



**U.S. Department of Energy**  
Oakland Operations Office, Oakland, California

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**DESIGNATED-LEVEL SAMPLING AND ANALYSIS PLAN  
ADDENDUM FOR THE RADIUM/STRONTIUM TREATMENT  
SYSTEMS AREA**

at 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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April 30, 2001  
Rev. 0

DOE Oakland Operations Contract DE-AC03-96SF20686

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*Submitted to:*

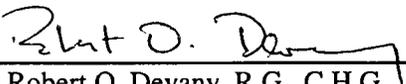
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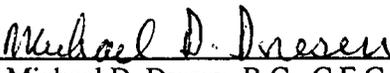
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## CONTENTS

1.	SAMPLING AND ANALYSIS PLAN	1-1
	1.1 Sampling Plan	1-1
	1.2 Analytical Plan	1-2
2.	REFERENCES	2-1

## TABLES

- Table 1. Summary of the Five Maximum Sample Concentrations for the Designated-Level Constituents of Concern, LEHR Radium/Strontium Treatment Systems Area
- Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity
- Table 3. Sampling and Analysis for Designated-Level Constituents of Concern, LEHR Radium/Strontium Treatment Systems Area

## FIGURE

- Figure 1. Proposed Sampling Locations for Designated-Level Constituents of Concern, LEHR Radium/Strontium Treatment Systems Area

## ACRONYMS

bgs	below ground surface
C-14	carbon-14
Cs-137	cesium-137
COC	constituent of concern
Cr <sup>+6</sup>	hexavalent chromium
DL	designated-level
ft	feet
H-3	tritium
ID	identification
LEHR	Laboratory for Energy-Related Health Research
RA	Removal Action
Ra/Sr	Radium/Strontium
RPM(s)	Remedial Project Manager(s)
SAP	Sampling and Analysis Plan
USCS	Unified Soil Classification System
WA	Weiss Associates

## 1. SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan (SAP) is an addendum to the *Sampling and Analysis Plan for the Removal Action at the Southwest Trenches, Radium/Strontium Treatment Systems and Domestic Septic System Area* (Attachment 1 of the Work Plan) (WA, 2000b). This document presents the approach and procedures for the designated-level (DL) sampling and analysis in the Radium/Strontium (Ra/Sr) Area at the Laboratory for Energy-Related Health Research (LEHR), University of California, Davis. The objective of this sampling and subsequent evaluation of the data is to determine whether residual concentrations of specific constituents in soil will potentially impact ground water. The specific constituents were identified during the DL analysis performed as part of the Ra/Sr Removal Action (RA) Phase II Data Evaluation. The results of the Ra/Sr RA Phase II Data Evaluation were presented at the April 10, 2001 Remedial Project Managers (RPMs) meeting, and will be provided in the *Draft Ra/Sr Treatment System Area Removal Action Confirmation Report* to be completed in September 2001. In addition, this SAP includes descriptions and rationale for the sampling activities and procedures for field work.

The DL evaluation identified five constituents of concern (COCs) that require additional evaluation: cesium-137 (Cs-137), hexavalent chromium (Cr<sup>+6</sup>), carbon-14 (C-14), mercury and nitrate (Tables 1 and 2). These are subsequently referred to as DL COCs. This sampling plan is designed to delineate the vertical extent of contamination associated with Cs-137, Cr<sup>+6</sup>, C-14, mercury and nitrate.

In addition to the five DL COCs listed above, Ra-226 and gamma emitters were reported from a confirmation sample at the bottom of dry well No. 2 (sample identification number SSRSC035). As discussed with the RPMs at the April 11, 2000 RPM meeting, Weiss Associates (WA) intends to re-sample at 42.5 feet below ground surface (ft bgs) and at greater depths to further evaluate the presence of the reported radionuclides.

### 1.1 Sampling Plan

This section describes the location and number of samples that will be collected to evaluate potential impact to ground water by the DL COCs. In general, samples will be collected from locations with the highest concentrations for each DL COC. Two locations are selected for nitrate, Cs-137 and C-14, and three locations are selected for mercury and Cr<sup>+6</sup>. A summary of the five maximum concentrations for each DL COC is presented in Table 1.

Soil samples will be collected at each DL boring location on five-foot intervals, with the first sample collected five feet below the depth of the original confirmation sample. Sample collection

will continue until ground water is encountered, which is estimated between 30 to 35 feet bgs during spring-time conditions. Targeted sample depths for each DL COC are summarized in Table 3. Approximately three to six samples will be collected from each boring location shown in Figure 1, depending on the original confirmation sample depth and the actual depth to ground water.

