG/KG		
CWRSC036	4-Bromophenyl Phenyl Ether			1420	UG/KG		
CWRSC036	4-Chloro-3-Methylphenol			1420	UG/KG		
CWRSC036	4-Chloroaniline			2840	UG/KG		
CWRSC036	4-Chlorophenyl Phenyl Ether			1420	UG/KG		
CWRSC036	4-Nitroaniline			1420	UG/KG		
CWRSC036	4-Nitrophenol			1420	UG/KG		
CWRSC036	Acenaphthene			1420	UG/KG		
CWRSC036	Acenaphthylene			1420	UG/KG		
CWRSC036	Anthracene			1420	UG/KG		
CWRSC036	Benzo(a)anthracene			1420	UG/KG		
CWRSC036	Benzo(a)pyrene			1420	UG/KG		
CWRSC036	Benzo(b)fluoranthene			1420	UG/KG		
CWRSC036	Benzo(g,h,i)perylene			1420	UG/KG		
CWRSC036	Benzo(k)fluoranthene			1420	UG/KG		
CWRSC036	Bis(2-Chloroethoxy)methane			1420	UG/KG		
CWRSC036	Bis(2-Chloroethyl)ether			1420	UG/KG		
CWRSC036	Bis(2-Ethylhexyl)phthalate			1420	UG/KG		
CWRSC036	Butyl Benzyl Phthalate			1420	UG/KG		
CWRSC036	Carbazole			1420	UG/KG		
CWRSC036	Chrysene			1420	UG/KG	UJ	c

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC036	Di-n-Butyl Phthalate			1420	UG/KG		
CWRSC036	Di-n-Octyl Phthalate			1420	UG/KG		
CWRSC036	Dibenzo(a,h)anthracene			1420	UG/KG		
CWRSC036	Dibenzofuran			1420	UG/KG		
CWRSC036	Diethyl Phthalate			1420	UG/KG		
CWRSC036	Dimethyl Phthalate			1420	UG/KG		
CWRSC036	Diphenylamine			1420	UG/KG		
CWRSC036	Fluoranthene			1420	UG/KG		
CWRSC036	Fluorene			1420	UG/KG		
CWRSC036	Hexachlorobenzene			1420	UG/KG		
CWRSC036	Hexachlorobutadiene			1420	UG/KG		
CWRSC036	Hexachlorocyclopentadiene			1420	UG/KG		
CWRSC036	Hexachloroethane			1420	UG/KG		
CWRSC036	Indeno(1,2,3-cd)pyrene			1420	UG/KG		
CWRSC036	Isophorone			1420	UG/KG		
CWRSC036	M,P-CRESOL			1420	UG/KG		
CWRSC036	N-Nitrosodipropylamine			1420	UG/KG		
CWRSC036	Naphthalene			1420	UG/KG		
CWRSC036	Nitrobenzene			1420	UG/KG		
CWRSC036	O-Cresol			1420	UG/KG		
CWRSC036	Pentachlorophenol			2840	UG/KG		
CWRSC036	Phenanthrene			1420	UG/KG		
CWRSC036	Phenol			1420	UG/KG		
CWRSC036	Pyrene			1420	UG/KG		
CWRSC037	Actinium-228	0.475	0.0746	0.0162	PCI/G		
CWRSC037	Americium-241	0.00252	0.00349	0.00631	PCI/G		
CWRSC037	Bismuth-212	0.315	0.0536	0.0348	PCI/G		
CWRSC037	Bismuth-214	0.365	0.0413	0.00789	PCI/G		
CWRSC037	Carbon-14	0.0181	0.0563	0.0962	PCI/G		
CWRSC037	Cesium-137	0.0229	0.00508	0.00469	PCI/G		
CWRSC037	Cobalt-60	-0.00138	0.00329	0.00543	PCI/G		
CWRSC037	Gross Alpha	6.91	2	1.79	PCI/G		
CWRSC037	Lead-210	0.527	1.32	1.14	PCI/G		
CWRSC037	Lead-212	0.509	0.0538	0.00788	PCI/G		
CWRSC037	Lead-214	0.416	0.0462	0.00851	PCI/G		
CWRSC037	Nonvolatile Beta	13.7	1.74	2.27	PCI/G		
CWRSC037	Plutonium-241	-0.179	0.222	0.411	PCI/G		
CWRSC037	Potassium-40	11.2	1.3	0.0392	PCI/G		
CWRSC037	Radium-223	-0.0211	0.0572	0.0843	PCI/G		
CWRSC037	Radium-226	0.535	0.0809	0.0334	PCI/G		
CWRSC037	Radium-228	0.475	0.0746	0.0162	PCI/G		
CWRSC037	Strontium-90	0.0139	0.00992	0.0174	PCI/G	UJ	c
CWRSC037	Thallium-208	0.161	0.0178	0.00446	PCI/G		
CWRSC037	Thorium-228	0.539	0.171	0.158	PCI/G		
CWRSC037	Thorium-230	0.478	0.145	0.0878	PCI/G		
CWRSC037	Thorium-232	0.442	0.135	0.0637	PCI/G		
CWRSC037	Thorium-234	0.738	0.348	0.252	PCI/G		
CWRSC037	Tritium	0.127	0.476	0.826	PCI/G		
CWRSC037	Uranium-233/234	0.463	0.0603	0.00633	PCI/G		
CWRSC037	Uranium-235	0.0249	0.0103	0.00918	PCI/G		
CWRSC037	Uranium-238	0.42	0.0561	0.0102	PCI/G		
CWRSC037	Antimony			6.1	MG/KG	R	m
CWRSC037	Arsenic	7.3		1	MG/KG		
CWRSC037	Barium	156		20.3	MG/KG		
CWRSC037	Beryllium	0.35		0.51	MG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC037	Cadmium			0.51	MG/KG		
CWRSC037	Chromium	99		1	MG/KG		
CWRSC037	Cobalt	19.1		5.1	MG/KG		
CWRSC037	Copper	34.8		2.5	MG/KG		
CWRSC037	Lead	14.1		0.3	MG/KG		
CWRSC037	Mercury	0.86		0.033	MG/KG	J	m
CWRSC037	Molybdenum	0.33		1	MG/KG	J	m
CWRSC037	Nickel	205		4.1	MG/KG		
CWRSC037	Selenium	1.3		0.51	MG/KG		
CWRSC037	Silver	0.58		1	MG/KG		
CWRSC037	Thallium			1	MG/KG		
CWRSC037	Vanadium	50.6		5.1	MG/KG		
CWRSC037	Zinc	71.2		2	MG/KG		
CWRSC037	Chromium, Hexavalent	0.0654		0.218	MG/KG	J	md
CWRSC037	Nitrate	6.14		1	MG/KG		
CWRSC037	4,4'-DDD			14.5	UG/KG		
CWRSC037	4,4'-DDE			14.5	UG/KG		
CWRSC037	4,4'-DDT			14.5	UG/KG	UJ	c
CWRSC037	Aldrin			7.2	UG/KG		
CWRSC037	Alpha-BHC			7.2	UG/KG		
CWRSC037	Alpha-Chlordane	3.6		7.2	UG/KG	J	qv
CWRSC037	Arochlor-1016			36.2	UG/KG		
CWRSC037	Arochlor-1221			36.2	UG/KG		
CWRSC037	Arochlor-1232			36.2	UG/KG		
CWRSC037	Arochlor-1242			36.2	UG/KG		
CWRSC037	Arochlor-1248			36.2	UG/KG		
CWRSC037	Arochlor-1254			36.2	UG/KG		
CWRSC037	Arochlor-1260			36.2	UG/KG		
CWRSC037	Beta-BHC			7.2	UG/KG		
CWRSC037	Chlordane	23.8		362	UG/KG	J	qv
CWRSC037	Delta-BHC			7.2	UG/KG		
CWRSC037	Dieldrin			14.5	UG/KG		
CWRSC037	Endosulfan I			7.2	UG/KG		
CWRSC037	Endosulfan II			14.5	UG/KG		
CWRSC037	Endosulfan Sulfate			14.5	UG/KG		
CWRSC037	Endrin			14.5	UG/KG		
CWRSC037	Endrin Aldehyde			14.5	UG/KG		
CWRSC037	Endrin Ketone			14.5	UG/KG		
CWRSC037	Gamma-BHC			7.2	UG/KG		
CWRSC037	gamma-Chlordane	5.7		7.2	UG/KG	J	qv
CWRSC037	Heptachlor			7.2	UG/KG		
CWRSC037	Heptachlor Epoxide			7.2	UG/KG		
CWRSC037	Methoxychlor			72.5	UG/KG	UJ	c
CWRSC037	Toxaphene			362	UG/KG		
CWRSC037	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC037	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC037	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC037	1,1-Dichloroethane			1.1	UG/KG		
CWRSC037	1,1-Dichloroethene			1.1	UG/KG		
CWRSC037	1,2-Dichloroethane			1.1	UG/KG		
CWRSC037	1,2-Dichloroethene (total)			2.2	UG/KG		
CWRSC037	1,2-Dichloropropane			1.1	UG/KG		
CWRSC037	2-Butanone			5.4	UG/KG	UJ	c
CWRSC037	2-Hexanone			5.4	UG/KG		
CWRSC037	4-Methyl-2-Pentanone			5.4	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC037	Acetone			27.2	UG/KG		
CWRSC037	Benzene			1.1	UG/KG		
CWRSC037	Bromoform			1.1	UG/KG		
CWRSC037	Carbon Disulfide			5.4	UG/KG		
CWRSC037	Carbon Tetrachloride			1.1	UG/KG		
CWRSC037	Chlorobenzene			1.1	UG/KG		
CWRSC037	Chlorodibromomethane			1.1	UG/KG		
CWRSC037	Chloroethane			1.1	UG/KG		
CWRSC037	Chloroform			1.1	UG/KG		
CWRSC037	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC037	Dichlorobromomethane			1.1	UG/KG		
CWRSC037	Ethylbenzene			1.1	UG/KG		
CWRSC037	Methyl Bromide			1.1	UG/KG		
CWRSC037	Methyl Chloride			1.1	UG/KG		
CWRSC037	Methylene Chloride			5.4	UG/KG		
CWRSC037	Styrene			1.1	UG/KG		
CWRSC037	Tetrachloroethene			1.1	UG/KG		
CWRSC037	Toluene	18.4		1.1	UG/KG		
CWRSC037	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC037	Trichloroethene			1.1	UG/KG		
CWRSC037	Vinyl Chloride			1.1	UG/KG		
CWRSC037	Xylenes (Total)	0.76		3.3	UG/KG	J	q
CWRSC037	1,2,4-Trichlorobenzene			3620	UG/KG		
CWRSC037	1,2-Dichlorobenzene			3620	UG/KG		
CWRSC037	1,3-Dichlorobenzene			3620	UG/KG		
CWRSC037	1,4-Dichlorobenzene			3620	UG/KG		
CWRSC037	2,2'-oxybis(1-Chloropropane)			3620	UG/KG		
CWRSC037	2,4,5-Trichlorophenol			3620	UG/KG		
CWRSC037	2,4,6-Trichlorophenol			3620	UG/KG		
CWRSC037	2,4-Dichlorophenol			3620	UG/KG		
CWRSC037	2,4-Dimethylphenol			3620	UG/KG		
CWRSC037	2,4-Dinitrophenol			7250	UG/KG		
CWRSC037	2,4-Dinitrotoluene			3620	UG/KG		
CWRSC037	2,6-Dinitrotoluene			3620	UG/KG		
CWRSC037	2-Chloronaphthalene			3620	UG/KG		
CWRSC037	2-Chlorophenol			3620	UG/KG		
CWRSC037	2-Methyl-4,6-dinitrophenol			3620	UG/KG		
CWRSC037	2-Methylnaphthalene			3620	UG/KG		
CWRSC037	2-Nitroaniline			3620	UG/KG	UJ	c
CWRSC037	2-Nitrophenol			3620	UG/KG		
CWRSC037	3,3'-Dichlorobenzidine			7250	UG/KG		
CWRSC037	3-Nitroaniline			3620	UG/KG		
CWRSC037	4-Bromophenyl Phenyl Ether			3620	UG/KG		
CWRSC037	4-Chloro-3-Methylphenol			3620	UG/KG		
CWRSC037	4-Chloroaniline			7250	UG/KG		
CWRSC037	4-Chlorophenyl Phenyl Ether			3620	UG/KG		
CWRSC037	4-Nitroaniline			3620	UG/KG		
CWRSC037	4-Nitrophenol			3620	UG/KG		
CWRSC037	Acenaphthene			3620	UG/KG		
CWRSC037	Acenaphthylene			3620	UG/KG		
CWRSC037	Anthracene			3620	UG/KG		
CWRSC037	Benzo(a)anthracene			3620	UG/KG		
CWRSC037	Benzo(a)pyrene			3620	UG/KG		
CWRSC037	Benzo(b)fluoranthene			3620	UG/KG		
CWRSC037	Benzo(g,h,i)perylene			3620	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC037	Benzo(k)fluoranthene			3620	UG/KG		
CWRSC037	Bis(2-Chloroethoxy)methane			3620	UG/KG		
CWRSC037	Bis(2-Chloroethyl)ether			3620	UG/KG		
CWRSC037	Bis(2-Ethylhexyl)phthalate			3620	UG/KG		
CWRSC037	Butyl Benzyl Phthalate			3620	UG/KG		
CWRSC037	Carbazole			3620	UG/KG		
CWRSC037	Chrysene			3620	UG/KG	UJ	c
CWRSC037	Di-n-Butyl Phthalate			3620	UG/KG		
CWRSC037	Di-n-Octyl Phthalate			3620	UG/KG		
CWRSC037	Dibenzo(a,h)anthracene			3620	UG/KG		
CWRSC037	Dibenzofuran			3620	UG/KG		
CWRSC037	Diethyl Phthalate			3620	UG/KG		
CWRSC037	Dimethyl Phthalate			3620	UG/KG		
CWRSC037	Diphenylamine			3620	UG/KG		
CWRSC037	Fluoranthene			3620	UG/KG		
CWRSC037	Fluorene			3620	UG/KG		
CWRSC037	Hexachlorobenzene			3620	UG/KG		
CWRSC037	Hexachlorobutadiene			3620	UG/KG		
CWRSC037	Hexachlorocyclopentadiene			3620	UG/KG		
CWRSC037	Hexachloroethane			3620	UG/KG		
CWRSC037	Indeno(1,2,3-cd)pyrene			3620	UG/KG		
CWRSC037	Isophorone			3620	UG/KG		
CWRSC037	M,P-CRESOL			3620	UG/KG		
CWRSC037	N-Nitrosodipropylamine			3620	UG/KG		
CWRSC037	Naphthalene			3620	UG/KG		
CWRSC037	Nitrobenzene			3620	UG/KG		
CWRSC037	O-Cresol			3620	UG/KG		
CWRSC037	Pentachlorophenol			7250	UG/KG		
CWRSC037	Phenanthrene			3620	UG/KG		
CWRSC037	Phenol			3620	UG/KG		
CWRSC037	Pyrene			3620	UG/KG		
CWRSC038	Bismuth-212	0.344	0.0715	0.0379	PCI/G		
CWRSC038	Bismuth-214	0.383	0.0509	0.00851	PCI/G		
CWRSC038	Carbon-14	0.091	0.0547	0.0742	PCI/G		
CWRSC038	Cobalt-60	0.00151	0.0032	0.00575	PCI/G		
CWRSC038	Nonvolatile Beta	14.3	1.73	2.12	PCI/G		
CWRSC038	Thorium-228	0.454	0.186	0.227	PCI/G		
