



REMEDIAL ALTERNATIVES REPORT
FORMER INDOOR RIFLE RANGE
ISLAND TREES HIGH SCHOOL

TABLE 2.3.1. AUGUST 2008 COMPOSITE SOIL SAMPLING RESULTS FOR LEAD BY J.C. BRODERICK AND ASSOCIATES

Sample ID	Lead Concentration (mg/kg)
Composite A	3.02
Composite B	3.67
Composite C	8.86
Composite D	3.33
Composite E	51.1
Composite F	6.82
Composite G	32.2
Composite H	4.52
Composite I	4.91
Composite J	15.5
Composite K	1,412
Composite K1	21,207
Composite K2	1,569
Composite K3	9.56
Composite K4	260
Composite K5	164
Composite K6	8.32
Composite L	6.23
Composite M	442
Composite N	12.6
Composite Q1	43.3
Composite Q2	5.60
Composite Q3	8.61
Composite Q4	3.38

TABLE 2.3.2. APRIL 2009 DISCRETE GRAB SOIL SAMPLING RESULTS FOR LEAD BY H2M

Sample ID	Lead Concentration (mg/kg)
Access Space 1	
A1-1	34.3
A1-2	24.2
A1-Dup1 (A1-2)	15.3
A1-3	7.3
A1-4	21.0
A1-5	4.0
A1-6	2.3
A1-7	4.5
A1-8	4.4
A1-9	4.1
A1-10	2.5
A1-11	11.0
A1-12	134
A1-13	306
A1-14	131
A1-15	4.9
A1-16	10.2
A1-17	103
A1-18	2.2
A1-19	2.0
A1-20	8.1
A1-Dup2 (A1-20)	11.7
A1-21	3.7
A1-22	7.2
A1-23	48.6
A1-24	19.1
A1-25	15.2
A1-26	4.8
A1-27	221
A1-28	18.6
A1-29	15.1
A1-30	12.6
A1-31	8.2
A1-32	3.3
A1-33	3.4
A1-34	1,600
A1-35	13.2
A1-36	15,100

TABLE 2.3.2. (continued) APRIL 2009 DISCRETE GRAB SOIL SAMPLING RESULTS FOR LEAD BY H2M

Sample ID	Lead Concentration (mg/kg)
Access Space 2	
A2-1	2.5
A2-2	7.1
A2-3	34.6
A2-4	4.2
A2-5	11.4
A2-6	24.6
A2-7	25.1
A2-8	16.6
A2-9	4.0
A2-10	5.7
A2-11	181
A2-12	14.4
A2-13	8.3
A2-14	3.7
A2-15	68.2
A2-16	3.2
A2-17	8.2
A2-18	275
A2-19	1,930
A2-Dup1 (A2-19)	2,320
A2-20	1,740
A2-21	9.7
A2-22	17.6
A2-Dup2 (A2-22)	22.5
A2-23	6.6
A2-24	414
A2-25	2.9
A2-26	61.9
A2-27	11.1
A2-28	8.1
A2-29	97.9
A2-30	170
A2-31	10.2
A2-32	18.9
A2-33	43.2
A2-34	3.8
A2-35	14.2
A2-36	13.2
A2-37	20.0
A2-Dup3 (A2-37)	101
A2-38	2.4
A2-39	13.5
A2-40	1,160
A2-41	9.6
A2-42	33.9
A2-43	466
A2-44	31.1
A2-Dup4 (A2-44)	34.8
A2-45	7.4

TABLE 2.3.2. (continued) APRIL 2009 DISCRETE GRAB SOIL SAMPLING RESULTS FOR LEAD BY H2M

Sample ID	Lead Concentration (mg/kg)
Access Space 3	
A3-1	9.1
A3-2	446
A3-3	4,080
A3-4	16.9
A3-5	63.8
A3-6	9.8
A3-7	44.8
A3-8	47.1
A3-9	20.5
A3-Dup1 (A3-9)	17.4
A3-10	9.0
A3-Dup2 (A3-10)	8.7
A3-11	21.5
A3-12	4.1
A3-13	4.4
A3-14	5.2
A3-15	12.2