The approach for sample ID No. SSRSC035 (bottom of former dry well No. 2) is to re-sample at 42.5 ft bgs and at 2.5 ft intervals to a depth of 47.5 ft bgs (Table 3).

DL borings will be located using survey coordinates and will be continuously cored using a direct-push drill rig. Soil samples will be collected in a core barrel with a butyrate liner. The soil cores will be screened by the field geologist and radiological control technician for indications of contamination. The field geologist will use the Unified Soil Classification System (USCS) to describe and document the lithology of the soil cores. The samples will be given unique ID numbers and placed in a cooler for transport to the laboratory under chain-of-custody procedures. In addition, one duplicate sample will be collected for every 10 samples (10%) for quality control.

All downhole drilling equipment will be steam cleaned prior to arrival on-site, and will be cleaned between each borehole using an Alconox detergent-water wash, potable water rinse, and a final de-ionized water rinse. Investigation-derived waste, consisting of rinsate decontamination water, will be placed in drums and sampled prior to disposal. Upon completion of the fieldwork, all borings will be grouted to the surface with a cement grout containing 3-5% bentonite by weight.

Soil sampling will be conducted in accordance with appropriate SOPs and procedures stated in the *Sampling and Analysis Plan for the Removal Action at the Southwest Trenches, Radium/Strontium Treatment Systems and Domestic Septic System Area* (Attachment 1 of the Work Plan) (WA, 2000b).

## 1.2 Analytical Plan

The soil samples will be analyzed as specified in Table 3. Analyses will be performed on a standard 30-day turnaround time for non-radionuclides and 45-day turnaround time for radionuclides.

The samples collected for this investigation will be analyzed by General Engineering Laboratories, Inc. in Charleston, South Carolina. Laboratory reports (hard copies and electronic files) will be forwarded from the laboratory to the WA Data Validation Chemist. These results will be validated and transferred to the project database by the WA Database Manager in accordance with procedures described in the QAPP (WA, 2000a).

## 2. REFERENCES

- Weiss Associates (WA), 1999, Standard Operating Procedures (SOPs) for Environmental Restoration/Waste Management, Laboratory for Energy-Related Health Research (LEHR), University of California at Davis, July.
- WA, 2000a, Final Quality Assurance Project Plan for the Laboratory for Energy-Related Health Research, University of California, Davis, June, Rev. 3.
- WA, 2000b, Final Work Plan for Removal Actions in the Southwest Trenches, Radium/Strontium Treatment Systems and Domestic Septic System Areas for LEHR, University of California at Davis, July, Rev. 0.

## TABLES

Table 1. Summary of the Five Maximum Sample Concentrations for the Designated Level Constituents of Concern, LEHR Radium/Strontium Treatment Systems Area

Lab Chemical	Maximum	2nd Highest	3rd Highest	4th Highest	5th Highest
Hexavalent Chromium	<b>SSRSC070</b>	<b>SSRSC078</b>	SSRSC076	SSRSC042	SSRSC018
Results (mg/kg)	0.8410	0.7620	0.5860	0.5640	0.5150
Nitrate	<b>SSRSC040</b>	<b>SSRSC032</b>	SSRSC039	SSRSC009	SSRSC002
Results (mg/kg)	340.0000	237.0000	186.0000	113.0000	82.7000
Mercury	<b>SSRSC024</b>	<b>SSRSC010</b>	SSRSC065	SSRSC051	SSRSC031
Results (mg/kg)	2.0000	2.0000	1.8000	1.8000	1.7000
Carbon-14	<b>SSRSC020</b>	<b>SSRSC019</b>	SSRSC025	SSRSC024	SSRSC009
Results (pCi/g)	2.4100	2.3800	0.4040	0.2770	0.2640
Cesium-137	<b>SSRSC072</b>	<b>SSRSC074</b>	SSRSC073	SSRSC078	SSRSC077
Results (pCi/g)	0.6120	0.4160	0.3820	0.1680	0.0973

**Legend**

<b>SSRSC040</b>	Recommended Sample Location
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Note: See Figure 1 for map locations.