CWRSC038	Uranium-238	0.469	0.06	0.00745	PCI/G		
CWRSC038	Antimony			5.9	MG/KG	R	m
CWRSC038	Arsenic	8		0.98	MG/KG		
CWRSC038	Barium	168		19.7	MG/KG		
CWRSC038	Beryllium	0.4		0.49	MG/KG		
CWRSC038	Cadmium			0.49	MG/KG		
CWRSC038	Copper	39.8		2.5	MG/KG		
CWRSC038	Selenium	1.4		0.49	MG/KG		
CWRSC038	Silver	8.4		0.98	MG/KG		
CWRSC038	Thallium			0.98	MG/KG		
CWRSC038	Vanadium	56		4.9	MG/KG		
CWRSC038	Chromium, Hexavalent			0.212	MG/KG	UJ	md
CWRSC038	4,4'-DDD			14.2	UG/KG		
CWRSC038	4,4'-DDE			14.2	UG/KG		
CWRSC038	4,4'-DDT			14.2	UG/KG	UJ	c
CWRSC038	Aldrin			7.1	UG/KG		
CWRSC038	Alpha-BHC			7.1	UG/KG		
CWRSC038	Alpha-Chlordane	29.4		7.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC038	Arochlor-1016			35.5	UG/KG		
CWRSC038	Arochlor-1221			35.5	UG/KG		
CWRSC038	Arochlor-1232			35.5	UG/KG		
CWRSC038	Arochlor-1242			35.5	UG/KG		
CWRSC038	Arochlor-1248			35.5	UG/KG		
CWRSC038	Arochlor-1254			35.5	UG/KG		
CWRSC038	Arochlor-1260			35.5	UG/KG		
CWRSC038	Beta-BHC			7.1	UG/KG		
CWRSC038	Chlordane	196		355	UG/KG	J	qv
CWRSC038	Delta-BHC			7.1	UG/KG		
CWRSC038	Dieldrin			14.2	UG/KG		
CWRSC038	Endosulfan I			7.1	UG/KG		
CWRSC038	Endosulfan II			14.2	UG/KG		
CWRSC038	Endosulfan Sulfate			14.2	UG/KG		
CWRSC038	Endrin			14.2	UG/KG		
CWRSC038	Endrin Aldehyde			14.2	UG/KG		
CWRSC038	Endrin Ketone			14.2	UG/KG		
CWRSC038	Gamma-BHC			7.1	UG/KG		
CWRSC038	gamma-Chlordane	45		7.1	UG/KG	J	v
CWRSC038	Heptachlor			7.1	UG/KG		
CWRSC038	Heptachlor Epoxide			7.1	UG/KG		
CWRSC038	Methoxychlor			70.9	UG/KG	UJ	c
CWRSC038	Toxaphene			355	UG/KG		
CWRSC038	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC038	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC038	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC038	1,1-Dichloroethane			1.1	UG/KG		
CWRSC038	1,1-Dichloroethene			1.1	UG/KG		
CWRSC038	1,2-Dichloroethane			1.1	UG/KG		
CWRSC038	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC038	1,2-Dichloropropane			1.1	UG/KG		
CWRSC038	2-Butanone			5.3	UG/KG	UJ	c
CWRSC038	2-Hexanone			5.3	UG/KG		
CWRSC038	4-Methyl-2-Pentanone			5.3	UG/KG		
CWRSC038	Acetone			26.6	UG/KG		
CWRSC038	Benzene			1.1	UG/KG		
CWRSC038	Bromoform			1.1	UG/KG		
CWRSC038	Carbon Disulfide			5.3	UG/KG		
CWRSC038	Carbon Tetrachloride			1.1	UG/KG		
CWRSC038	Chlorobenzene			1.1	UG/KG		
CWRSC038	Chlorodibromomethane			1.1	UG/KG		
CWRSC038	Chloroethane			1.1	UG/KG		
CWRSC038	Chloroform			1.1	UG/KG		
CWRSC038	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC038	Dichlorobromomethane			1.1	UG/KG		
CWRSC038	Ethylbenzene	0.86		1.1	UG/KG	J	q
CWRSC038	Methyl Bromide			1.1	UG/KG		
CWRSC038	Methyl Chloride			1.1	UG/KG		
CWRSC038	Methylene Chloride			5.3	UG/KG		
CWRSC038	Styrene			1.1	UG/KG		
CWRSC038	Tetrachloroethene			1.1	UG/KG		
CWRSC038	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC038	Trichloroethene			1.1	UG/KG		
CWRSC038	Vinyl Chloride			1.1	UG/KG		
CWRSC038	Xylenes (Total)	3.8		3.2	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC038	1,2,4-Trichlorobenzene			3550	UG/KG		
CWRSC038	1,2-Dichlorobenzene			3550	UG/KG		
CWRSC038	1,3-Dichlorobenzene			3550	UG/KG		
CWRSC038	1,4-Dichlorobenzene			3550	UG/KG		
CWRSC038	2,2'-oxybis(1-Chloropropane)			3550	UG/KG		
CWRSC038	2,4,5-Trichlorophenol			3550	UG/KG		
CWRSC038	2,4,6-Trichlorophenol			3550	UG/KG		
CWRSC038	2,4-Dichlorophenol			3550	UG/KG		
CWRSC038	2,4-Dimethylphenol			3550	UG/KG		
CWRSC038	2,4-Dinitrophenol			7090	UG/KG		
CWRSC038	2,4-Dinitrotoluene			3550	UG/KG		
CWRSC038	2,6-Dinitrotoluene			3550	UG/KG		
CWRSC038	2-Chloronaphthalene			3550	UG/KG		
CWRSC038	2-Chlorophenol			3550	UG/KG		
CWRSC038	2-Methyl-4,6-dinitrophenol			3550	UG/KG		
CWRSC038	2-Methylnaphthalene			3550	UG/KG		
CWRSC038	2-Nitroaniline			3550	UG/KG	UJ	c
CWRSC038	2-Nitrophenol			3550	UG/KG		
CWRSC038	3,3'-Dichlorobenzidine			7090	UG/KG		
CWRSC038	3-Nitroaniline			3550	UG/KG		
CWRSC038	4-Bromophenyl Phenyl Ether			3550	UG/KG		
CWRSC038	4-Chloro-3-Methylphenol			3550	UG/KG		
CWRSC038	4-Chloroaniline			7090	UG/KG		
CWRSC038	4-Chlorophenyl Phenyl Ether			3550	UG/KG		
CWRSC038	4-Nitroaniline			3550	UG/KG		
CWRSC038	4-Nitrophenol			3550	UG/KG		
CWRSC038	Acenaphthene			3550	UG/KG		
CWRSC038	Acenaphthylene			3550	UG/KG		
CWRSC038	Anthracene			3550	UG/KG		
CWRSC038	Benzo(a)anthracene			3550	UG/KG		
CWRSC038	Benzo(a)pyrene			3550	UG/KG		
CWRSC038	Benzo(b)fluoranthene			3550	UG/KG		
CWRSC038	Benzo(g,h,i)perylene			3550	UG/KG		
CWRSC038	Benzo(k)fluoranthene			3550	UG/KG		
CWRSC038	Bis(2-Chloroethoxy)methane			3550	UG/KG		
CWRSC038	Bis(2-Chloroethyl)ether			3550	UG/KG		
CWRSC038	Bis(2-Ethylhexyl)phthalate			3550	UG/KG		
CWRSC038	Butyl Benzyl Phthalate			3550	UG/KG		
CWRSC038	Carbazole			3550	UG/KG		
CWRSC038	Chrysene			3550	UG/KG	UJ	c
CWRSC038	Di-n-Butyl Phthalate			3550	UG/KG		
CWRSC038	Di-n-Octyl Phthalate			3550	UG/KG		
CWRSC038	Dibenzo(a,h)anthracene			3550	UG/KG		
CWRSC038	Dibenzofuran			3550	UG/KG		
CWRSC038	Diethyl Phthalate			3550	UG/KG		
CWRSC038	Dimethyl Phthalate			3550	UG/KG		
CWRSC038	Diphenylamine			3550	UG/KG		
CWRSC038	Fluoranthene			3550	UG/KG		
CWRSC038	Fluorene			3550	UG/KG		
CWRSC038	Hexachlorobenzene			3550	UG/KG		
CWRSC038	Hexachlorobutadiene			3550	UG/KG		
CWRSC038	Hexachlorocyclopentadiene			3550	UG/KG		
CWRSC038	Hexachloroethane			3550	UG/KG		
CWRSC038	Indeno(1,2,3-cd)pyrene			3550	UG/KG		
CWRSC038	Isophorone			3550	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC038	M,P-CRESOL			3550	UG/KG		
CWRSC038	N-Nitrosodipropylamine			3550	UG/KG		
CWRSC038	Naphthalene			3550	UG/KG		
CWRSC038	Nitrobenzene			3550	UG/KG		
CWRSC038	O-Cresol			3550	UG/KG		
CWRSC038	Pentachlorophenol			7090	UG/KG		
CWRSC038	Phenanthrene			3550	UG/KG		
CWRSC038	Phenol			3550	UG/KG		
CWRSC038	Pyrene			3550	UG/KG		
CWRSC039	Actinium-228	0.513	0.0804	0.0169	PCI/G		
CWRSC039	Americium-241	0.00884	0.00581	0.00709	PCI/G		
CWRSC039	Cesium-137	0.0456	0.0065	0.00464	PCI/G		
CWRSC039	Gross Alpha	7.9	2.07	1.55	PCI/G		
CWRSC039	Lead-210	0.628	1.36	1.17	PCI/G		
CWRSC039	Lead-212	0.539	0.0569	0.00787	PCI/G		
CWRSC039	Lead-214	0.447	0.0496	0.00889	PCI/G		
CWRSC039	Plutonium-241	-0.0838	0.186	0.342	PCI/G		
CWRSC039	Potassium-40	11.5	1.34	0.0397	PCI/G		
CWRSC039	Radium-223	0.0161	0.0582	0.0873	PCI/G		
CWRSC039	Radium-226	0.566	0.0866	0.0272	PCI/G		
CWRSC039	Radium-228	0.513	0.0804	0.0169	PCI/G		
CWRSC039	Strontium-90	0.0415	0.0152	0.0241	PCI/G	J	c
CWRSC039	Thallium-208	0.172	0.0187	0.00456	PCI/G		
CWRSC039	Thorium-230	0.5	0.133	0.0422	PCI/G		
CWRSC039	Thorium-232	0.549	0.141	0.0422	PCI/G		
CWRSC039	Thorium-234	0.663	0.323	0.252	PCI/G		
CWRSC039	Tritium	0.365	0.471	0.793	PCI/G		
CWRSC039	Uranium-233/234	0.451	0.0598	0.00817	PCI/G		
CWRSC039	Uranium-235	0.0342	0.0116	0.00654	PCI/G		
CWRSC039	Chromium	165		0.98	MG/KG		
CWRSC039	Cobalt	20.5		4.9	MG/KG		
CWRSC039	Lead	17.5		0.29	MG/KG		
CWRSC039	Mercury	1.2		0.033	MG/KG	J	m
CWRSC039	Molybdenum	0.33		0.98	MG/KG	J	m
CWRSC039	Nickel	217		3.9	MG/KG		
CWRSC039	Zinc	79.6		2	MG/KG		
CWRSC039	Nitrate	4.73		1	MG/KG		
CWRSC039	Toluene	173		2.1	UG/KG		
CWRSC040	Actinium-228	0.584	0.0782	0.0172	PCI/G		
CWRSC040	Americium-241	0.00118	0.00237	0.00497	PCI/G		
CWRSC040	Bismuth-212	0.387	0.0714	0.038	PCI/G		
CWRSC040	Bismuth-214	0.464	0.0634	0.00852	PCI/G		
CWRSC040	Carbon-14	0.016	0.057	0.0975	PCI/G		
CWRSC040	Cesium-137	0.0106	0.00585	0.00481	PCI/G		
CWRSC040	Cobalt-60	0.0022	0.00323	0.00576	PCI/G		
CWRSC040	Gross Alpha	6.09	2	2.36	PCI/G		
CWRSC040	Lead-210	0.536	0.101	0.0734	PCI/G		
CWRSC040	Lead-212	0.59	0.064	0.00739	PCI/G		
CWRSC040	Lead-214	0.496	0.0546	0.00861	PCI/G		
CWRSC040	Nonvolatile Beta	11.7	1.6	2.11	PCI/G		
CWRSC040	Plutonium-241	-0.0685	0.187	0.343	PCI/G		
CWRSC040	Potassium-40	11.8	1.15	0.0383	PCI/G		
CWRSC040	Radium-223	0.0000284	0.0546	0.0828	PCI/G		
CWRSC040	Radium-226	0.614	0.0873	0.0322	PCI/G		
CWRSC040	Radium-228	0.584	0.0782	0.0172	PCI/G		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC040	Strontium-90	0.00773	0.0129	0.0218	PCI/G	UJ	c
CWRSC040	Thallium-208	0.19	0.0244	0.00479	PCI/G		
CWRSC040	Thorium-228	0.53	0.141	0.135	PCI/G		
CWRSC040	Thorium-230	0.542	0.127	0.0522	PCI/G		
CWRSC040	Thorium-232	0.463	0.114	0.0411	PCI/G		
CWRSC040	Thorium-234	0.527	0.137	0.0901	PCI/G		
CWRSC040	Tritium	0.119	0.448	0.777	PCI/G		
CWRSC040	Uranium-233/234	0.436	0.0604	0.00925	PCI/G		
CWRSC040	Uranium-235	0.0378	0.0127	0.00291	PCI/G		
CWRSC040	Uranium-238	0.464	0.0634	0.00739	PCI/G		
CWRSC040	Antimony			6.5	MG/KG	R	m
CWRSC040	Arsenic	7.8		1.1	MG/KG		
CWRSC040	Barium	174		21.7	MG/KG		
CWRSC040	Beryllium	0.42		0.54	MG/KG		
CWRSC040	Cadmium			0.54	MG/KG		
CWRSC040	Chromium	104		1.1	MG/KG		
CWRSC040	Cobalt	20.9		5.4	MG/KG		
CWRSC040	Copper	39		2.7	MG/KG		
CWRSC040	Lead	8.4		0.33	MG/KG		
CWRSC040	Mercury	0.9		0.035	MG/KG	J	m
CWRSC040	Molybdenum	0.32		1.1	MG/KG	J	m
CWRSC040	Nickel	210		4.3	MG/KG		
CWRSC040	Selenium	1.4		0.54	MG/KG		
CWRSC040	Silver	3.9		1.1	MG/KG		
CWRSC040	Thallium			1.1	MG/KG		
CWRSC040	Vanadium	56.1		5.4	MG/KG		
CWRSC040	Zinc	70.9		2.2	MG/KG		
CWRSC040	Chromium, Hexavalent			0.218	MG/KG	UJ	md
CWRSC040	Nitrate	2.47		1	MG/KG		
CWRSC040	4,4'-DDD			7.2	UG/KG		
CWRSC040	4,4'-DDE			7.2	UG/KG		
CWRSC040	4,4'-DDT			7.2	UG/KG	UJ	c
CWRSC040	Aldrin			3.6	UG/KG		
CWRSC040	Alpha-BHC			3.6	UG/KG		
CWRSC040	Alpha-Chlordane	2		3.6	UG/KG	J	qv
CWRSC040	Arochlor-1016			18.1	UG/KG		
CWRSC040	Arochlor-1221			18.1	UG/KG		
CWRSC040	Arochlor-1232			18.1	UG/KG		
CWRSC040	Arochlor-1242			18.1	UG/KG		
CWRSC040	Arochlor-1248			18.1	UG/KG		
CWRSC040	Arochlor-1254			18.1	UG/KG		
CWRSC040	Arochlor-1260			18.1	UG/KG		