TABLE 2.3.2. (continued) APRIL 2009 DISCRETE GRAB SOIL SAMPLING RESULTS FOR LEAD BY H2M

Sample ID	Lead Concentration (mg/kg)
Access Space 4 West	
A4W-1	134
A4W-2	19.8
A4W-3	22.8
A4W-4	59.3
A4W-5	5.1
A4W-6	5.0
A4W-7	2.8
A4W-8	15.0
A4W-9	92.5
A4W-10	2,100
A4W-11	5.2
A4W-12	44.6
A4W-13	7.6
A4W-14	4.0
A4W-Dup1 (A4W-14)	2.6
A4W-15	49.1
A4W-16	7.2
A4W-17	16.3
A4W-18	15.6
A4W-19	8.0
A4W-20	5.4
A4W-21	51.1
A4W-Dup2 (A4W-21)	4.8
A4W-22	15.7
A4W-23	19.3
A4W-24	12.5
A4W-25	84.0
A4W-26	113
A4W-27	12.3
A4W-28	5.3
A4W-29	30.5

TABLE 2.3.2. (continued) APRIL 2009 DISCRETE GRAB SOIL SAMPLING RESULTS FOR LEAD BY H2M

Sample ID	Lead Concentration (mg/kg)
Access Space 4 East	
A4E-1	13.8
A4E-2	7.5
A4E-3	9.1
A4E-4	8.7
A4E-5	5.5
A4E-6	5.0
A4E-7	3.8
A4E-8	54.6
A4E-9	5.7
A4E-10	5.3
A4E-11	2.3
A4E-12	46.0
A4E-13	12.4
A4E-14	11.7
A4E-Dup1 (A4E-14)	7.3
A4E-15	11.0
A4E-16	4.9
A4E-17	7.8
A4E-18	3.3
A4E-19	24.8
A4E-20	4.2
A4E-21	7.5
A4E-Dup2 (A4E-21)	7.7
A4E-22	15.3
A4E-23	3.9
A4E-24	2.4
A4E-25	2.8
A4E-26	25.2
A4E-27	8.4
A4E-28	3.0
A4E-29	29.5

TABLE 2.3.2. (continued) APRIL 2009 DISCRETE GRAB SOIL SAMPLING RESULTS FOR LEAD BY H2M

Sample ID	Lead Concentration (mg/kg)
Access Space 5	
A5-1	15.7
A5-2	8.5
A5-3	5.8
A5-4	5.6
A5-5	7.9
A5-6	13.1
A5-7	7.8
A5-Dup1 (A5-7)	8.6
A5-8	32.0
A5-9	16.0
A5-10	11.6
A5-11	5.9
A5-12	6.0
A5-15	16.8
A5-16	15.5
A5-17	9.4
A5-18	7.3
A5-19	12.8
A5-22	7.9
A5-23	7.0
A5-24	4.3
A5-25	8.2
A5-26	1,420
A5-Dup2 (A5-26)	1,610

Table 4.7.1. Remedial Alternative I - No Action Cost Analysis

1. Capital Costs

Item	Description	Unit Price	Quantity	Cost
a.	Declaration of Covenants and Restrictions	\$5,000 ls	1	\$5,000
			Subtotal	\$5,000
			Admin. (10%)	\$500
			Eng. (10%)	\$500
			Contingency (20%)	\$1,000
			Estimated Capital Costs	\$7,000

2. Annual Operating Costs

Item	Description	Unit Price	Quantity	Cost
a.	Inspection and maintenance of poly sheeting ^[1]	\$1,000 yr	1	\$1,000
			Estimated Operating Costs	\$1,000

3. Present Worth - Capital Costs and Annual Operating Costs

	Estimated Capital Costs	\$7,000
	PW of Estimated Annual Operating Costs (40 yrs, 3%)	\$23,100
	Total Present Worth	\$30,100

^[1] This cost does not include any inspection and certification fees associated with the Art Room Floor.

Note: The remedial alternative costs provided herein are engineer's estimates for planning purposes and to permit an evaluation of alternatives. The actual project costs may vary at the time of implementation based on changes in the project scope and the actual contractor pricing.