**Abbreviations**

mg/kg                      milligrams per kilogram  
 pCi/g                      picoCuries per gram

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity

Sample Identification	Mercury Concentration (mg/kg)	Depth (ft bgs)
SSRSC010	2.0	1
SSRSC024	2.0	5.5
SSRSC051	1.8	2.5
SSRSC065	1.8	1.5
SSRSC031	1.7	1
SSRSC074	1.5	7
SSRSC021	1.4	2
SSRSC063	1.4	3
SSRSC071	1.4	5.5
SSRSC043	1.35	5
SSRSC064	1.3	1.5
SSRSC011	1.2	1
SSRSC030	1.2	1
SSRSC073	1.2	6
SSRSC001	1.1	5.5
SSRSC022	1.1	5
SSRSC066	1.0	3
SSRSC078	0.99	2
SSRSC067	0.91	3
SSRSC017	0.88	1
SSRSC068	0.87	3
SSRSC015	0.86	10
SSRSC052	0.83	2.5
SSRSC069	0.76	7
SSRSC023	0.74	13.5
SSRSC028	0.64	6
SSRSC072	0.6	6
SSRSC003	0.58	10

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Mercury Concentration (mg/kg)	Depth (ft bgs)
SSRSC018	0.51	11
SSRSC005	0.42	10
SSRSC054	0.41	7
SSRSC006	0.38	10
SSRSC004	0.33	10
SSRSC027	0.32	3
SSRSC013	0.31	16
SSRSC062	0.29	8
SSRSC060	0.28	11
SSRSC007	0.27	2
SSRSC026	0.27	3
SSRSC053	0.27	8
SSRSC055	0.26	10
SSRSC038	0.25	10
SSRSC076	0.25	2
SSRSC045	0.247	10
SSRSC077	0.24	6
SSRSC002	0.23	10
SSRSC012	0.23	9.5
SSRSC029	0.23	4
SSRSC040	0.23	20
SSRSC056	0.22	11
SSRSC019	0.2	8
SSRSC033	0.2	8
SSRSC070	0.2	7
SSRSC016	0.19	13
SSRSC035	0.18	42.5
SSRSC036	0.18	10

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Mercury Concentration (mg/kg)	Depth (ft bgs)
SSRSC049	0.173	10
SSRSC061	0.17	12
SSRSC047	0.169	9
SSRSC020	0.16	13.5
SSRSC025	0.16	7
SSRSC044	0.158	9
SSRSC050	0.152	10
SSRSC008	0.15	9
SSRSC009	0.15	9
SSRSC058	0.15	10
SSRSC014	0.14	13.5
SSRSC032	0.14	4.5
SSRSC057	0.14	8
SSRSC059	0.14	10
SSRSC042	0.13	42.5
SSRSC046	0.124	9
SSRSC034	0.12	42.5
SSRSC048	0.118	10
SSRSC041	0.11	42.5
SSRSC037	0.1	10
SSRSC039	0.1	15
SSRSC075	0.081	6

**Abbreviations**

ft bgs feet below ground surface  
 mg/kg milligrams per kilogram

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Nitrate Concentration (mg/kg)	Depth (ft bgs)
SSRSC040	304	20
SSRSC032	237	4.5
SSRSC039	186	15
SSRSC009	113	9
SSRSC002	82.7	10
SSRSC012	82	9.5
SSRSC041	80.1	42.5
SSRSC042	53.6	42.5
SSRSC035	38.8	42.5
SSRSC024	31.6	5.5
SSRSC029	31.3	4
SSRSC001	30.1	5.5
SSRSC015	29.2	10
SSRSC023	27.3	13.5
SSRSC013	26.1	16
SSRSC004	21.3	10
SSRSC026	19.5	3
SSRSC025	18.8	7
SSRSC055	16.4	10
SSRSC027	16.2	3
SSRSC016	14.6	13
SSRSC006	13.9	10
SSRSC007	13.8	2
SSRSC010	12.5	1
SSRSC011	12.4	1
SSRSC049	12.1	10
SSRSC050	11.8	10
SSRSC033	11.7	8

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Nitrate Concentration (mg/kg)	Depth (ft bgs)
SSRSC005	11.5	10
SSRSC048	10.9	10
SSRSC019	10.5	8
SSRSC059	9.22	10
SSRSC034	8.45	42.5
SSRSC017	8.27	1
SSRSC022	7.66	5
SSRSC058	7.66	10
SSRSC021	7.31	2
SSRSC056	7.18	11
SSRSC067	6.66	3
SSRSC068	6.37	3
SSRSC028	5.89	6
SSRSC038	5.26	10
SSRSC070	4.23	7
SSRSC003	4.1	10
SSRSC069	3.2	7
SSRSC062	3.15	8
SSRSC074	2.96	7
SSRSC014	2.83	13.5
SSRSC076	2.8	2
SSRSC053	2.37	8
SSRSC054	2.31	7
SSRSC077	2.31	6
SSRSC037	2.21	10
SSRSC075	2.08	6
SSRSC061	2.05	12
SSRSC057	1.97	8