CWRSC040	Beta-BHC			3.6	UG/KG		
CWRSC040	Chlordane	12		181	UG/KG	J	q
CWRSC040	Delta-BHC			3.6	UG/KG		
CWRSC040	Dieldrin			7.2	UG/KG		
CWRSC040	Endosulfan I			3.6	UG/KG		
CWRSC040	Endosulfan II			7.2	UG/KG		
CWRSC040	Endosulfan Sulfate			7.2	UG/KG		
CWRSC040	Endrin			7.2	UG/KG		
CWRSC040	Endrin Aldehyde			7.2	UG/KG		
CWRSC040	Endrin Ketone			7.2	UG/KG		
CWRSC040	Gamma-BHC			3.6	UG/KG		
CWRSC040	gamma-Chlordane	2.6		3.6	UG/KG	J	qv
CWRSC040	Heptachlor			3.6	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC040	Heptachlor Epoxide			3.6	UG/KG		
CWRSC040	Methoxychlor			36.2	UG/KG	UJ	c
CWRSC040	Toxaphene			181	UG/KG		
CWRSC040	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC040	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC040	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC040	1,1-Dichloroethane			1.1	UG/KG		
CWRSC040	1,1-Dichloroethene			1.1	UG/KG		
CWRSC040	1,2-Dichloroethane			1.1	UG/KG		
CWRSC040	1,2-Dichloroethene (total)			2.2	UG/KG		
CWRSC040	1,2-Dichloropropane			1.1	UG/KG		
CWRSC040	2-Butanone			5.4	UG/KG	UJ	c
CWRSC040	2-Hexanone			5.4	UG/KG		
CWRSC040	4-Methyl-2-Pentanone			5.4	UG/KG		
CWRSC040	Acetone			27.2	UG/KG	UJ	c
CWRSC040	Benzene			1.1	UG/KG		
CWRSC040	Bromoform			1.1	UG/KG		
CWRSC040	Carbon Disulfide			5.4	UG/KG		
CWRSC040	Carbon Tetrachloride			1.1	UG/KG		
CWRSC040	Chlorobenzene			1.1	UG/KG		
CWRSC040	Chlorodibromomethane			1.1	UG/KG		
CWRSC040	Chloroethane			1.1	UG/KG		
CWRSC040	Chloroform			1.1	UG/KG		
CWRSC040	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC040	Dichlorobromomethane			1.1	UG/KG		
CWRSC040	Ethylbenzene			1.1	UG/KG		
CWRSC040	Methyl Bromide			1.1	UG/KG		
CWRSC040	Methyl Chloride			1.1	UG/KG		
CWRSC040	Methylene Chloride			5.4	UG/KG		
CWRSC040	Styrene			1.1	UG/KG		
CWRSC040	Tetrachloroethene			1.1	UG/KG		
CWRSC040	Toluene	9.9		1.1	UG/KG		
CWRSC040	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC040	Trichloroethene			1.1	UG/KG		
CWRSC040	Vinyl Chloride			1.1	UG/KG		
CWRSC040	Xylenes (Total)			3.3	UG/KG		
CWRSC040	1,2,4-Trichlorobenzene			1450	UG/KG		
CWRSC040	1,2-Dichlorobenzene			1450	UG/KG		
CWRSC040	1,3-Dichlorobenzene			1450	UG/KG		
CWRSC040	1,4-Dichlorobenzene			1450	UG/KG		
CWRSC040	2,2'-oxybis(1-Chloropropane)			1450	UG/KG		
CWRSC040	2,4,5-Trichlorophenol			1450	UG/KG		
CWRSC040	2,4,6-Trichlorophenol			1450	UG/KG		
CWRSC040	2,4-Dichlorophenol			1450	UG/KG		
CWRSC040	2,4-Dimethylphenol			1450	UG/KG		
CWRSC040	2,4-Dinitrophenol			2900	UG/KG		
CWRSC040	2,4-Dinitrotoluene			1450	UG/KG		
CWRSC040	2,6-Dinitrotoluene			1450	UG/KG		
CWRSC040	2-Chloronaphthalene			1450	UG/KG		
CWRSC040	2-Chlorophenol			1450	UG/KG		
CWRSC040	2-Methyl-4,6-dinitrophenol			1450	UG/KG		
CWRSC040	2-Methylnaphthalene			1450	UG/KG		
CWRSC040	2-Nitroaniline			1450	UG/KG	UJ	c
CWRSC040	2-Nitrophenol			1450	UG/KG		
CWRSC040	3,3'-Dichlorobenzidine			2900	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC040	3-Nitroaniline			1450	UG/KG		
CWRSC040	4-Bromophenyl Phenyl Ether			1450	UG/KG		
CWRSC040	4-Chloro-3-Methylphenol			1450	UG/KG		
CWRSC040	4-Chloroaniline			2900	UG/KG		
CWRSC040	4-Chlorophenyl Phenyl Ether			1450	UG/KG		
CWRSC040	4-Nitroaniline			1450	UG/KG		
CWRSC040	4-Nitrophenol			1450	UG/KG		
CWRSC040	Acenaphthene			1450	UG/KG		
CWRSC040	Acenaphthylene			1450	UG/KG		
CWRSC040	Anthracene			1450	UG/KG		
CWRSC040	Benzo(a)anthracene			1450	UG/KG		
CWRSC040	Benzo(a)pyrene			1450	UG/KG		
CWRSC040	Benzo(b)fluoranthene			1450	UG/KG		
CWRSC040	Benzo(g,h,i)perylene			1450	UG/KG		
CWRSC040	Benzo(k)fluoranthene			1450	UG/KG		
CWRSC040	Bis(2-Chloroethoxy)methane			1450	UG/KG		
CWRSC040	Bis(2-Chloroethyl)ether			1450	UG/KG		
CWRSC040	Bis(2-Ethylhexyl)phthalate			1450	UG/KG		
CWRSC040	Butyl Benzyl Phthalate			1450	UG/KG		
CWRSC040	Carbazole			1450	UG/KG		
CWRSC040	Chrysene			1450	UG/KG	UJ	c
CWRSC040	Di-n-Butyl Phthalate			1450	UG/KG		
CWRSC040	Di-n-Octyl Phthalate			1450	UG/KG		
CWRSC040	Dibenzo(a,h)anthracene			1450	UG/KG		
CWRSC040	Dibenzofuran			1450	UG/KG		
CWRSC040	Diethyl Phthalate			1450	UG/KG		
CWRSC040	Dimethyl Phthalate			1450	UG/KG		
CWRSC040	Diphenylamine			1450	UG/KG		
CWRSC040	Fluoranthene			1450	UG/KG		
CWRSC040	Fluorene			1450	UG/KG		
CWRSC040	Hexachlorobenzene			1450	UG/KG		
CWRSC040	Hexachlorobutadiene			1450	UG/KG		
CWRSC040	Hexachlorocyclopentadiene			1450	UG/KG		
CWRSC040	Hexachloroethane			1450	UG/KG		
CWRSC040	Indeno(1,2,3-cd)pyrene			1450	UG/KG		
CWRSC040	Isophorone			1450	UG/KG		
CWRSC040	M,P-CRESOL			1450	UG/KG		
CWRSC040	N-Nitrosodipropylamine			1450	UG/KG		
CWRSC040	Naphthalene			1450	UG/KG		
CWRSC040	Nitrobenzene			1450	UG/KG		
CWRSC040	O-Cresol			1450	UG/KG		
CWRSC040	Pentachlorophenol			2900	UG/KG		
CWRSC040	Phenanthrene			1450	UG/KG		
CWRSC040	Phenol			1450	UG/KG		
CWRSC040	Pyrene			1450	UG/KG		
CWRSC041	Actinium-228	0.516	0.0754	0.0175	PCI/G		
CWRSC041	Americium-241	0.00264	0.00307	0.00264	PCI/G		
CWRSC041	Bismuth-212	0.33	0.0589	0.037	PCI/G		
CWRSC041	Bismuth-214	0.412	0.0476	0.00853	PCI/G		
CWRSC041	Carbon-14	0.0136	0.0578	0.099	PCI/G		
CWRSC041	Cesium-137	0.00662	0.00363	0.00495	PCI/G		
CWRSC041	Cobalt-60	0.00562	0.00741	0.00562	PCI/G		
CWRSC041	Gross Alpha	7.31	2.13	2.24	PCI/G		
CWRSC041	Lead-210	0.288	0.615	0.781	PCI/G		
CWRSC041	Lead-212	0.584	0.0606	0.00829	PCI/G		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC041	Lead-214	0.485	0.0533	0.0092	PCI/G		
CWRSC041	Nonvolatile Beta	14.5	1.78	2.32	PCI/G		
CWRSC041	Plutonium-241	-0.142	0.205	0.38	PCI/G		
CWRSC041	Potassium-40	11.6	1.2	0.04	PCI/G		
CWRSC041	Radium-223	-0.0936	0.0568	0.0925	PCI/G		
CWRSC041	Radium-226	0.567	0.0921	0.0381	PCI/G		
CWRSC041	Radium-228	0.516	0.0754	0.0175	PCI/G		
CWRSC041	Strontium-90	-0.00798	0.0109	0.0191	PCI/G	UJ	c
CWRSC041	Thallium-208	0.175	0.0188	0.00466	PCI/G		
CWRSC041	Thorium-228	0.435	0.165	0.193	PCI/G		
CWRSC041	Thorium-230	0.539	0.155	0.0638	PCI/G		
CWRSC041	Thorium-232	0.515	0.149	0.0516	PCI/G		
CWRSC041	Thorium-234	0.689	0.286	0.234	PCI/G		
CWRSC041	Tritium	0.128	0.482	0.837	PCI/G		
CWRSC041	Uranium-233/234	0.423	0.056	0.00778	PCI/G		
CWRSC041	Uranium-235	0.0285	0.0111	0.01	PCI/G		
CWRSC041	Uranium-238	0.416	0.0553	0.01	PCI/G		
CWRSC041	Antimony			6.1	MG/KG	R	m
CWRSC041	Arsenic	7.8		1	MG/KG		
CWRSC041	Barium	172		20.3	MG/KG		
CWRSC041	Beryllium	0.41		0.51	MG/KG		
CWRSC041	Cadmium			0.51	MG/KG		
CWRSC041	Chromium	128		1	MG/KG		
CWRSC041	Cobalt	20.9		5.1	MG/KG		
CWRSC041	Copper	38.2		2.5	MG/KG		
CWRSC041	Lead	10.3		0.3	MG/KG		
CWRSC041	Mercury	1.3		0.034	MG/KG	J	m
CWRSC041	Molybdenum	0.32		1	MG/KG	J	m
CWRSC041	Nickel	230		4	MG/KG		
CWRSC041	Selenium	1.3		0.51	MG/KG		
CWRSC041	Silver	2.1		1	MG/KG		
CWRSC041	Thallium			1	MG/KG		
CWRSC041	Vanadium	57.5		5.1	MG/KG		
CWRSC041	Zinc	73.9		2	MG/KG		
CWRSC041	Chromium, Hexavalent			0.216	MG/KG	UJ	md
CWRSC041	Nitrate	7.31		1	MG/KG		
CWRSC041	4,4'-DDD			7.2	UG/KG	UJ	c
CWRSC041	4,4'-DDE			7.2	UG/KG		
CWRSC041	4,4'-DDT			7.2	UG/KG	UJ	c
CWRSC041	Aldrin			3.6	UG/KG		
CWRSC041	Alpha-BHC			3.6	UG/KG		
CWRSC041	Alpha-Chlordane	1.3		3.6	UG/KG	J	qv
CWRSC041	Arochlor-1016			17.9	UG/KG		
CWRSC041	Arochlor-1221			17.9	UG/KG		
CWRSC041	Arochlor-1232			17.9	UG/KG		
CWRSC041	Arochlor-1242			17.9	UG/KG		
CWRSC041	Arochlor-1248			17.9	UG/KG		
CWRSC041	Arochlor-1254			17.9	UG/KG		
CWRSC041	Arochlor-1260			17.9	UG/KG		
CWRSC041	Beta-BHC			3.6	UG/KG		
CWRSC041	Chlordane	7.7		179	UG/KG	J	q
CWRSC041	Delta-BHC			3.6	UG/KG		
CWRSC041	Dieldrin			7.2	UG/KG		
CWRSC041	Endosulfan I			3.6	UG/KG		
CWRSC041	Endosulfan II			7.2	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC041	Endosulfan Sulfate			7.2	UG/KG		
CWRSC041	Endrin			7.2	UG/KG		
CWRSC041	Endrin Aldehyde			7.2	UG/KG		
CWRSC041	Endrin Ketone			7.2	UG/KG	UJ	c
CWRSC041	Gamma-BHC			3.6	UG/KG		
CWRSC041	gamma-Chlordane	1.5		3.6	UG/KG	J	qv
CWRSC041	Heptachlor			3.6	UG/KG		
CWRSC041	Heptachlor Epoxide			3.6	UG/KG		
CWRSC041	Methoxychlor			35.8	UG/KG	UJ	c
CWRSC041	Toxaphene			179	UG/KG		
CWRSC041	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC041	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC041	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC041	1,1-Dichloroethane			1.1	UG/KG		
CWRSC041	1,1-Dichloroethene			1.1	UG/KG		
CWRSC041	1,2-Dichloroethane			1.1	UG/KG		
CWRSC041	1,2-Dichloroethene (total)			2.2	UG/KG		
CWRSC041	1,2-Dichloropropane			1.1	UG/KG		
CWRSC041	2-Butanone			5.4	UG/KG	UJ	c
CWRSC041	2-Hexanone			5.4	UG/KG		
CWRSC041	4-Methyl-2-Pentanone			5.4	UG/KG		
CWRSC041	Acetone			26.9	UG/KG	UJ	c
CWRSC041	Benzene			1.1	UG/KG		
CWRSC041	Bromoform			1.1	UG/KG		
CWRSC041	Carbon Disulfide			5.4	UG/KG		
CWRSC041	Carbon Tetrachloride			1.1	UG/KG		
CWRSC041	Chlorobenzene			1.1	UG/KG		
CWRSC041	Chlorodibromomethane			1.1	UG/KG		
CWRSC041	Chloroethane			1.1	UG/KG		
CWRSC041	Chloroform			1.1	UG/KG		
CWRSC041	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC041	Dichlorobromomethane			1.1	UG/KG		
CWRSC041	Ethylbenzene			1.1	UG/KG		
CWRSC041	Methyl Bromide			1.1	UG/KG		
CWRSC041	Methyl Chloride			1.1	UG/KG		
CWRSC041	Methylene Chloride			5.4	UG/KG		
CWRSC041	Styrene			1.1	UG/KG		
CWRSC041	Tetrachloroethene			1.1	UG/KG		
CWRSC041	Toluene	5.4		1.1	UG/KG		
CWRSC041	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC041	Trichloroethene			1.1	UG/KG		
CWRSC041	Vinyl Chloride			1.1	UG/KG		
CWRSC041	Xylenes (Total)			3.2	UG/KG		
CWRSC041	1,2,4-Trichlorobenzene			3580	UG/KG		
CWRSC041	1,2-Dichlorobenzene			3580	UG/KG		
CWRSC041	1,3-Dichlorobenzene			3580	UG/KG		
CWRSC041	1,4-Dichlorobenzene			3580	UG/KG		
CWRSC041	2,2'-oxybis(1-Chloropropane)			3580	UG/KG		
