

CSMRI SITE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY FACT SHEET

Introduction

This is a summary of a Remedial Investigation (RI) and an on-going Feasibility Study (FS) of the Fenced Area and the Clay Pits Area of the CSMRI Site performed by New Horizons Environmental Consultants, Inc. on behalf of Colorado School of Mines (School). The CSMRI Site is located between Clear Creek on the north and the School on the south. The main entrance to the Site is about 500 feet northwest of the intersection of 12th Street and Birch in Golden, Colorado. A separate small (20-foot x 75-foot) area located just to the south of the corner of 12th Street and Birch, known as the "Clay Pits Area", was part of the investigation.

The CSMRI Site was used as a mining research center. Numerous mineral research projects were conducted at the Site from 1912 until about 1987, including some that involved the investigation of radioactive ores. The research projects utilized 16 buildings on the Site that were removed to the floor slabs and foundations in the mid-1990s. Operational wastewater was collected in a settling pond located at the north end of the Site. The settling pond area was cleaned up under an U.S. Environmental Protection Agency (EPA) removal action that ended in 1997.

Concrete/Asphalt Demolition

Demolition operations were conducted from November through December 2002 and all concrete and asphalt removed from the Site were either released as demolition debris for disposal at BFI's Foothills Landfill (BFI) near Golden (a solid waste facility) or taken to Recycled Materials, Inc. (RMI) plant in Arvada, CO for recycling. The demolition prepared the Site for the RI.

Remedial Investigation Process

The RI included the following tasks:

- 3,282 points using Global Positioning System units to record gamma survey points.
- 169 surface soil samples.
- 36 test pits with 56 subsurface samples
- 28 borings with 68 subsurface samples
- Sampling of seven ground-water monitoring wells

Remedial Investigation Results

The investigation showed some affected areas primarily near the former buildings inside the Fenced Area. The deeper shaded areas on Figure 1 show the potentially affected areas. The survey of the Clay Pits Area showed no radiation above background.

Soil samples were analyzed for 11 metals, isotopic thorium and uranium (alpha spectroscopy), and 40 common isotopes (gamma spectroscopy). A partial summary of the surface samples and the background concentrations are provided in Table 1.

Ground-water samples were analyzed for 11 metals, major anions and cations, isotopic radium, thorium, and uranium, gross alpha and beta, 68 volatile organic compounds, and 70 semi-volatile organic compounds. A partial summary table of ground-water results is provided in Table 2.

Remedial Options

The School is now considering alternative possible clean-up options as part of the FS, including:

- No Action/Institutional Controls
- On-Site In Place Closure
- On-Site Below Ground Repository with Waste Stabilization/Solidification
- Off-Site Disposal at a Solid Waste Landfill
- Off-Site Disposal at a Solid Waste and/or Special Waste Landfill

The School is requesting comments from interested persons about the RI and FS.

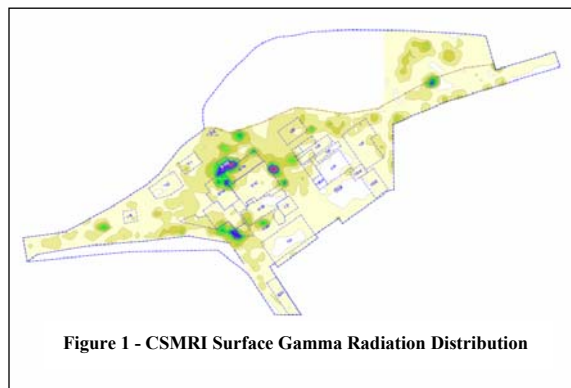


Figure 1 - CSMRI Surface Gamma Radiation Distribution

Table 1 Surface Soil Sample Results

Trace Metal/ Isotope	Minimum	Maximum	Lognormal Mean	Background Upper Limit ¹	CDPHE Proposed Residential Soil Standard
Arsenic	1.8	330	17.9	13.5	0.39
Barium	48	2900	228	337	5,277
Cadmium	ND	51	0.604	1.28	76.1
Chromium	6	79	15.6	15.9	223 ²
Lead	6.4	14,000	153	81.3	400
Mercury	0.015	400	0.942	0.575	1.1 ³ / 23 ⁴
Molybdenum	0.89	980	13.7	5.43	390 ⁵
Selenium	ND	11	1.34	1.40	380
Silver	ND	58	0.670	0.0809	380
Vanadium	15	350	39.2	46.1	550 ⁵
Zinc	49	7,100	314	226	22,825
Ra-226	0.93	170	5.07	2.60	NA
Ra-228	0.68	7.3	1.82	2.28	NA
Thorium-228	0.94	109	2.03	2.56	NA
Thorium-230	0.75	272	3.98	1.71	NA
Thorium-232	0.76	107	1.85	2.32	NA
Uranium-234	ND	85	3.14	2.28	NA
Uranium-235	ND	4.9	0.162	0.0917	NA
Uranium-238	0.63	88	3.06	1.51	NA

Notes: Metal units are in milligrams per kilogram – Isotope units are in picocuries per gram; ND, Not detected; NA, Not applicable; ¹ 90-percent confidence level of lognormal distribution; ² Chromium VI standard; ³ Elemental mercury; ⁴ Mercury compounds; ⁵ EPA Region 9 proposed soil standard

Table 2 Ground-Water Sample Results

Compound	Ground-Water Monitoring Well, CSMRI-						
	01	02	03	04	05	06	07
Bromodichloromethane	ND	ND	ND	ND	0.35 J	ND	ND
Chloroform	ND	ND	ND	0.82 J	1.2	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	1.3	ND	ND	ND
Tetrachloroethene	ND	ND	ND	1.3	ND	ND	ND
Trichloroethene	ND	ND	ND	3.9	0.51 J	ND	ND
Arsenic	ND	ND	3.6 B	4.1 B	3.8 B	ND	4.6 B
Barium	82 B	85 B	25 B	53 B	66 B	75 B	62 B
Cadmium	ND	ND	ND	ND	ND	ND	ND
Chromium	ND	ND	ND	ND	ND	ND	ND
Lead	ND	ND	ND	ND	ND	ND	ND
Mercury	ND	ND	ND	ND	ND	ND	ND
Molybdenum	ND	ND	6.5 B	140	13	ND	6.5
Selenium	ND	3.2 B	4.5 B	3.5 B	6.7	1.3 B	4.9 B
Silver	ND	1.1 B	ND	1.4 B	ND	ND	2.0 B
Vanadium	1.2 B	ND	ND	1.1 B	ND	ND	2.2 B
Zinc	ND	12 B	9.1 B	230	48	ND	23
Total Uranium, 2/03	3.6	1.8	18	24	4.2	4.2	12
Total Uranium, 4/03	4.3	1.9	18	51	3.4	2.5	18
Total Uranium, 7/03	1.3	2.9	14	79	4.1	2.2	42

Notes: All units in micrograms per liter; ND, Not detected; Volatile organic compound (VOC) values are an average of the three rounds of ground-water sampling; metal values are the third round values; Total uranium values are provided for all three rounds; J, estimated value for VOC; B, estimated value for metal