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Nitrate Concentration (mg/kg)	Depth (ft bgs)
SSRSC046	1.88	9
SSRSC078	1.84	2
SSRSC020	1.83	13.5
SSRSC073	1.71	6
SSRSC044	1.67	9
SSRSC008	1.61	9
SSRSC072	1.5	6
SSRSC060	1.31	11
SSRSC043	1.26	5
SSRSC045	1.12	10
SSRSC071	1.12	5.5
SSRSC063	1.02	3
SSRSC066	0.991	3
SSRSC047	0.957	9
SSRSC064	0.926	1.5
SSRSC030	0.901	1
SSRSC065	0.881	1.5
SSRSC036	0.787	10
SSRSC031	0.784	1
SSRSC018	0.496	11
SSRSC051	< 0.231	2.5
SSRSC052	< 0.231	2.5

**Abbreviations**

ft bgs feet below ground surface  
 mg/kg milligrams per kilogram

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Hexavalent Chromium Concentration (mg/kg)	Depth (ft bgs)
SSRSC070	0.841	7
SSRSC078	0.762	2
SSRSC076	0.586	2
SSRSC042	0.564	42.5
SSRSC018	0.515	11
SSRSC072	0.509	6
SSRSC077	0.507	6
SSRSC073	0.498	6
SSRSC034	0.47	42.5
SSRSC001	0.384	5.5
SSRSC044	0.367	9
SSRSC039	0.342	15
SSRSC074	0.334	7
SSRSC066	0.323	3
SSRSC026	0.319	3
SSRSC068	0.29	3
SSRSC005	0.289	10
SSRSC006	0.289	10
SSRSC075	0.287	6
SSRSC010	0.286	1
SSRSC040	0.283	20
SSRSC012	0.278	9.5
SSRSC004	0.264	10
SSRSC007	0.264	2
SSRSC069	0.263	7
SSRSC063	0.261	3
SSRSC035	0.26	42.5
SSRSC067	0.26	3

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Hexavalent Chromium Concentration (mg/kg)	Depth (ft bgs)
SSRSC003	0.255	10
SSRSC027	0.251	3
SSRSC011	0.246	1
SSRSC037	0.244	10
SSRSC038	0.232	10
SSRSC009	0.231	9
SSRSC065	0.226	1.5
SSRSC015	0.222	10
SSRSC008	0.215	9
SSRSC043	0.2	5
SSRSC019	0.19	8
SSRSC071	0.185	5.5
SSRSC013	0.176	16
SSRSC029	0.176	4
SSRSC028	0.174	6
SSRSC036	0.172	10
SSRSC056	0.161	11
SSRSC021	0.158	2
SSRSC054	0.156	7
SSRSC014	0.155	13.5
SSRSC046	0.153	9
SSRSC053	0.148	8
SSRSC016	0.147	13
SSRSC062	0.147	8
SSRSC047	0.142	9
SSRSC050	0.14	10
SSRSC023	0.127	13.5
SSRSC025	0.112	7

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Hexavalent Chromium Concentration (mg/kg)	Depth (ft bgs)
SSRSC064	0.108	1.5
SSRSC041	0.106	42.5
SSRSC051	0.104	2.5
SSRSC030	0.101	1
SSRSC020	0.0819	13.5
SSRSC017	0.0749	1
SSRSC002	< 0.242	10
SSRSC022	< 0.212	5
SSRSC024	< 0.222	5.5
SSRSC031	< 0.224	1
SSRSC032	< 0.228	4.5
SSRSC033	< 0.228	8
SSRSC045	< 0.103	10
SSRSC048	< 0.105	10
SSRSC049	< 0.105	10
SSRSC052	< 0.105	2.5
SSRSC055	< 0.109	10
SSRSC057	< 0.216	8
SSRSC058	< 0.112	10
SSRSC059	< 0.108	10
SSRSC060	< 0.108	11
SSRSC061	< 0.109	12