CWRSC041	2,4,5-Trichlorophenol			3580	UG/KG		
CWRSC041	2,4,6-Trichlorophenol			3580	UG/KG		
CWRSC041	2,4-Dichlorophenol			3580	UG/KG		
CWRSC041	2,4-Dimethylphenol			3580	UG/KG		
CWRSC041	2,4-Dinitrophenol			7170	UG/KG		
CWRSC041	2,4-Dinitrotoluene			3580	UG/KG		
CWRSC041	2,6-Dinitrotoluene			3580	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC041	2-Chloronaphthalene			3580	UG/KG		
CWRSC041	2-Chlorophenol			3580	UG/KG		
CWRSC041	2-Methyl-4,6-dinitrophenol			3580	UG/KG		
CWRSC041	2-Methylnaphthalene			3580	UG/KG		
CWRSC041	2-Nitroaniline			3580	UG/KG	UJ	c
CWRSC041	2-Nitrophenol			3580	UG/KG		
CWRSC041	3,3'-Dichlorobenzidine			7170	UG/KG		
CWRSC041	3-Nitroaniline			3580	UG/KG		
CWRSC041	4-Bromophenyl Phenyl Ether			3580	UG/KG		
CWRSC041	4-Chloro-3-Methylphenol			3580	UG/KG		
CWRSC041	4-Chloroaniline			7170	UG/KG		
CWRSC041	4-Chlorophenyl Phenyl Ether			3580	UG/KG		
CWRSC041	4-Nitroaniline			3580	UG/KG		
CWRSC041	4-Nitrophenol			3580	UG/KG		
CWRSC041	Acenaphthene			3580	UG/KG		
CWRSC041	Acenaphthylene			3580	UG/KG		
CWRSC041	Anthracene			3580	UG/KG		
CWRSC041	Benzo(a)anthracene			3580	UG/KG		
CWRSC041	Benzo(a)pyrene			3580	UG/KG		
CWRSC041	Benzo(b)fluoranthene			3580	UG/KG		
CWRSC041	Benzo(g,h,i)perylene			3580	UG/KG	UJ	c
CWRSC041	Benzo(k)fluoranthene			3580	UG/KG		
CWRSC041	Bis(2-Chloroethoxy)methane			3580	UG/KG		
CWRSC041	Bis(2-Chloroethyl)ether			3580	UG/KG		
CWRSC041	Bis(2-Ethylhexyl)phthalate			3580	UG/KG		
CWRSC041	Butyl Benzyl Phthalate			3580	UG/KG		
CWRSC041	Carbazole			3580	UG/KG		
CWRSC041	Chrysene			3580	UG/KG		
CWRSC041	Di-n-Butyl Phthalate			3580	UG/KG		
CWRSC041	Di-n-Octyl Phthalate			3580	UG/KG		
CWRSC041	Dibenzo(a,h)anthracene			3580	UG/KG	UJ	c
CWRSC041	Dibenzofuran			3580	UG/KG		
CWRSC041	Diethyl Phthalate			3580	UG/KG		
CWRSC041	Dimethyl Phthalate			3580	UG/KG		
CWRSC041	Diphenylamine			3580	UG/KG		
CWRSC041	Fluoranthene			3580	UG/KG		
CWRSC041	Fluorene			3580	UG/KG		
CWRSC041	Hexachlorobenzene			3580	UG/KG		
CWRSC041	Hexachlorobutadiene			3580	UG/KG		
CWRSC041	Hexachlorocyclopentadiene			3580	UG/KG		
CWRSC041	Hexachloroethane			3580	UG/KG		
CWRSC041	Indeno(1,2,3-cd)pyrene			3580	UG/KG	UJ	c
CWRSC041	Isophorone			3580	UG/KG		
CWRSC041	M,P-CRESOL			3580	UG/KG		
CWRSC041	N-Nitrosodipropylamine			3580	UG/KG		
CWRSC041	Naphthalene			3580	UG/KG		
CWRSC041	Nitrobenzene			3580	UG/KG		
CWRSC041	O-Cresol			3580	UG/KG		
CWRSC041	Pentachlorophenol			7170	UG/KG		
CWRSC041	Phenanthrene			3580	UG/KG		
CWRSC041	Phenol			3580	UG/KG		
CWRSC041	Pyrene			3580	UG/KG		
CWRSC042	Actinium-228	0.518	0.0727	0.0173	PCI/G		
CWRSC042	Americium-241	0.000787	0.00158	0.00236	PCI/G		
CWRSC042	Bismuth-212	0.381	0.0813	0.0384	PCI/G		

Appendix A. Ra/Sr Area 1 RA Overburden Soil Data

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC042	Bismuth-214	0.438	0.0797	0.0089	PCI/G		
CWRSC042	Carbon-14	0.058	0.0553	0.0759	PCI/G		
CWRSC042	Cesium-137	0.0224	0.0063	0.00509	PCI/G		
CWRSC042	Cobalt-60	-0.00116	0.00295	0.00504	PCI/G		
CWRSC042	Gross Alpha	7.18	1.99	1.59	PCI/G		
CWRSC042	Lead-210	0.531	0.673	0.661	PCI/G		
CWRSC042	Lead-212	0.518	0.0624	0.00739	PCI/G		
CWRSC042	Lead-214	0.462	0.0609	0.00939	PCI/G		
CWRSC042	Nonvolatile Beta	14.4	1.73	2.13	PCI/G		
CWRSC042	Plutonium-241	-0.21	0.201	0.376	PCI/G		
CWRSC042	Potassium-40	10.9	1.26	0.0403	PCI/G		
CWRSC042	Radium-223	-0.0104	0.0508	0.086	PCI/G		
CWRSC042	Radium-226	0.523	0.114	0.0552	PCI/G		
CWRSC042	Radium-228	0.518	0.0727	0.0173	PCI/G		
CWRSC042	Strontium-90	0.0191	0.0184	0.0305	PCI/G	UJ	c
CWRSC042	Thallium-208	0.186	0.0324	0.0049	PCI/G		
CWRSC042	Thorium-228	0.447	0.147	0.149	PCI/G		
CWRSC042	Thorium-230	0.354	0.114	0.0756	PCI/G		
CWRSC042	Thorium-232	0.487	0.136	0.0696	PCI/G		
CWRSC042	Thorium-234	0.57	0.295	0.245	PCI/G		
CWRSC042	Tritium	0.388	0.5	0.842	PCI/G		
CWRSC042	Uranium-233/234	0.429	0.0577	0.00834	PCI/G		
CWRSC042	Uranium-235	0.0323	0.0111	0.00262	PCI/G		
CWRSC042	Uranium-238	0.429	0.0578	0.00666	PCI/G		
CWRSC042	Antimony			5.7	MG/KG	R	m
CWRSC042	Arsenic	7.3		0.94	MG/KG		
CWRSC042	Barium	159		18.9	MG/KG		
CWRSC042	Beryllium	0.37		0.47	MG/KG		
CWRSC042	Cadmium			0.47	MG/KG		
CWRSC042	Chromium	115		0.94	MG/KG		
CWRSC042	Cobalt	20.4		4.7	MG/KG		
CWRSC042	Copper	34.7		2.4	MG/KG		
CWRSC042	Lead	12.1		0.28	MG/KG		
CWRSC042	Mercury	0.92		0.034	MG/KG	J	m
CWRSC042	Molybdenum	0.32		0.94	MG/KG	J	m
CWRSC042	Nickel	228		3.8	MG/KG		
CWRSC042	Selenium	1.4		0.47	MG/KG		
CWRSC042	Silver	2.2		0.94	MG/KG		
CWRSC042	Thallium			0.94	MG/KG		
CWRSC042	Vanadium	54.1		4.7	MG/KG		
CWRSC042	Zinc	73.4		1.9	MG/KG		
CWRSC042	Chromium, Hexavalent	0.0936		0.208	MG/KG		
CWRSC042	Nitrate	2		1	MG/KG		
CWRSC042	4,4'-DDD			13.7	UG/KG	UJ	c
CWRSC042	4,4'-DDE			13.7	UG/KG		
CWRSC042	4,4'-DDT			13.7	UG/KG	UJ	c
CWRSC042	Aldrin			6.9	UG/KG		
CWRSC042	Alpha-BHC			6.9	UG/KG		
CWRSC042	Alpha-Chlordane	1.7		6.9	UG/KG	J	qv
CWRSC042	Arochlor-1016			34.4	UG/KG		
CWRSC042	Arochlor-1221			34.4	UG/KG		
CWRSC042	Arochlor-1232			34.4	UG/KG		
CWRSC042	Arochlor-1242			34.4	UG/KG		
CWRSC042	Arochlor-1248			34.4	UG/KG		
CWRSC042	Arochlor-1254			34.4	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC042	Arochlor-1260			34.4	UG/KG		
CWRSC042	Beta-BHC			6.9	UG/KG		
CWRSC042	Chlordane	11.2		344	UG/KG	J	q
CWRSC042	Delta-BHC			6.9	UG/KG		
CWRSC042	Dieldrin			13.7	UG/KG		
CWRSC042	Endosulfan I			6.9	UG/KG		
CWRSC042	Endosulfan II			13.7	UG/KG		
CWRSC042	Endosulfan Sulfate			13.7	UG/KG		
CWRSC042	Endrin			13.7	UG/KG		
CWRSC042	Endrin Aldehyde			13.7	UG/KG		
CWRSC042	Endrin Ketone			13.7	UG/KG	UJ	c
CWRSC042	Gamma-BHC			6.9	UG/KG		
CWRSC042	gamma-Chlordane	2.4		6.9	UG/KG	J	qv
CWRSC042	Heptachlor			6.9	UG/KG		
CWRSC042	Heptachlor Epoxide			6.9	UG/KG		
CWRSC042	Methoxychlor			68.7	UG/KG	UJ	c
CWRSC042	Toxaphene			344	UG/KG		
CWRSC042	1,1,1-Trichloroethane			1	UG/KG		
CWRSC042	1,1,2,2-Tetrachloroethane			1	UG/KG		
CWRSC042	1,1,2-Trichloroethane			1	UG/KG		
CWRSC042	1,1-Dichloroethane			1	UG/KG		
CWRSC042	1,1-Dichloroethene			1	UG/KG		
CWRSC042	1,2-Dichloroethane			1	UG/KG		
CWRSC042	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC042	1,2-Dichloropropane			1	UG/KG		
CWRSC042	2-Butanone	1.4		5.2	UG/KG	J	qc
CWRSC042	2-Hexanone			5.2	UG/KG		
CWRSC042	4-Methyl-2-Pentanone			5.2	UG/KG		
CWRSC042	Acetone	3.9		25.8	UG/KG	J	qc
CWRSC042	Benzene			1	UG/KG		
CWRSC042	Bromoform			1	UG/KG		
CWRSC042	Carbon Disulfide			5.2	UG/KG		
CWRSC042	Carbon Tetrachloride			1	UG/KG		
CWRSC042	Chlorobenzene			1	UG/KG		
CWRSC042	Chlorodibromomethane			1	UG/KG		
CWRSC042	Chloroethane			1	UG/KG		
CWRSC042	Chloroform			1	UG/KG		
CWRSC042	cis-1,3-Dichloropropylene			1	UG/KG		
CWRSC042	Dichlorobromomethane			1	UG/KG		
CWRSC042	Ethylbenzene			1	UG/KG		
CWRSC042	Methyl Bromide			1	UG/KG		
CWRSC042	Methyl Chloride			1	UG/KG		
CWRSC042	Methylene Chloride	0.53		5.2	UG/KG	J	q
CWRSC042	Styrene			1	UG/KG		
CWRSC042	Tetrachloroethene			1	UG/KG		
CWRSC042	Toluene	14.5		1	UG/KG		
CWRSC042	Trans-1,3-Dichloropropene			1	UG/KG		
CWRSC042	Trichloroethene			1	UG/KG		
CWRSC042	Vinyl Chloride			1	UG/KG		
CWRSC042	Xylenes (Total)			3.1	UG/KG		
CWRSC042	1,2,4-Trichlorobenzene			6870	UG/KG		
CWRSC042	1,2-Dichlorobenzene			6870	UG/KG		
CWRSC042	1,3-Dichlorobenzene			6870	UG/KG		
CWRSC042	1,4-Dichlorobenzene			6870	UG/KG		
CWRSC042	2,2'-oxybis(1-Chloropropane)			6870	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC042	2,4,5-Trichlorophenol			6870	UG/KG		
CWRSC042	2,4,6-Trichlorophenol			6870	UG/KG		
CWRSC042	2,4-Dichlorophenol			6870	UG/KG		
CWRSC042	2,4-Dimethylphenol			6870	UG/KG		
CWRSC042	2,4-Dinitrophenol			13700	UG/KG		
CWRSC042	2,4-Dinitrotoluene			6870	UG/KG		
CWRSC042	2,6-Dinitrotoluene			6870	UG/KG		
CWRSC042	2-Chloronaphthalene			6870	UG/KG		
CWRSC042	2-Chlorophenol			6870	UG/KG		
CWRSC042	2-Methyl-4,6-dinitrophenol			6870	UG/KG		
CWRSC042	2-Methylnaphthalene			6870	UG/KG		
CWRSC042	2-Nitroaniline			6870	UG/KG	UJ	c
CWRSC042	2-Nitrophenol			6870	UG/KG		
CWRSC042	3,3'-Dichlorobenzidine			13700	UG/KG		
CWRSC042	3-Nitroaniline			6870	UG/KG		
CWRSC042	4-Bromophenyl Phenyl Ether			6870	UG/KG		
CWRSC042	4-Chloro-3-Methylphenol			6870	UG/KG		
CWRSC042	4-Chloroaniline			13700	UG/KG		
CWRSC042	4-Chlorophenyl Phenyl Ether			6870	UG/KG		
CWRSC042	4-Nitroaniline			6870	UG/KG		
CWRSC042	4-Nitrophenol			6870	UG/KG		
CWRSC042	Acenaphthene			6870	UG/KG		
CWRSC042	Acenaphthylene			6870	UG/KG		
CWRSC042	Anthracene			6870	UG/KG		
CWRSC042	Benzo(a)anthracene			6870	UG/KG		
CWRSC042	Benzo(a)pyrene			6870	UG/KG		
CWRSC042	Benzo(b)fluoranthene			6870	UG/KG		
CWRSC042	Benzo(g,h,i)perylene			6870	UG/KG	UJ	c
CWRSC042	Benzo(k)fluoranthene			6870	UG/KG		
CWRSC042	Bis(2-Chloroethoxy)methane			6870	UG/KG		
CWRSC042	Bis(2-Chloroethyl)ether			6870	UG/KG		
CWRSC042	Bis(2-Ethylhexyl)phthalate			6870	UG/KG		
CWRSC042	Butyl Benzyl Phthalate			6870	UG/KG		
CWRSC042	Carbazole			6870	UG/KG		
CWRSC042	Chrysene			6870	UG/KG		
CWRSC042	Di-n-Butyl Phthalate			6870	UG/KG		
CWRSC042	Di-n-Octyl Phthalate			6870	UG/KG		
CWRSC042	Dibenzo(a,h)anthracene			6870	UG/KG	UJ	c
CWRSC042	Dibenzofuran			6870	UG/KG		
CWRSC042	Diethyl Phthalate			6870	UG/KG		
CWRSC042	Dimethyl Phthalate			6870	UG/KG		
CWRSC042	Diphenylamine			6870	UG/KG		
CWRSC042	Fluoranthene			6870	UG/KG		
CWRSC042	Fluorene			6870	UG/KG		
CWRSC042	Hexachlorobenzene			6870	UG/KG		
CWRSC042	Hexachlorobutadiene			6870	UG/KG		
CWRSC042	Hexachlorocyclopentadiene			6870	UG/KG		
CWRSC042	Hexachloroethane			6870	UG/KG		
CWRSC042	Indeno(1,2,3-cd)pyrene			6870	UG/KG	UJ	c
CWRSC042	Isophorone			6870	UG/KG		
CWRSC042	M,P-CRESOL			6870	UG/KG		
CWRSC042	N-Nitrosodipropylamine			6870	UG/KG		
CWRSC042	Naphthalene			6870	UG/KG		
CWRSC042	Nitrobenzene			6870	UG/KG		
CWRSC042	O-Cresol			6870	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC042	Pentachlorophenol			13700	UG/KG		
CWRSC042	Phenanthrene			6870	UG/KG		
CWRSC042	Phenol			6870	UG/KG		
CWRSC042	Pyrene			6870	UG/KG		
CWRSC043	Actinium-228	0.488	0.0679	0.026	PCI/G		
CWRSC043	Americium-241	-0.000491	0.000984	0.00613	PCI/G		
CWRSC043	Bismuth-212	0.298	0.0767	0.0561	PCI/G		
CWRSC043	Bismuth-214	0.426	0.0639	0.0132	PCI/G		
CWRSC043	Carbon-14	0.0401	0.0589	0.0995	PCI/G		
CWRSC043	Cesium-137	0.0255	0.00775	0.0071	PCI/G		
CWRSC043	Cobalt-60	0.00449	0.00439	0.00781	PCI/G		
CWRSC043	Gross Alpha	7.18	2.3	2.23	PCI/G		
CWRSC043	Lead-210	0.252	0.478	0.778	PCI/G		
CWRSC043	Lead-212	0.518	0.0567	0.0106	PCI/G		
CWRSC043	Lead-214	0.461	0.0573	0.0132	PCI/G		
CWRSC043	Nonvolatile Beta	14	1.76	2.11	PCI/G		
CWRSC043	Plutonium-241	-0.0526	0.213	0.39	PCI/G		
CWRSC043	Potassium-40	11	1.19	0.0607	PCI/G		
CWRSC043	Radium-223	0.0315	0.0845	0.126	PCI/G		
CWRSC043	Radium-226	0.529	0.0875	0.0361	PCI/G		
CWRSC043	Radium-228	0.488	0.0679	0.026	PCI/G		
CWRSC043	Strontium-90	0.0307	0.0129	0.0204	PCI/G	J	c
CWRSC043	Thallium-208	0.172	0.0257	0.00693	PCI/G		
CWRSC043	Thorium-228	0.532	0.158	0.146	PCI/G		
CWRSC043	Thorium-230	0.42	0.121	0.0434	PCI/G		
CWRSC043	Thorium-232	0.364	0.11	0.0434	PCI/G		
CWRSC043	Thorium-234	0.519	0.362	0.319	PCI/G		
CWRSC043	Tritium	0.502	0.492	0.817	PCI/G		
CWRSC043	Uranium-233/234	0.386	0.0528	0.0065	PCI/G		
CWRSC043	Uranium-235	0.0358	0.0123	0.00942	PCI/G		
CWRSC043	Uranium-238	0.41	0.0554	0.00939	PCI/G		
CWRSC043	Antimony			5.7	MG/KG	R	m
CWRSC043	Arsenic	6.4		0.95	MG/KG		
CWRSC043	Barium	135		18.9	MG/KG		
CWRSC043	Beryllium	0.31		0.47	MG/KG		
CWRSC043	Cadmium			0.47	MG/KG		
CWRSC043	Chromium	100		0.95	MG/KG		
CWRSC043	Cobalt	17.4		4.7	MG/KG		
CWRSC043	Copper	28.8		2.4	MG/KG		
CWRSC043	Lead	13.9		0.28	MG/KG		
CWRSC043	Mercury	1.4		0.031	MG/KG	J	m
CWRSC043	Molybdenum	0.24		0.95	MG/KG	J	m
CWRSC043	Nickel	196		3.8	MG/KG		
CWRSC043	Selenium	1.2		0.47	MG/KG		
CWRSC043	Silver	0.14		0.95	MG/KG		
CWRSC043	Thallium			0.95	MG/KG		
CWRSC043	Vanadium	45.3		4.7	MG/KG		
CWRSC043	Zinc	65.3		1.9	MG/KG		
CWRSC043	Chromium, Hexavalent	0.168		0.21	MG/KG		
CWRSC043	Nitrate	3.03		1	MG/KG		
CWRSC043	4,4'-DDD			6.9	UG/KG	UJ	c
CWRSC043	4,4'-DDE			6.9	UG/KG		
CWRSC043	4,4'-DDT			6.9	UG/KG	UJ	c
CWRSC043	Aldrin			3.5	UG/KG		
CWRSC043	Alpha-BHC			3.5	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC043	Alpha-Chlordane	3.5		3.5	UG/KG		
CWRSC043	Arochlor-1016			17.4	UG/KG		
CWRSC043	Arochlor-1221			17.4	UG/KG		
CWRSC043	Arochlor-1232			17.4	UG/KG		
CWRSC043	Arochlor-1242			17.4	UG/KG		
CWRSC043	Arochlor-1248			17.4	UG/KG		
CWRSC043	Arochlor-1254			17.4	UG/KG		
CWRSC043	Arochlor-1260			17.4	UG/KG		
CWRSC043	Beta-BHC			3.5	UG/KG		
CWRSC043	Chlordane	23.5		174	UG/KG	J	qv
CWRSC043	Delta-BHC			3.5	UG/KG		
CWRSC043	Dieldrin			6.9	UG/KG		
CWRSC043	Endosulfan I			3.5	UG/KG		
CWRSC043	Endosulfan II			6.9	UG/KG		
CWRSC043	Endosulfan Sulfate			6.9	UG/KG		
CWRSC043	Endrin			6.9	UG/KG		
CWRSC043	Endrin Aldehyde			6.9	UG/KG		
CWRSC043	Endrin Ketone			6.9	UG/KG	UJ	c
CWRSC043	Gamma-BHC			3.5	UG/KG		
CWRSC043	gamma-Chlordane	5.7		3.5	UG/KG	J	v
CWRSC043	Heptachlor			3.5	UG/KG		
CWRSC043	Heptachlor Epoxide			3.5	UG/KG		
CWRSC043	Methoxychlor			34.7	UG/KG	UJ	c
CWRSC043	Toxaphene			174	UG/KG		
CWRSC043	1,1,1-Trichloroethane			1	UG/KG		
CWRSC043	1,1,2,2-Tetrachloroethane			1	UG/KG		
CWRSC043	1,1,2-Trichloroethane			1	UG/KG		
CWRSC043	1,1-Dichloroethane			1	UG/KG		
CWRSC043	1,1-Dichloroethene			1	UG/KG		
CWRSC043	1,2-Dichloroethane			1	UG/KG		
CWRSC043	1,2-Dichloroethene (total)			2.1	UG/KG		
CWRSC043	1,2-Dichloropropane			1	UG/KG		
CWRSC043	2-Butanone			5.2	UG/KG	UJ	c
CWRSC043	2-Hexanone			5.2	UG/KG		
CWRSC043	4-Methyl-2-Pentanone			5.2	UG/KG		
CWRSC043	Acetone			26	UG/KG	UJ	c
CWRSC043	Benzene			1	UG/KG		
CWRSC043	Bromoform			1	UG/KG		
CWRSC043	Carbon Disulfide			5.2	UG/KG		
CWRSC043	Carbon Tetrachloride			1	UG/KG		
CWRSC043	Chlorobenzene			1	UG/KG		
CWRSC043	Chlorodibromomethane			1	UG/KG		
CWRSC043	Chloroethane			1	UG/KG		
CWRSC043	Chloroform			1	UG/KG		
CWRSC043	cis-1,3-Dichloropropylene			1	UG/KG		
CWRSC043	Dichlorobromomethane			1	UG/KG		
CWRSC043	Ethylbenzene			1	UG/KG		
CWRSC043	Methyl Bromide			1	UG/KG		
CWRSC043	Methyl Chloride			1	UG/KG		
CWRSC043	Methylene Chloride	0.89		5.2	UG/KG	J	q
CWRSC043	Styrene			1	UG/KG		
CWRSC043	Tetrachloroethene			1	UG/KG		
CWRSC043	Toluene	6.3		1	UG/KG		
CWRSC043	Trans-1,3-Dichloropropene			1	UG/KG		
CWRSC043	Trichloroethene			1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC043	Vinyl Chloride			1	UG/KG		
CWRSC043	Xylenes (Total)			3.1	UG/KG		
CWRSC043	1,2,4-Trichlorobenzene			6940	UG/KG		
CWRSC043	1,2-Dichlorobenzene			6940	UG/KG		
CWRSC043	1,3-Dichlorobenzene			6940	UG/KG		
CWRSC043	1,4-Dichlorobenzene			6940	UG/KG		
CWRSC043	2,2'-oxybis(1-Chloropropane)			6940	UG/KG		
CWRSC043	2,4,5-Trichlorophenol			6940	UG/KG		
CWRSC043	2,4,6-Trichlorophenol			6940	UG/KG		
CWRSC043	2,4-Dichlorophenol			6940	UG/KG		
CWRSC043	2,4-Dimethylphenol			6940	UG/KG		
CWRSC043	2,4-Dinitrophenol			13900	UG/KG		
CWRSC043	2,4-Dinitrotoluene			6940	UG/KG		
CWRSC043	2,6-Dinitrotoluene			6940	UG/KG		
CWRSC043	2-Chloronaphthalene			6940	UG/KG		
CWRSC043	2-Chlorophenol			6940	UG/KG		
CWRSC043	2-Methyl-4,6-dinitrophenol			6940	UG/KG		
CWRSC043	2-Methylnaphthalene			6940	UG/KG		
CWRSC043	2-Nitroaniline			6940	UG/KG	UJ	c
CWRSC043	2-Nitrophenol			6940	UG/KG		
CWRSC043	3,3'-Dichlorobenzidine			13900	UG/KG		
CWRSC043	3-Nitroaniline			6940	UG/KG		
CWRSC043	4-Bromophenyl Phenyl Ether			6940	UG/KG		
CWRSC043	4-Chloro-3-Methylphenol			6940	UG/KG		
CWRSC043	4-Chloroaniline			13900	UG/KG		
CWRSC043	4-Chlorophenyl Phenyl Ether			6940	UG/KG		
CWRSC043	4-Nitroaniline			6940	UG/KG		
CWRSC043	4-Nitrophenol			6940	UG/KG		
CWRSC043	Acenaphthene			6940	UG/KG		
CWRSC043	Acenaphthylene			6940	UG/KG		
CWRSC043	Anthracene			6940	UG/KG		
CWRSC043	Benzo(a)anthracene			6940	UG/KG		
CWRSC043	Benzo(a)pyrene			6940	UG/KG		
CWRSC043	Benzo(b)fluoranthene			6940	UG/KG		
CWRSC043	Benzo(g,h,i)perylene			6940	UG/KG	UJ	c
CWRSC043	Benzo(k)fluoranthene			6940	UG/KG		
CWRSC043	Bis(2-Chloroethoxy)methane			6940	UG/KG		
CWRSC043	Bis(2-Chloroethyl)ether			6940	UG/KG		
CWRSC043	Bis(2-Ethylhexyl)phthalate			6940	UG/KG		
CWRSC043	Butyl Benzyl Phthalate			6940	UG/KG		
CWRSC043	Carbazole			6940	UG/KG		
CWRSC043	Chrysene			6940	UG/KG		
CWRSC043	Di-n-Butyl Phthalate			6940	UG/KG		
CWRSC043	Di-n-Octyl Phthalate			6940	UG/KG		
CWRSC043	Dibenzo(a,h)anthracene			6940	UG/KG	UJ	c
CWRSC043	Dibenzofuran			6940	UG/KG		
CWRSC043	Diethyl Phthalate			6940	UG/KG		
CWRSC043	Dimethyl Phthalate			6940	UG/KG		
CWRSC043	Diphenylamine			6940	UG/KG		
CWRSC043	Fluoranthene			6940	UG/KG		
CWRSC043	Fluorene			6940	UG/KG		
CWRSC043	Hexachlorobenzene			6940	UG/KG		
CWRSC043	Hexachlorobutadiene			6940	UG/KG		
CWRSC043	Hexachlorocyclopentadiene			6940	UG/KG		
CWRSC043	Hexachloroethane			6940	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC043	Indeno(1,2,3-cd)pyrene			6940	UG/KG	UJ	c
CWRSC043	Isophorone			6940	UG/KG		
CWRSC043	M,P-CRESOL			6940	UG/KG		
CWRSC043	N-Nitrosodipropylamine			6940	UG/KG		
CWRSC043	Naphthalene			6940	UG/KG		
CWRSC043	Nitrobenzene			6940	UG/KG		
CWRSC043	O-Cresol			6940	UG/KG		
CWRSC043	Pentachlorophenol			13900	UG/KG		
CWRSC043	Phenanthrene			6940	UG/KG		
CWRSC043	Phenol			6940	UG/KG		
CWRSC043	Pyrene			6940	UG/KG		
CWRSC044	Actinium-228	0.456	0.0621	0.0174	PCI/G		
CWRSC044	Americium-241	0.00382	0.00444	0.00382	PCI/G		
CWRSC044	Bismuth-212	0.287	0.0537	0.0375	PCI/G		
CWRSC044	Bismuth-214	0.386	0.0512	0.00859	PCI/G		
CWRSC044	Carbon-14	-0.031	0.0543	0.0955	PCI/G		
CWRSC044	Cesium-137	0.0188	0.005	0.00482	PCI/G		
CWRSC044	Cobalt-60	0.000921	0.00306	0.00548	PCI/G		
CWRSC044	Gross Alpha	7.06	1.98	1.73	PCI/G		
CWRSC044	Lead-210	0.516	0.119	0.0683	PCI/G		
CWRSC044	Lead-212	0.469	0.0511	0.00661	PCI/G		
CWRSC044	Lead-214	0.432	0.0487	0.00808	PCI/G		
CWRSC044	Nonvolatile Beta	14.5	1.78	2.27	PCI/G		
CWRSC044	Plutonium-241	-0.114	0.194	0.358	PCI/G		
CWRSC044	Potassium-40	10.5	1.04	0.0424	PCI/G		
CWRSC044	Radium-223	0.0301	0.0428	0.0765	PCI/G		
CWRSC044	Radium-226	0.522	0.077	0.0275	PCI/G		
CWRSC044	Radium-228	0.456	0.0621	0.0174	PCI/G		
CWRSC044	Strontium-90	0.0217	0.0101	0.0162	PCI/G	J	c
CWRSC044	Thallium-208	0.15	0.0194	0.00505	PCI/G		
CWRSC044	Thorium-228	0.51	0.142	0.123	PCI/G		
CWRSC044	Thorium-230	0.377	0.105	0.0372	PCI/G		
CWRSC044	Thorium-232	0.407	0.11	0.0161	PCI/G		
CWRSC044	Thorium-234	0.515	0.138	0.0812	PCI/G		
CWRSC044	Tritium	0.231	0.439	0.751	PCI/G		
CWRSC044	Uranium-233/234	0.412	0.0549	0.00897	PCI/G		
CWRSC044	Uranium-235	0.0285	0.0103	0.00623	PCI/G		
CWRSC044	Uranium-238	0.408	0.0544	0.00621	PCI/G		
CWRSC044	Antimony			6.4	MG/KG	R	m
CWRSC044	Arsenic	5.9		1.1	MG/KG		
CWRSC044	Barium	123		21.5	MG/KG		
CWRSC044	Beryllium	0.28		0.54	MG/KG		
CWRSC044	Cadmium			0.54	MG/KG		
CWRSC044	Chromium	82.7		1.1	MG/KG		
CWRSC044	Cobalt	16.3		5.4	MG/KG		
CWRSC044	Copper	26		2.7	MG/KG		
CWRSC044	Lead	10.2		0.32	MG/KG		
CWRSC044	Mercury	1.3		0.029	MG/KG	J	m
CWRSC044	Molybdenum	0.24		1.1	MG/KG	J	m
CWRSC044	Nickel	174		4.3	MG/KG		
CWRSC044	Selenium	1.2		0.54	MG/KG		
CWRSC044	Silver	0.35		1.1	MG/KG		
CWRSC044	Thallium			1.1	MG/KG		
CWRSC044	Vanadium	40.9		5.4	MG/KG		