**Abbreviations**

ft bgs feet below ground surface  
 mg/kg milligrams per kilogram

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Carbon-14 Activity (pCi/g)	Depth (ft bgs)
SSRSC020	2.41	13.5
SSRSC019	2.38	8
SSRSC025	0.404	7
SSRSC024	0.277	5.5
SSRSC009	0.264	9
SSRSC008	0.173	9
SSRSC051	0.127	2.5
SSRSC057	0.107	8
SSRSC056	0.101	11
SSRSC067	0.101	3
SSRSC010	0.0958	1
SSRSC075	0.0924	6
SSRSC061	0.0914	12
SSRSC070	0.0895	7
SSRSC078	0.0891	2
SSRSC062	0.0884	8
SSRSC047	0.0871	9
SSRSC004	0.0835	10
SSRSC066	0.0807	3
SSRSC068	0.0777	3
SSRSC073	0.0752	6
SSRSC045	0.0745	10
SSRSC069	0.072	7
SSRSC001	0.0708	5.5
SSRSC060	0.0682	11
SSRSC058	0.0676	10
SSRSC034	0.0601	42.5
SSRSC072	0.0579	6

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Carbon-14 Activity (pCi/g)	Depth (ft bgs)
SSRSC063	0.0526	3
SSRSC064	0.0503	1.5
SSRSC065	0.048	1.5
SSRSC076	0.044	2
SSRSC007	0.0437	2
SSRSC043	0.0428	5
SSRSC059	0.0426	10
SSRSC003	0.0421	10
SSRSC071	0.0401	5.5
SSRSC036	0.0385	10
SSRSC050	0.0374	10
SSRSC002	0.035	10
SSRSC006	0.0324	10
SSRSC011	0.0321	1
SSRSC046	0.0311	9
SSRSC044	0.0307	9
SSRSC005	0.0302	10
SSRSC077	0.0301	6
SSRSC074	0.0281	7
SSRSC038	0.0264	10
SSRSC027	0.0261	3
SSRSC053	0.0257	8
SSRSC039	0.0248	15
SSRSC048	0.024	10
SSRSC012	0.0227	9.5
SSRSC035	0.0222	42.5
SSRSC028	0.0217	6
SSRSC013	0.0187	16

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Carbon-14 Activity (pCi/g)	Depth (ft bgs)
SSRSC026	0.0118	3
SSRSC042	0.00526	42.5
SSRSC031	0.00474	1
SSRSC032	0.00146	4.5
SSRSC049	0	10
SSRSC041	-0.0016	42.5
SSRSC023	-0.00185	13.5
SSRSC018	-0.00211	11
SSRSC055	-0.0025	10
SSRSC021	-0.00307	2
SSRSC022	-0.00743	5
SSRSC040	-0.0108	20
SSRSC054	-0.0109	7
SSRSC052	-0.0118	2.5
SSRSC017	-0.0145	1
SSRSC037	-0.0153	10
SSRSC014	-0.0297	13.5
SSRSC033	-0.0335	8
SSRSC015	-0.0342	10
SSRSC016	-0.037	13
SSRSC030	-0.0378	1
SSRSC029	-0.0616	4

**Abbreviations**

ft bgs feet below ground surface  
 pCi/g picoCuries per gram

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Cesium-137 Activity (pCi/g)	Depth (ft bgs)
SSRSC072	0.612	6
SSRSC074	0.416	7
SSRSC073	0.382	6
SSRSC078	0.168	2
SSRSC077	0.0973	6
SSRSC075	0.0379	6
SSRSC069	0.0267	7
SSRSC037	0.0228	10
SSRSC021	0.0225	2
SSRSC035	0.0213	42.5
SSRSC036	0.0107	10
SSRSC051	0.00993	2.5
SSRSC016	0.00954	13
SSRSC055	0.00831	10
SSRSC042	0.00774	42.5
SSRSC052	0.00719	2.5
SSRSC041	0.00712	42.5
SSRSC015	0.00648	10
SSRSC044	0.00614	9
SSRSC054	0.0051	7
SSRSC023	0.00499	13.5
SSRSC017	0.00454	1
SSRSC057	0.00441	8
SSRSC034	0.00418	42.5
SSRSC009	0.00403	9
SSRSC002	0.00341	10
SSRSC004	0.0032	10
SSRSC005	0.00313	10