CWRSC044	Zinc	58.4		2.2	MG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC044	Chromium, Hexavalent	0.0848		0.212	MG/KG		
CWRSC044	Nitrate	3.45		1	MG/KG		
CWRSC044	4,4'-DDD			7.2	UG/KG	UJ	c
CWRSC044	4,4'-DDE			7.2	UG/KG		
CWRSC044	4,4'-DDT			7.2	UG/KG	UJ	c
CWRSC044	Aldrin			3.6	UG/KG		
CWRSC044	Alpha-BHC			3.6	UG/KG		
CWRSC044	Alpha-Chlordane	1.5		3.6	UG/KG	J	qv
CWRSC044	Arochlor-1016			17.9	UG/KG		
CWRSC044	Arochlor-1221			17.9	UG/KG		
CWRSC044	Arochlor-1232			17.9	UG/KG		
CWRSC044	Arochlor-1242			17.9	UG/KG		
CWRSC044	Arochlor-1248			17.9	UG/KG		
CWRSC044	Arochlor-1254			17.9	UG/KG		
CWRSC044	Arochlor-1260			17.9	UG/KG		
CWRSC044	Beta-BHC			3.6	UG/KG		
CWRSC044	Chlordane	10.2		179	UG/KG	J	q
CWRSC044	Delta-BHC			3.6	UG/KG		
CWRSC044	Dieldrin			7.2	UG/KG		
CWRSC044	Endosulfan I			3.6	UG/KG		
CWRSC044	Endosulfan II			7.2	UG/KG		
CWRSC044	Endosulfan Sulfate			7.2	UG/KG		
CWRSC044	Endrin			7.2	UG/KG		
CWRSC044	Endrin Aldehyde			7.2	UG/KG		
CWRSC044	Endrin Ketone			7.2	UG/KG	UJ	c
CWRSC044	Gamma-BHC			3.6	UG/KG		
CWRSC044	gamma-Chlordane	2.2		3.6	UG/KG	J	qv
CWRSC044	Heptachlor			3.6	UG/KG		
CWRSC044	Heptachlor Epoxide			3.6	UG/KG		
CWRSC044	Methoxychlor			35.8	UG/KG	UJ	c
CWRSC044	Toxaphene			179	UG/KG		
CWRSC044	1,1,1-Trichloroethane			1.1	UG/KG		
CWRSC044	1,1,2,2-Tetrachloroethane			1.1	UG/KG		
CWRSC044	1,1,2-Trichloroethane			1.1	UG/KG		
CWRSC044	1,1-Dichloroethane			1.1	UG/KG		
CWRSC044	1,1-Dichloroethene			1.1	UG/KG		
CWRSC044	1,2-Dichloroethane			1.1	UG/KG		
CWRSC044	1,2-Dichloroethene (total)			2.2	UG/KG		
CWRSC044	1,2-Dichloropropane			1.1	UG/KG		
CWRSC044	2-Butanone			5.4	UG/KG	UJ	c
CWRSC044	2-Hexanone			5.4	UG/KG		
CWRSC044	4-Methyl-2-Pentanone			5.4	UG/KG		
CWRSC044	Acetone			26.9	UG/KG	UJ	c
CWRSC044	Benzene			1.1	UG/KG		
CWRSC044	Bromoform			1.1	UG/KG		
CWRSC044	Carbon Disulfide			5.4	UG/KG		
CWRSC044	Carbon Tetrachloride			1.1	UG/KG		
CWRSC044	Chlorobenzene			1.1	UG/KG		
CWRSC044	Chlorodibromomethane			1.1	UG/KG		
CWRSC044	Chloroethane			1.1	UG/KG		
CWRSC044	Chloroform			1.1	UG/KG		
CWRSC044	cis-1,3-Dichloropropylene			1.1	UG/KG		
CWRSC044	Dichlorobromomethane			1.1	UG/KG		
CWRSC044	Ethylbenzene			1.1	UG/KG		
CWRSC044	Methyl Bromide			1.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC044	Methyl Chloride			1.1	UG/KG		
CWRSC044	Methylene Chloride			5.4	UG/KG		
CWRSC044	Styrene			1.1	UG/KG		
CWRSC044	Tetrachloroethene			1.1	UG/KG		
CWRSC044	Toluene	16.4		1.1	UG/KG		
CWRSC044	Trans-1,3-Dichloropropene			1.1	UG/KG		
CWRSC044	Trichloroethene			1.1	UG/KG		
CWRSC044	Vinyl Chloride			1.1	UG/KG		
CWRSC044	Xylenes (Total)	0.84		3.2	UG/KG	J	q
CWRSC044	1,2,4-Trichlorobenzene			3580	UG/KG		
CWRSC044	1,2-Dichlorobenzene			3580	UG/KG		
CWRSC044	1,3-Dichlorobenzene			3580	UG/KG		
CWRSC044	1,4-Dichlorobenzene			3580	UG/KG		
CWRSC044	2,2'-oxybis(1-Chloropropane)			3580	UG/KG		
CWRSC044	2,4,5-Trichlorophenol			3580	UG/KG		
CWRSC044	2,4,6-Trichlorophenol			3580	UG/KG		
CWRSC044	2,4-Dichlorophenol			3580	UG/KG		
CWRSC044	2,4-Dimethylphenol			3580	UG/KG		
CWRSC044	2,4-Dinitrophenol			7170	UG/KG		
CWRSC044	2,4-Dinitrotoluene			3580	UG/KG		
CWRSC044	2,6-Dinitrotoluene			3580	UG/KG		
CWRSC044	2-Chloronaphthalene			3580	UG/KG		
CWRSC044	2-Chlorophenol			3580	UG/KG		
CWRSC044	2-Methyl-4,6-dinitrophenol			3580	UG/KG		
CWRSC044	2-Methylnaphthalene			3580	UG/KG		
CWRSC044	2-Nitroaniline			3580	UG/KG	UJ	c
CWRSC044	2-Nitrophenol			3580	UG/KG		
CWRSC044	3,3'-Dichlorobenzidine			7170	UG/KG		
CWRSC044	3-Nitroaniline			3580	UG/KG		
CWRSC044	4-Bromophenyl Phenyl Ether			3580	UG/KG		
CWRSC044	4-Chloro-3-Methylphenol			3580	UG/KG		
CWRSC044	4-Chloroaniline			7170	UG/KG		
CWRSC044	4-Chlorophenyl Phenyl Ether			3580	UG/KG		
CWRSC044	4-Nitroaniline			3580	UG/KG		
CWRSC044	4-Nitrophenol			3580	UG/KG		
CWRSC044	Acenaphthene			3580	UG/KG		
CWRSC044	Acenaphthylene			3580	UG/KG		
CWRSC044	Anthracene			3580	UG/KG		
CWRSC044	Benzo(a)anthracene			3580	UG/KG		
CWRSC044	Benzo(a)pyrene			3580	UG/KG		
CWRSC044	Benzo(b)fluoranthene			3580	UG/KG		
CWRSC044	Benzo(g,h,i)perylene			3580	UG/KG		
CWRSC044	Benzo(k)fluoranthene			3580	UG/KG		
CWRSC044	Bis(2-Chloroethoxy)methane			3580	UG/KG		
CWRSC044	Bis(2-Chloroethyl)ether			3580	UG/KG		
CWRSC044	Bis(2-Ethylhexyl)phthalate			3580	UG/KG		
CWRSC044	Butyl Benzyl Phthalate			3580	UG/KG		
CWRSC044	Carbazole			3580	UG/KG		
CWRSC044	Chrysene			3580	UG/KG	UJ	c
CWRSC044	Di-n-Butyl Phthalate			3580	UG/KG		
CWRSC044	Di-n-Octyl Phthalate			3580	UG/KG		
CWRSC044	Dibenzo(a,h)anthracene			3580	UG/KG		
CWRSC044	Dibenzofuran			3580	UG/KG		
CWRSC044	Diethyl Phthalate			3580	UG/KG		
CWRSC044	Dimethyl Phthalate			3580	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC044	Diphenylamine			3580	UG/KG		
CWRSC044	Fluoranthene			3580	UG/KG		
CWRSC044	Fluorene			3580	UG/KG		
CWRSC044	Hexachlorobenzene			3580	UG/KG		
CWRSC044	Hexachlorobutadiene			3580	UG/KG		
CWRSC044	Hexachlorocyclopentadiene			3580	UG/KG		
CWRSC044	Hexachloroethane			3580	UG/KG		
CWRSC044	Indeno(1,2,3-cd)pyrene			3580	UG/KG		
CWRSC044	Isophorone			3580	UG/KG		
CWRSC044	M,P-CRESOL			3580	UG/KG		
CWRSC044	N-Nitrosodipropylamine			3580	UG/KG		
CWRSC044	Naphthalene			3580	UG/KG		
CWRSC044	Nitrobenzene			3580	UG/KG		
CWRSC044	O-Cresol			3580	UG/KG		
CWRSC044	Pentachlorophenol			7170	UG/KG		
CWRSC044	Phenanthrene			3580	UG/KG		
CWRSC044	Phenol			3580	UG/KG		
CWRSC044	Pyrene			3580	UG/KG		
CWRSC045	Actinium-228	0.419	0.0591	0.0149	PCI/G		
CWRSC045	Americium-241	0.000573	0.00393	0.0103	PCI/G		
CWRSC045	Bismuth-212	0.271	0.0589	0.033	PCI/G		
CWRSC045	Bismuth-214	0.434	0.0785	0.00775	PCI/G		
CWRSC045	Carbon-14	0.0137	0.0553	0.0947	PCI/G		
CWRSC045	Cesium-137	0.018	0.00576	0.00422	PCI/G		
CWRSC045	Cobalt-60	-0.000268	0.00248	0.00433	PCI/G		
CWRSC045	Gross Alpha	6.74	1.78	1.11	PCI/G		
CWRSC045	Lead-210	0.29	0.573	0.605	PCI/G		
CWRSC045	Lead-212	0.425	0.0513	0.00662	PCI/G		
CWRSC045	Lead-214	0.481	0.0632	0.00809	PCI/G		
CWRSC045	Nonvolatile Beta	13.1	1.69	2.14	PCI/G		
CWRSC045	Plutonium-241	0.0332	0.187	0.32	PCI/G		
CWRSC045	Potassium-40	9.6	1.11	0.0344	PCI/G		
CWRSC045	Radium-223	0.00642	0.0503	0.078	PCI/G		
CWRSC045	Radium-226	0.506	0.0702	0.0247	PCI/G		
CWRSC045	Radium-228	0.419	0.0591	0.0149	PCI/G		
CWRSC045	Strontium-90	0.0203	0.0127	0.0207	PCI/G	UJ	c
CWRSC045	Thallium-208	0.152	0.0265	0.00432	PCI/G		
CWRSC045	Thorium-228	0.315	0.0901	0.0834	PCI/G		
CWRSC045	Thorium-230	0.334	0.0836	0.0324	PCI/G		
CWRSC045	Thorium-232	0.323	0.0819	0.0324	PCI/G		
CWRSC045	Thorium-234	0.523	0.269	0.209	PCI/G		
CWRSC045	Tritium	-0.453	0.457	0.841	PCI/G		
CWRSC045	Uranium-233/234	0.327	0.049	0.0139	PCI/G		
CWRSC045	Uranium-235	0.0204	0.00994	0.00931	PCI/G		
CWRSC045	Uranium-238	0.338	0.0499	0.00741	PCI/G		
CWRSC045	Antimony			5.9	MG/KG	R	m
CWRSC045	Arsenic	5.5		0.98	MG/KG		
CWRSC045	Barium	108		19.6	MG/KG		
CWRSC045	Beryllium	0.26		0.49	MG/KG		
CWRSC045	Cadmium			0.49	MG/KG		
CWRSC045	Chromium	75.9		0.98	MG/KG		
CWRSC045	Cobalt	14.4		4.9	MG/KG		
CWRSC045	Copper	25.2		2.4	MG/KG		
CWRSC045	Lead	7.9		0.29	MG/KG		
CWRSC045	Mercury	0.44		0.026	MG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC045	Molybdenum	0.26		0.98	MG/KG		
CWRSC045	Nickel	132		3.9	MG/KG		
CWRSC045	Selenium	0.82		0.49	MG/KG		
CWRSC045	Silver	0.22		0.98	MG/KG		
CWRSC045	Thallium			0.98	MG/KG		
CWRSC045	Vanadium	38.8		4.9	MG/KG		
CWRSC045	Zinc	48.2		2	MG/KG		
CWRSC045	Chromium, Hexavalent	0.117		0.195	MG/KG		
CWRSC045	Nitrate	3.7		1	MG/KG		
CWRSC045	4,4'-DDD			13.7	UG/KG		
CWRSC045	4,4'-DDE			13.7	UG/KG		
CWRSC045	4,4'-DDT	2.8		13.7	UG/KG	J	qv
CWRSC045	Aldrin			6.9	UG/KG		
CWRSC045	Alpha-BHC			6.9	UG/KG		
CWRSC045	Alpha-Chlordane	1.2		6.9	UG/KG	J	qv
CWRSC045	Arochlor-1016			34.4	UG/KG		
CWRSC045	Arochlor-1221			34.4	UG/KG		
CWRSC045	Arochlor-1232			34.4	UG/KG		
CWRSC045	Arochlor-1242			34.4	UG/KG		
CWRSC045	Arochlor-1248			34.4	UG/KG		
CWRSC045	Arochlor-1254			34.4	UG/KG		
CWRSC045	Arochlor-1260			34.4	UG/KG		
CWRSC045	Beta-BHC			6.9	UG/KG		
CWRSC045	Chlordane	7.1		344	UG/KG	J	q
CWRSC045	Delta-BHC			6.9	UG/KG		
CWRSC045	Dieldrin			13.7	UG/KG		
CWRSC045	Endosulfan I			6.9	UG/KG		
CWRSC045	Endosulfan II			13.7	UG/KG		
CWRSC045	Endosulfan Sulfate			13.7	UG/KG		
CWRSC045	Endrin			13.7	UG/KG		
CWRSC045	Endrin Aldehyde			13.7	UG/KG		
CWRSC045	Endrin Ketone			13.7	UG/KG		
CWRSC045	Gamma-BHC			6.9	UG/KG		
CWRSC045	gamma-Chlordane	1.3		6.9	UG/KG	J	qv
CWRSC045	Heptachlor			6.9	UG/KG		
CWRSC045	Heptachlor Epoxide			6.9	UG/KG		
CWRSC045	Methoxychlor			68.7	UG/KG		
CWRSC045	Toxaphene			344	UG/KG		
CWRSC045	1,1,1-Trichloroethane			2.1	UG/KG		
CWRSC045	1,1,2,2-Tetrachloroethane			2.1	UG/KG		
CWRSC045	1,1,2-Trichloroethane			2.1	UG/KG		
CWRSC045	1,1-Dichloroethane			2.1	UG/KG		
CWRSC045	1,1-Dichloroethene			2.1	UG/KG		
CWRSC045	1,2-Dichloroethane			2.1	UG/KG		
CWRSC045	1,2-Dichloroethene (total)			4.1	UG/KG		
CWRSC045	1,2-Dichloropropane			2.1	UG/KG		
CWRSC045	2-Butanone			10.3	UG/KG	UJ	c
CWRSC045	2-Hexanone			10.3	UG/KG		
CWRSC045	4-Methyl-2-Pentanone			10.3	UG/KG		
CWRSC045	Acetone			51.5	UG/KG		
CWRSC045	Benzene			2.1	UG/KG		
CWRSC045	Bromoform			2.1	UG/KG		
CWRSC045	Carbon Disulfide			10.3	UG/KG		
CWRSC045	Carbon Tetrachloride			2.1	UG/KG		
CWRSC045	Chlorobenzene			2.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC045	Chlorodibromomethane			2.1	UG/KG		
CWRSC045	Chloroethane			2.1	UG/KG		
CWRSC045	Chloroform			2.1	UG/KG		
CWRSC045	cis-1,3-Dichloropropylene			2.1	UG/KG		
CWRSC045	Dichlorobromomethane			2.1	UG/KG		
CWRSC045	Ethylbenzene			2.1	UG/KG		
CWRSC045	Methyl Bromide			2.1	UG/KG		
CWRSC045	Methyl Chloride			2.1	UG/KG		
CWRSC045	Methylene Chloride			10.3	UG/KG		
CWRSC045	Styrene			2.1	UG/KG		
CWRSC045	Tetrachloroethene			2.1	UG/KG		
CWRSC045	Toluene	94.5		2.1	UG/KG		
CWRSC045	Trans-1,3-Dichloropropene			2.1	UG/KG		
CWRSC045	Trichloroethene			2.1	UG/KG		
CWRSC045	Vinyl Chloride			2.1	UG/KG		
CWRSC045	Xylenes (Total)	2		6.2	UG/KG	J	q
CWRSC045	1,2,4-Trichlorobenzene			1370	UG/KG		
CWRSC045	1,2-Dichlorobenzene			1370	UG/KG		
CWRSC045	1,3-Dichlorobenzene			1370	UG/KG		
CWRSC045	1,4-Dichlorobenzene			1370	UG/KG		
CWRSC045	2,2'-oxybis(1-Chloropropane)			1370	UG/KG		
CWRSC045	2,4,5-Trichlorophenol			1370	UG/KG		
CWRSC045	2,4,6-Trichlorophenol			1370	UG/KG		
CWRSC045	2,4-Dichlorophenol			1370	UG/KG		
CWRSC045	2,4-Dimethylphenol			1370	UG/KG		
CWRSC045	2,4-Dinitrophenol			2750	UG/KG		
CWRSC045	2,4-Dinitrotoluene			1370	UG/KG		
CWRSC045	2,6-Dinitrotoluene			1370	UG/KG		
CWRSC045	2-Chloronaphthalene			1370	UG/KG		
CWRSC045	2-Chlorophenol			1370	UG/KG		
CWRSC045	2-Methyl-4,6-dinitrophenol			1370	UG/KG		
CWRSC045	2-Methylnaphthalene			1370	UG/KG		
CWRSC045	2-Nitroaniline			1370	UG/KG		
CWRSC045	2-Nitrophenol			1370	UG/KG		
CWRSC045	3,3'-Dichlorobenzidine			2750	UG/KG	UJ	c
CWRSC045	3-Nitroaniline			1370	UG/KG		
CWRSC045	4-Bromophenyl Phenyl Ether			1370	UG/KG		
CWRSC045	4-Chloro-3-Methylphenol			1370	UG/KG		
CWRSC045	4-Chloroaniline			2750	UG/KG		
CWRSC045	4-Chlorophenyl Phenyl Ether			1370	UG/KG		
CWRSC045	4-Nitroaniline			1370	UG/KG		
CWRSC045	4-Nitrophenol			1370	UG/KG	UJ	c
CWRSC045	Acenaphthene			1370	UG/KG		
CWRSC045	Acenaphthylene			1370	UG/KG		
CWRSC045	Anthracene			1370	UG/KG		
CWRSC045	Benzo(a)anthracene			1370	UG/KG		
CWRSC045	Benzo(a)pyrene			1370	UG/KG		
CWRSC045	Benzo(b)fluoranthene			1370	UG/KG		
CWRSC045	Benzo(g,h,i)perylene			1370	UG/KG	UJ	c
CWRSC045	Benzo(k)fluoranthene			1370	UG/KG		
CWRSC045	Bis(2-Chloroethoxy)methane			1370	UG/KG		
CWRSC045	Bis(2-Chloroethyl)ether			1370	UG/KG		
CWRSC045	Bis(2-Ethylhexyl)phthalate			1370	UG/KG		
CWRSC045	Butyl Benzyl Phthalate			1370	UG/KG		
CWRSC045	Carbazole			1370	UG/KG	UJ	c

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC045	Chrysene			1370	UG/KG		
CWRSC045	Di-n-Butyl Phthalate			1370	UG/KG		
CWRSC045	Di-n-Octyl Phthalate			1370	UG/KG		
CWRSC045	Dibenzo(a,h)anthracene			1370	UG/KG	UJ	c
CWRSC045	Dibenzofuran			1370	UG/KG		
CWRSC045	Diethyl Phthalate			1370	UG/KG		
CWRSC045	Dimethyl Phthalate			1370	UG/KG		
CWRSC045	Diphenylamine			1370	UG/KG		
CWRSC045	Fluoranthene			1370	UG/KG		
CWRSC045	Fluorene			1370	UG/KG		
CWRSC045	Hexachlorobenzene			1370	UG/KG		
CWRSC045	Hexachlorobutadiene			1370	UG/KG		
CWRSC045	Hexachlorocyclopentadiene			1370	UG/KG		
CWRSC045	Hexachloroethane			1370	UG/KG		
CWRSC045	Indeno(1,2,3-cd)pyrene			1370	UG/KG		
CWRSC045	Isophorone			1370	UG/KG		
CWRSC045	M,P-CRESOL			1370	UG/KG		
CWRSC045	N-Nitrosodipropylamine			1370	UG/KG		
CWRSC045	Naphthalene			1370	UG/KG		
CWRSC045	Nitrobenzene			1370	UG/KG		
CWRSC045	O-Cresol			1370	UG/KG		
CWRSC045	Pentachlorophenol			2750	UG/KG		
CWRSC045	Phenanthrene			1370	UG/KG		
CWRSC045	Phenol			1370	UG/KG		
CWRSC045	Pyrene			1370	UG/KG		
CWRSC046	Actinium-228	0.506	0.0753	0.0161	PCI/G		
CWRSC046	Americium-241	0.000939	0.00188	0.00282	PCI/G		
CWRSC046	Bismuth-212	0.375	0.0581	0.0335	PCI/G		
CWRSC046	Bismuth-214	0.432	0.0489	0.00777	PCI/G		
CWRSC046	Carbon-14	0.00181	0.0537	0.0926	PCI/G		
CWRSC046	Cesium-137	0.0251	0.00522	0.00462	PCI/G		
CWRSC046	Cobalt-60	-0.0000423	0.00286	0.00502	PCI/G		
CWRSC046	Gross Alpha	6.63	1.81	1.4	PCI/G		
CWRSC046	Lead-210	0.504	0.682	0.671	PCI/G		
CWRSC046	Lead-212	0.548	0.0574	0.0084	PCI/G		
CWRSC046	Lead-214	0.472	0.0525	0.00849	PCI/G		
CWRSC046	Nonvolatile Beta	10.6	1.62	2.33	PCI/G		
CWRSC046	Plutonium-241	0.0678	0.224	0.381	PCI/G		
CWRSC046	Potassium-40	11.3	1.21	0.0384	PCI/G		
CWRSC046	Radium-223	0.0167	0.0479	0.0837	PCI/G		
CWRSC046	Radium-226	0.535	0.0754	0.0279	PCI/G		
CWRSC046	Radium-228	0.506	0.0753	0.0161	PCI/G		
CWRSC046	Strontium-90	0.0196	0.0126	0.0208	PCI/G	UJ	c
CWRSC046	Thallium-208	0.168	0.0182	0.00433	PCI/G		
CWRSC046	Thorium-228	0.495	0.124	0.095	PCI/G		
CWRSC046	Thorium-230	0.472	0.111	0.0311	PCI/G		
CWRSC046	Thorium-232	0.363	0.0936	0.0134	PCI/G		
CWRSC046	Thorium-234	0.688	0.259	0.202	PCI/G		
CWRSC046	Tritium	-0.61	0.485	0.905	PCI/G		
CWRSC046	Uranium-233/234	0.414	0.0583	0.0129	PCI/G		
CWRSC046	Uranium-235	0.0202	0.0106	0.0119	PCI/G		
CWRSC046	Uranium-238	0.476	0.0645	0.00288	PCI/G		
CWRSC046	Antimony			6.2	MG/KG	R	m
CWRSC046	Arsenic	7.7		1	MG/KG		
CWRSC046	Barium	168		20.6	MG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC046	Beryllium	0.39		0.52	MG/KG		
CWRSC046	Cadmium			0.52	MG/KG		
CWRSC046	Chromium	122		1	MG/KG		
CWRSC046	Cobalt	20		5.2	MG/KG		
CWRSC046	Copper	38.6		2.6	MG/KG		
CWRSC046	Lead	11.3		0.31	MG/KG		
CWRSC046	Mercury	0.87		0.032	MG/KG		
CWRSC046	Molybdenum	0.25		1	MG/KG		
CWRSC046	Nickel	213		4.1	MG/KG		
CWRSC046	Selenium	1		0.52	MG/KG		
CWRSC046	Silver	4.6		1	MG/KG		
CWRSC046	Thallium			1	MG/KG		
CWRSC046	Vanadium	53.4		5.2	MG/KG		
CWRSC046	Zinc	69.3		2.1	MG/KG		
CWRSC046	Chromium, Hexavalent	0.231		0.21	MG/KG		
CWRSC046	Nitrate	2.51		1	MG/KG		
CWRSC046	4,4'-DDD			14	UG/KG		
CWRSC046	4,4'-DDE			14	UG/KG		
CWRSC046	4,4'-DDT	2.9		14	UG/KG	J	q
CWRSC046	Aldrin			7	UG/KG		
CWRSC046	Alpha-BHC			7	UG/KG		
CWRSC046	Alpha-Chlordane	2.2		7	UG/KG	J	qv
CWRSC046	Arochlor-1016			35.1	UG/KG		
CWRSC046	Arochlor-1221			35.1	UG/KG		
CWRSC046	Arochlor-1232			35.1	UG/KG		
CWRSC046	Arochlor-1242			35.1	UG/KG		
CWRSC046	Arochlor-1248			35.1	UG/KG		
CWRSC046	Arochlor-1254			35.1	UG/KG		
CWRSC046	Arochlor-1260			35.1	UG/KG		
CWRSC046	Beta-BHC			7	UG/KG		
CWRSC046	Chlordane	13.2		351	UG/KG	J	q
CWRSC046	Delta-BHC			7	UG/KG		
CWRSC046	Dieldrin			14	UG/KG		
CWRSC046	Endosulfan I			7	UG/KG		
CWRSC046	Endosulfan II			14	UG/KG		
CWRSC046	Endosulfan Sulfate			14	UG/KG		
CWRSC046	Endrin			14	UG/KG		
CWRSC046	Endrin Aldehyde			14	UG/KG		
CWRSC046	Endrin Ketone			14	UG/KG		
CWRSC046	Gamma-BHC			7	UG/KG		
CWRSC046	gamma-Chlordane	2.7		7	UG/KG	J	qv
CWRSC046	Heptachlor			7	UG/KG		
CWRSC046	Heptachlor Epoxide			7	UG/KG		
CWRSC046	Methoxychlor			70.2	UG/KG		
CWRSC046	Toxaphene			351	UG/KG		
CWRSC046	1,1,1-Trichloroethane			2.1	UG/KG		
CWRSC046	1,1,2,2-Tetrachloroethane			2.1	UG/KG		
CWRSC046	1,1,2-Trichloroethane			2.1	UG/KG		
CWRSC046	1,1-Dichloroethane			2.1	UG/KG		
CWRSC046	1,1-Dichloroethene			2.1	UG/KG		
CWRSC046	1,2-Dichloroethane			2.1	UG/KG		
CWRSC046	1,2-Dichloroethene (total)			4.2	UG/KG		
CWRSC046	1,2-Dichloropropane			2.1	UG/KG		
CWRSC046	2-Butanone	29.2		10.5	UG/KG	J	c
CWRSC046	2-Hexanone			10.5	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC046	4-Methyl-2-Pentanone			10.5	UG/KG		
CWRSC046	Acetone			52.6	UG/KG		
CWRSC046	Benzene			2.1	UG/KG		
CWRSC046	Bromoform			2.1	UG/KG		
CWRSC046	Carbon Disulfide			10.5	UG/KG		
CWRSC046	Carbon Tetrachloride			2.1	UG/KG		
CWRSC046	Chlorobenzene			2.1	UG/KG		
CWRSC046	Chlorodibromomethane			2.1	UG/KG		
CWRSC046	Chloroethane			2.1	UG/KG		
CWRSC046	Chloroform			2.1	UG/KG		
CWRSC046	cis-1,3-Dichloropropylene			2.1	UG/KG		
CWRSC046	Dichlorobromomethane			2.1	UG/KG		
CWRSC046	Ethylbenzene			2.1	UG/KG		
CWRSC046	Methyl Bromide			2.1	UG/KG		
CWRSC046	Methyl Chloride			2.1	UG/KG		
CWRSC046	Methylene Chloride			10.5	UG/KG		
CWRSC046	Styrene			2.1	UG/KG		
CWRSC046	Tetrachloroethene			2.1	UG/KG		
CWRSC046	Toluene	145		2.1	UG/KG		
CWRSC046	Trans-1,3-Dichloropropene			2.1	UG/KG		
CWRSC046	Trichloroethene			2.1	UG/KG		
CWRSC046	Vinyl Chloride			2.1	UG/KG		
CWRSC046	Xylenes (Total)	4.6		6.3	UG/KG	J	q
CWRSC046	1,2,4-Trichlorobenzene			351	UG/KG		
CWRSC046	1,2-Dichlorobenzene			351	UG/KG		
CWRSC046	1,3-Dichlorobenzene			351	UG/KG		
CWRSC046	1,4-Dichlorobenzene			351	UG/KG		
CWRSC046	2,2'-oxybis(1-Chloropropane)			351	UG/KG		
CWRSC046	2,4,5-Trichlorophenol			351	UG/KG		
CWRSC046	2,4,6-Trichlorophenol			351	UG/KG		
CWRSC046	2,4-Dichlorophenol			351	UG/KG		
CWRSC046	2,4-Dimethylphenol			351	UG/KG		
CWRSC046	2,4-Dinitrophenol			702	UG/KG		
CWRSC046	2,4-Dinitrotoluene			351	UG/KG		
CWRSC046	2,6-Dinitrotoluene			351	UG/KG		
CWRSC046	2-Chloronaphthalene			351	UG/KG		
CWRSC046	2-Chlorophenol			351	UG/KG		
CWRSC046	2-Methyl-4,6-dinitrophenol			351	UG/KG		
CWRSC046	2-Methylnaphthalene			351	UG/KG		
CWRSC046	2-Nitroaniline			351	UG/KG		
CWRSC046	2-Nitrophenol			351	UG/KG		
CWRSC046	3,3'-Dichlorobenzidine			702	UG/KG	UJ	c
CWRSC046	3-Nitroaniline			351	UG/KG		
CWRSC046	4-Bromophenyl Phenyl Ether			351	UG/KG		
CWRSC046	4-Chloro-3-Methylphenol			351	UG/KG		
CWRSC046	4-Chloroaniline			702	UG/KG		
CWRSC046	4-Chlorophenyl Phenyl Ether			351	UG/KG		
CWRSC046	4-Nitroaniline			351	UG/KG		
CWRSC046	4-Nitrophenol			351	UG/KG	UJ	c
CWRSC046	Acenaphthene			351	UG/KG		
CWRSC046	Acenaphthylene			351	UG/KG		
CWRSC046	Anthracene			351	UG/KG		
CWRSC046	Benzo(a)anthracene			351	UG/KG		
CWRSC046	Benzo(a)pyrene			351	UG/KG		
CWRSC046	Benzo(b)fluoranthene			351	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC046	Benzo(g,h,i)perylene			351	UG/KG	UJ	c
CWRSC046	Benzo(k)fluoranthene			351	UG/KG		
CWRSC046	Bis(2-Chloroethoxy)methane			351	UG/KG		
CWRSC046	Bis(2-Chloroethyl)ether			351	UG/KG		
CWRSC046	Bis(2-Ethylhexyl)phthalate			351	UG/KG		
CWRSC046	Butyl Benzyl Phthalate			351	UG/KG		
CWRSC046	Carbazole			351	UG/KG	UJ	c
CWRSC046	Chrysene			351	UG/KG		
CWRSC046	Di-n-Butyl Phthalate			351	UG/KG		
CWRSC046	Di-n-Octyl Phthalate			351	UG/KG		
CWRSC046	Dibenzo(a,h)anthracene			351	UG/KG	UJ	c
CWRSC046	Dibenzofuran			351	UG/KG		