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Cesium-137 Activity (pCi/g)	Depth (ft bgs)
SSRSC066	0.00313	3
SSRSC068	0.00295	3
SSRSC063	0.0029	3
SSRSC040	0.00288	20
SSRSC010	0.00218	1
SSRSC071	0.00207	5.5
SSRSC030	0.00201	1
SSRSC059	0.00195	10
SSRSC035R	0.00193	
SSRSC058	0.00188	10
SSRSC003	0.00179	10
SSRSC033	0.00172	8
SSRSC038	0.00172	10
SSRSC039	0.00159	15
SSRSC065	0.00159	1.5
SSRSC011	0.00149	1
SSRSC031	0.00124	1
SSRSC018	0.00119	11
SSRSC043	0.00118	5
SSRSC061	0.00108	12
SSRSC013	0.00107	16
SSRSC062	0.001	8
SSRSC006	0.000998	10
SSRSC070	0.000869	7
SSRSC012	0.000784	9.5
SSRSC008	0.000682	9
SSRSC001	0.000587	5.5
SSRSC022	0.000577	5

Table 2. LEHR Radium/Strontium Treatment Systems Area Designated-Level Constituents of Concern, Sorted in Descending Order by Concentration/Activity (continued)

Sample Identification	Cesium-137 Activity (pCi/g)	Depth (ft bgs)
SSRSC049	0.000425	10
SSRSC064	0.0000935	1.5
SSRSC046	0.0000679	9
SSRSC076	0.0000145	2
SSRSC032	0	4.5
SSRSC047	0	9
SSRSC053	0	8
SSRSC026	-0.000249	3
SSRSC029	-0.00032	4
SSRSC019	-0.000348	8
SSRSC067	-0.000713	3
SSRSC060	-0.000742	11
SSRSC020	-0.00095	13.5
SSRSC007	-0.000965	2
SSRSC048	-0.00105	10
SSRSC045	-0.00107	10
SSRSC027	-0.0013	3
SSRSC028	-0.00158	6
SSRSC014	-0.00178	13.5
SSRSC024	-0.00201	5.5
SSRSC050	-0.00203	10
SSRSC056	-0.00213	11
SSRSC025	-0.00315	7

**Abbreviations**

ft bgs feet below ground surface  
 pCi/g picoCuries per gram

Table 3. Sampling and Analysis for Designated-Level Constituents of Concern, LEHR Radium/Strontium Treatment Systems Area

DL <sup>(1)</sup> COC <sup>(2)</sup>	Ra/Sr Area Confirmation Sample ID	Ra/Sr Area Confirmation Sample Depth (ft bgs)	DL COC Boring ID	Sample Depths (ft. bgs) <sup>(3)</sup>	Total Soil Samples	Analytical Method <sup>(4)</sup>	Required Detection Limit for Soil (pCi/g or mg/kg)	TAT <sup>(6)</sup>
Hexavalent Chromium	SSRSC070	7	DL-1	12, 17, 22, 27, 32	5	EPA Method 3060A/7196	0.05	30-day
Hexavalent Chromium	SSRSC078	2	DL-2	7, 12, 17, 22, 27, 32	6	EPA Method 3060A/7196	0.05	30-day
Hexavalent Chromium	SSRSC042	2.5	DL-3	42.5, 45.0, 47.5	3	EPA Method 3060A/7196	0.05	30-day
Nitrate	SSRSC040	20	DL-4	25, 30, 35	3	EPA Method 300.0	1	30-day
Nitrate	SSRSC032	4.5	DL-5	9.5, 14.5, 19.5, 24.5, 29.5, 34.5	6	EPA Method 300.0	1	30-day
Mercury	SSRSC024	5.5	DL-6	10.5, 15.5, 20.5, 25.5, 30.5	6	CLP SOW ILM 03.0	0.1	30-day
Mercury	SSRSC010	1	DL-7	6, 11, 16, 21, 26, 31	6	CLP SOW ILM 03.0	0.1	30-day
Mercury	SSRSC051	2.5	DL-8	7.5, 12.5, 17.5, 22.5, 27.5, 32.5	6	CLP SOW ILM 03.0	0.1	30-day
Carbon-14	SSRSC020	13.5	DL-9	18.5, 23.5, 28.5, 33.5	4	Lab SOP <sup>(5)</sup>	0.1	45-day
Carbon-14	SSRSC019	8	DL-10	13, 18, 23, 28, 33	5	Lab SOP	0.1	45-day
Cesium-137	SSRSC072	6	DL-11	11, 16, 21, 26, 31	5	EPA Method 901.1	0.01	45-day
Cesium-137	SSRSC074	7	DL-12	12, 17, 22, 27, 32	5	EPA Method 901.1	0.01	45-day
Radium-226	SSRSC035	42.5	DL-13	42.5, 45, 47.5	3	EPA Method 901.1	0.1	45-day