CWRSC046	Diethyl Phthalate			351	UG/KG		
CWRSC046	Dimethyl Phthalate			351	UG/KG		
CWRSC046	Diphenylamine			351	UG/KG		
CWRSC046	Fluoranthene			351	UG/KG		
CWRSC046	Fluorene			351	UG/KG		
CWRSC046	Hexachlorobenzene			351	UG/KG		
CWRSC046	Hexachlorobutadiene			351	UG/KG		
CWRSC046	Hexachlorocyclopentadiene			351	UG/KG		
CWRSC046	Hexachloroethane			351	UG/KG		
CWRSC046	Indeno(1,2,3-cd)pyrene			351	UG/KG		
CWRSC046	Isophorone			351	UG/KG		
CWRSC046	M,P-CRESOL			351	UG/KG		
CWRSC046	N-Nitrosodipropylamine			351	UG/KG		
CWRSC046	Naphthalene			351	UG/KG		
CWRSC046	Nitrobenzene			351	UG/KG		
CWRSC046	O-Cresol			351	UG/KG		
CWRSC046	Pentachlorophenol			702	UG/KG		
CWRSC046	Phenanthrene			351	UG/KG		
CWRSC046	Phenol			351	UG/KG		
CWRSC046	Pyrene			351	UG/KG		
CWRSC047	Actinium-228	0.423	0.062	0.015	PCI/G		
CWRSC047	Americium-241	-0.00000774	0.0019	0.00594	PCI/G		
CWRSC047	Bismuth-212	0.272	0.0501	0.0312	PCI/G		
CWRSC047	Bismuth-214	0.377	0.0429	0.00738	PCI/G		
CWRSC047	Carbon-14	-0.0217	0.0529	0.0926	PCI/G		
CWRSC047	Cesium-137	0.0149	0.00333	0.00408	PCI/G		
CWRSC047	Cobalt-60	0.000808	0.00265	0.00465	PCI/G		
CWRSC047	Gross Alpha	5.31	1.82	2.2	PCI/G		
CWRSC047	Lead-210	0.235	0.634	0.638	PCI/G		
CWRSC047	Lead-212	0.447	0.0464	0.00683	PCI/G		
CWRSC047	Lead-214	0.434	0.0479	0.00784	PCI/G		
CWRSC047	Nonvolatile Beta	11.7	1.65	2.21	PCI/G		
CWRSC047	Plutonium-241	0.0553	0.211	0.361	PCI/G		
CWRSC047	Potassium-40	10.2	1.05	0.0347	PCI/G		
CWRSC047	Radium-223	0.00644	0.0491	0.0758	PCI/G		
CWRSC047	Radium-226	0.46	0.0643	0.0252	PCI/G		
CWRSC047	Radium-228	0.423	0.062	0.015	PCI/G		
CWRSC047	Strontium-90	0.0194	0.0156	0.0258	PCI/G	UJ	c
CWRSC047	Thallium-208	0.139	0.0156	0.00395	PCI/G		
CWRSC047	Thorium-228	0.511	0.142	0.127	PCI/G		
CWRSC047	Thorium-230	0.306	0.0938	0.0573	PCI/G		
CWRSC047	Thorium-232	0.37	0.103	0.0365	PCI/G		
CWRSC047	Thorium-234	0.427	0.247	0.193	PCI/G		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC047	Tritium	-0.354	0.481	0.876	PCI/G		
CWRSC047	Uranium-233/234	0.343	0.0509	0.012	PCI/G		
CWRSC047	Uranium-235	0.0226	0.0105	0.0094	PCI/G		
CWRSC047	Uranium-238	0.38	0.0547	0.00937	PCI/G		
CWRSC047	Antimony			5.8	MG/KG	R	m
CWRSC047	Arsenic	6.6		0.96	MG/KG		
CWRSC047	Barium	131		19.3	MG/KG		
CWRSC047	Beryllium	0.3		0.48	MG/KG		
CWRSC047	Cadmium			0.48	MG/KG		
CWRSC047	Chromium	87.7		0.96	MG/KG		
CWRSC047	Cobalt	17		4.8	MG/KG		
CWRSC047	Copper	31.2		2.4	MG/KG		
CWRSC047	Lead	11.3		0.29	MG/KG		
CWRSC047	Mercury	0.64		0.033	MG/KG		
CWRSC047	Molybdenum	0.28		0.96	MG/KG		
CWRSC047	Nickel	170		3.8	MG/KG		
CWRSC047	Selenium	0.65		0.48	MG/KG		
CWRSC047	Silver	1.1		0.96	MG/KG		
CWRSC047	Thallium			0.96	MG/KG		
CWRSC047	Vanadium	43.6		4.8	MG/KG		
CWRSC047	Zinc	59.4		1.9	MG/KG		
CWRSC047	Chromium, Hexavalent	0.0872		0.194	MG/KG		
CWRSC047	Nitrate	4.19		1	MG/KG		
CWRSC047	4,4'-DDD			27.5	UG/KG		
CWRSC047	4,4'-DDE			27.5	UG/KG		
CWRSC047	4,4'-DDT			27.5	UG/KG		
CWRSC047	Aldrin			13.7	UG/KG		
CWRSC047	Alpha-BHC			13.7	UG/KG		
CWRSC047	Alpha-Chlordane	1.5		13.7	UG/KG	J	qv
CWRSC047	Arochlor-1016			68.7	UG/KG		
CWRSC047	Arochlor-1221			68.7	UG/KG		
CWRSC047	Arochlor-1232			68.7	UG/KG		
CWRSC047	Arochlor-1242			68.7	UG/KG		
CWRSC047	Arochlor-1248			68.7	UG/KG		
CWRSC047	Arochlor-1254			68.7	UG/KG		
CWRSC047	Arochlor-1260			68.7	UG/KG		
CWRSC047	Beta-BHC			13.7	UG/KG		
CWRSC047	Chlordane	9.9		687	UG/KG	J	q
CWRSC047	Delta-BHC			13.7	UG/KG		
CWRSC047	Dieldrin			27.5	UG/KG		
CWRSC047	Endosulfan I			13.7	UG/KG		
CWRSC047	Endosulfan II			27.5	UG/KG		
CWRSC047	Endosulfan Sulfate			27.5	UG/KG		
CWRSC047	Endrin			27.5	UG/KG		
CWRSC047	Endrin Aldehyde			27.5	UG/KG		
CWRSC047	Endrin Ketone			27.5	UG/KG		
CWRSC047	Gamma-BHC			13.7	UG/KG		
CWRSC047	gamma-Chlordane	2		13.7	UG/KG	J	qv
CWRSC047	Heptachlor			13.7	UG/KG		
CWRSC047	Heptachlor Epoxide			13.7	UG/KG		
CWRSC047	Methoxychlor			137	UG/KG		
CWRSC047	Toxaphene			687	UG/KG		
CWRSC047	1,1,1-Trichloroethane			2.1	UG/KG		
CWRSC047	1,1,2,2-Tetrachloroethane			2.1	UG/KG		
CWRSC047	1,1,2-Trichloroethane			2.1	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC047	1,1-Dichloroethane			2.1	UG/KG		
CWRSC047	1,1-Dichloroethene			2.1	UG/KG		
CWRSC047	1,2-Dichloroethane			2.1	UG/KG		
CWRSC047	1,2-Dichloroethene (total)			4.1	UG/KG		
CWRSC047	1,2-Dichloropropane			2.1	UG/KG		
CWRSC047	2-Butanone	11.2		10.3	UG/KG	J	c
CWRSC047	2-Hexanone			10.3	UG/KG		
CWRSC047	4-Methyl-2-Pentanone			10.3	UG/KG		
CWRSC047	Acetone			51.5	UG/KG		
CWRSC047	Benzene			2.1	UG/KG		
CWRSC047	Bromoform			2.1	UG/KG		
CWRSC047	Carbon Disulfide			10.3	UG/KG		
CWRSC047	Carbon Tetrachloride			2.1	UG/KG		
CWRSC047	Chlorobenzene			2.1	UG/KG		
CWRSC047	Chlorodibromomethane			2.1	UG/KG		
CWRSC047	Chloroethane			2.1	UG/KG		
CWRSC047	Chloroform			2.1	UG/KG		
CWRSC047	cis-1,3-Dichloropropylene			2.1	UG/KG		
CWRSC047	Dichlorobromomethane			2.1	UG/KG		
CWRSC047	Ethylbenzene			2.1	UG/KG		
CWRSC047	Methyl Bromide			2.1	UG/KG		
CWRSC047	Methyl Chloride			2.1	UG/KG		
CWRSC047	Methylene Chloride			10.3	UG/KG		
CWRSC047	Styrene			2.1	UG/KG		
CWRSC047	Tetrachloroethene			2.1	UG/KG		
CWRSC047	Toluene	124		2.1	UG/KG		
CWRSC047	Trans-1,3-Dichloropropene			2.1	UG/KG		
CWRSC047	Trichloroethene			2.1	UG/KG		
CWRSC047	Vinyl Chloride			2.1	UG/KG		
CWRSC047	Xylenes (Total)	3.5		6.2	UG/KG	J	q
CWRSC047	1,2,4-Trichlorobenzene			344	UG/KG		
CWRSC047	1,2-Dichlorobenzene			344	UG/KG		
CWRSC047	1,3-Dichlorobenzene			344	UG/KG		
CWRSC047	1,4-Dichlorobenzene			344	UG/KG		
CWRSC047	2,2'-oxybis(1-Chloropropane)			344	UG/KG		
CWRSC047	2,4,5-Trichlorophenol			344	UG/KG		
CWRSC047	2,4,6-Trichlorophenol			344	UG/KG		
CWRSC047	2,4-Dichlorophenol			344	UG/KG		
CWRSC047	2,4-Dimethylphenol			344	UG/KG		
CWRSC047	2,4-Dinitrophenol			687	UG/KG		
CWRSC047	2,4-Dinitrotoluene			344	UG/KG		
CWRSC047	2,6-Dinitrotoluene			344	UG/KG		
CWRSC047	2-Chloronaphthalene			344	UG/KG		
CWRSC047	2-Chlorophenol			344	UG/KG		
CWRSC047	2-Methyl-4,6-dinitrophenol			344	UG/KG		
CWRSC047	2-Methylnaphthalene			344	UG/KG		
CWRSC047	2-Nitroaniline			344	UG/KG		
CWRSC047	2-Nitrophenol			344	UG/KG		
CWRSC047	3,3'-Dichlorobenzidine			687	UG/KG	UJ	c
CWRSC047	3-Nitroaniline			344	UG/KG		
CWRSC047	4-Bromophenyl Phenyl Ether			344	UG/KG		
CWRSC047	4-Chloro-3-Methylphenol			344	UG/KG		
CWRSC047	4-Chloroaniline			687	UG/KG		
CWRSC047	4-Chlorophenyl Phenyl Ether			344	UG/KG		
CWRSC047	4-Nitroaniline			344	UG/KG		

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC047	4-Nitrophenol			344	UG/KG	UJ	c
CWRSC047	Acenaphthene			344	UG/KG		
CWRSC047	Acenaphthylene			344	UG/KG		
CWRSC047	Anthracene			344	UG/KG		
CWRSC047	Benzo(a)anthracene			344	UG/KG		
CWRSC047	Benzo(a)pyrene			344	UG/KG		
CWRSC047	Benzo(b)fluoranthene			344	UG/KG		
CWRSC047	Benzo(g,h,i)perylene			344	UG/KG	UJ	c
CWRSC047	Benzo(k)fluoranthene			344	UG/KG		
CWRSC047	Bis(2-Chloroethoxy)methane			344	UG/KG		
CWRSC047	Bis(2-Chloroethyl)ether			344	UG/KG		
CWRSC047	Bis(2-Ethylhexyl)phthalate			344	UG/KG		
CWRSC047	Butyl Benzyl Phthalate			344	UG/KG		
CWRSC047	Carbazole			344	UG/KG	UJ	c
CWRSC047	Chrysene			344	UG/KG		
CWRSC047	Di-n-Butyl Phthalate			344	UG/KG		
CWRSC047	Di-n-Octyl Phthalate			344	UG/KG		
CWRSC047	Dibenzo(a,h)anthracene			344	UG/KG	UJ	c
CWRSC047	Dibenzofuran			344	UG/KG		
CWRSC047	Diethyl Phthalate			344	UG/KG		
CWRSC047	Dimethyl Phthalate			344	UG/KG		
CWRSC047	Diphenylamine			344	UG/KG		
CWRSC047	Fluoranthene			344	UG/KG		
CWRSC047	Fluorene			344	UG/KG		
CWRSC047	Hexachlorobenzene			344	UG/KG		
CWRSC047	Hexachlorobutadiene			344	UG/KG		
CWRSC047	Hexachlorocyclopentadiene			344	UG/KG		
CWRSC047	Hexachloroethane			344	UG/KG		
CWRSC047	Indeno(1,2,3-cd)pyrene			344	UG/KG		
CWRSC047	Isophorone			344	UG/KG		
CWRSC047	M,P-CRESOL			344	UG/KG		
CWRSC047	N-Nitrosodipropylamine			344	UG/KG		
CWRSC047	Naphthalene			344	UG/KG		
CWRSC047	Nitrobenzene			344	UG/KG		
CWRSC047	O-Cresol			344	UG/KG		
CWRSC047	Pentachlorophenol			687	UG/KG		
CWRSC047	Phenanthrene			344	UG/KG		
CWRSC047	Phenol			344	UG/KG		
CWRSC047	Pyrene			344	UG/KG		
CWRSC061	Lead	5.2		0.14	mg/kg		
CWRSC062	Lead	3.8		0.14	mg/kg		
CWRSC063	Lead	6		0.14	mg/kg		
CWRSC064	Lead	5.2		0.13	mg/kg		
CWRSC065	Lead	5.8		0.14	mg/kg		
CWRSC066	Lead	5.9		0.15	mg/kg		
CWRSC067	Lead	6.4		0.14	mg/kg		
CWRSC068	Lead	6.1		0.14	mg/kg		
CWRSC069	Lead	7.2		0.14	mg/kg		
CWRSC070	Lead	7.2		0.15	mg/kg		
CWRSC071	Lead	6.6		0.15	mg/kg		
CWRSC072	Lead	9.2		0.14	mg/kg		
CWRSC073	Lead	13.4		0.16	mg/kg		
CWRSC074	Lead	8.6		0.15	mg/kg		
CWRSC075	Lead	8.6		0.13	mg/kg		
CWRSC076	Lead	8.2		0.13	mg/kg		

Appendix A. Ra/Sr Area 1 RA Overburden Soil Data

Sample Identification	Analyte	Concentration	Error	Detection Limit	Units	Expert Review Qualifier	Expert Review Subqualifier
CWRSC077	Lead	8.2		0.2	mg/kg		
CWRSC078	Lead	10.7		0.14	mg/kg		
CWRSC079	Lead	7.73		0.15	mg/kg	J	m
CWRSC080	Lead	9.08		0.13	mg/kg	J	m
CWRSC081	Lead	18		0.14	mg/kg	J	m
CWRSC082	Lead	6.09		0.15	mg/kg	J	m
CWRSC083	Lead	12.2		0.13	mg/kg	J	m

Appendix A. Ra/Sr Area 1 RA Overburden Soil Data

Notes:

J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantification limit. However, the reported quantification limit is approximate and may or may not represent the actual limit of quantification necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
c	Calibration failure; poor or unstable response.
d	Matrix duplicate imprecision or MS/MSD imprecision.
m	Matrix spike/matrix spike duplicate recovery failure.
q	Below CRQL/CRDL or above calibration range.
v	Detected concentrations >25% difference between 2 GC columns (pesticides).