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Table 3. Sampling and Analysis for Designated-Level Constituents of Concern, LEHR Radium/Strontium Treatment Systems Area (continued)

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**Notes and Abbreviations**

- (1) DL = Designated Level
- (2) COC = Constituent of Concern
- (3) Samples will be collected in each boring at the depths indicated.
- (4) Holding time is six months.
- (5) SOP = Standard Operating Procedure
- (6) TAT = Turnaround Time

**FIGURE**

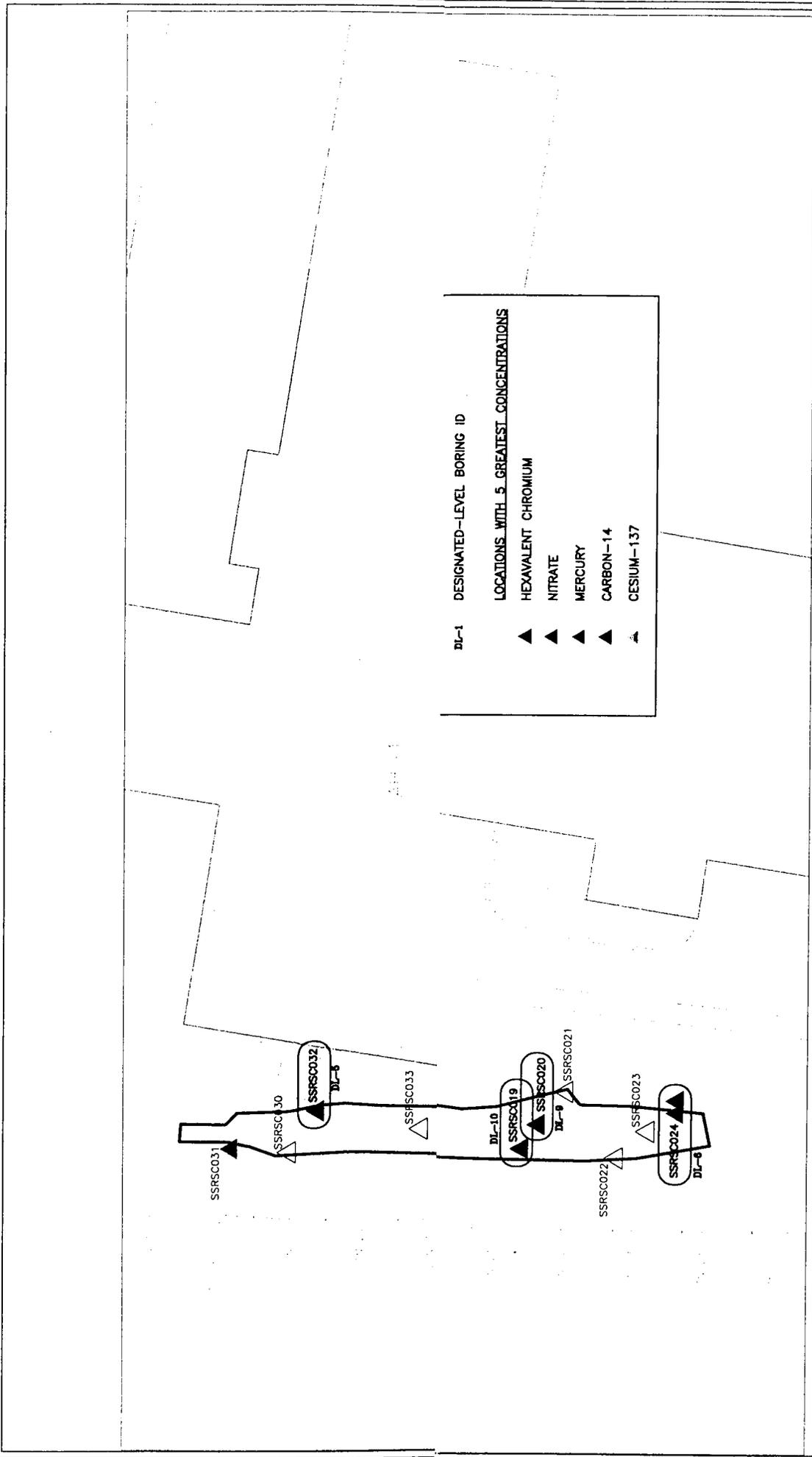


Figure 1. Proposed Sampling Locations for Designated-Level Constituents of Concern, LEHR Radium/Strontium Treatment Systems Area

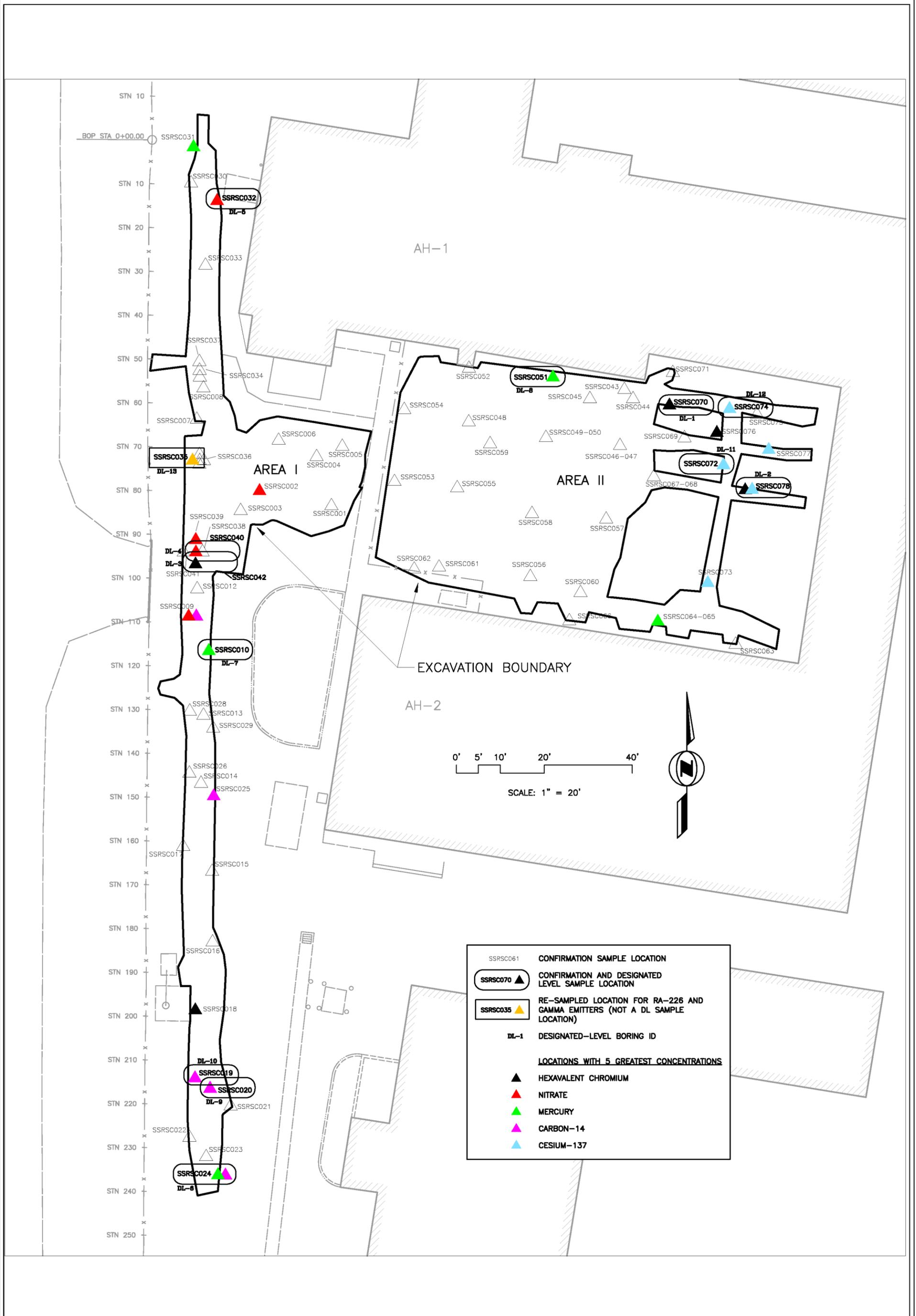


Figure 1. Proposed Sampling Locations for Designated-Level Constituents of Concern, LEHR Radium/Strontium Treatment Systems Area