Table 4.7.2. Remedial Alternative II - Capping Cost Analysis

1. Capital Costs

Item	Description	Unit Price	Quantity	Cost
a.	Entrance access	\$15,000 ls	1	\$15,000
b.	Installation of concrete capping	\$20 sf	4650	\$93,000
c.	Dust control, monitoring and oversight (labor, equipment, testing, etc.)	\$3,000 day	15	\$45,000
d.	Disposal of remediation generated wastes (PPE, plastic, supplies)	\$500 drum	15	\$7,500
e.	Post remedial alternative cleaning (wipedown), testing and analysis	\$15,000 ls	1	\$15,000
f.	Dust barrier in access spaces (geofabric installation)	\$7,500 ls	1	\$7,500
g.	Final report preparation and submittal	\$15,000 ls	1	\$15,000
h.	Declaration of Covenants and Restrictions	\$5,000 ls	1	\$5,000
Subtotal				\$203,000
Admin. (10%)				\$20,300
Eng. (10%)				\$20,300
Contingency (20%)				\$40,600
Estimated Capital Costs				\$284,200

2. Annual Operating Costs

Item	Description	Unit Price	Quantity	Cost
a.	Annual inspection and PE certification of capping ^[1]	\$1,000 yr	1	\$1,000
Estimated Operating Costs				\$1,000

3. Future Costs

Item	Description	Unit Price	Quantity	Cost
a.	Entrance access	\$15,000 ls	1	\$15,000
b.	Concrete removal (assumes manual labor)	\$65 cy	60	\$3,900
c.	Soil excavation - Vactor & Operator	\$2,000 day	12	\$24,000
d.	Additional labor	\$4,000 day	12	\$48,000
e.	Vactainer (spot fee and transportation)	\$3,000 ea	5	\$15,000
f.	Soil disposal (assumes non-haz. waste; 125 tons plus 30 tons of backfill)	\$175 ton	155	\$27,125
g.	Concrete disposal	\$42 cy	60	\$2,520
h.	Soil disposal characterization (analytical sampling)	\$1,500 ea	5	\$7,500
i.	Disposal of remediation generated wastes (PPE, plastic, supplies)	\$500 drum	10	\$5,000
j.	Dust control, monitoring and oversight (labor, equipment, testing, etc.)	\$3,000 day	10	\$30,000
k.	Confirmatory endpoint sampling - labor	\$2,500 day	2	\$5,000
l.	Confirmatory endpoint sampling - analytical	\$75 ea	125	\$9,375
m.	Post remedial alternative cleaning (wipedown), testing and analysis	\$25,000 ls	1	\$25,000
n.	Demarcation fabric and pea gravel in tunnels (5 crew, materials, etc.)	\$25,000 ls	1	\$25,000
o.	Dust barrier in access spaces (geofabric installation)	\$7,500 ls	1	\$7,500
p.	Final report preparation and submittal	\$20,000 ls	1	\$20,000
Subtotal				\$269,920
Admin. (10%)				\$26,992
Eng. (10%)				\$26,992
Contingency (40%)				\$107,968
Estimated Future Cost				\$431,872

3. Present Worth - Capital Costs, Annual Operating Costs & Future Remedial Costs

Estimated Capital Costs	\$284,200
PV of Estimated Annual Operating Costs (40 yrs, 3%)	\$23,100
PV of Estimated Future Remedial Cost (40 yrs, 3%)	\$132,393
Total Present Worth	\$439,693

^[1] This cost does not include any inspection and certification fees associated with the Art Room Floor.

Note: The remedial alternative costs provided herein are engineer's estimates for planning purposes and to permit an evaluation of alternatives. The actual project costs may vary at the time of implementation based on changes in the project scope and the actual contractor pricing.

Table 4.7.3. Remedial Alternative III - Excavation Cost Analysis

1. Capital Costs

Item	Description	Unit Price	Quantity	Cost
a.	Entrance access	\$15,000 ls	1	\$15,000
b.	Soil excavation - Vactor & Operator	\$2,000 day	10	\$20,000
c.	Additional labor	\$4,000 day	10	\$40,000
d.	Vactainer (spot fee and transportation)	\$3,000 ea	5	\$15,000
e.	Soil disposal (assumes non-haz. waste)	\$175 ton	125	\$21,875
f.	Soil disposal characterization (analytical sampling)	\$1,500 ea	5	\$7,500
g.	Disposal of remediation generated wastes (PPE, plastic, supplies)	\$500 drum	10	\$5,000
h.	Dust control, monitoring and oversight (labor, equipment, testing, etc.)	\$3,000 day	10	\$30,000
i.	Confirmatory endpoint sampling - labor	\$2,500 day	2	\$5,000
j.	Confirmatory endpoint sampling - analytical	\$75 ea	125	\$9,375
k.	Post remedial alternative cleaning (wipedown), testing and analysis	\$25,000 ls	1	\$25,000
l.	Demarcation fabric and pea gravel in tunnels (5 crew, materials, etc.)	\$25,000 ls	1	\$25,000
m.	Dust barrier in access spaces (geofabric installation)	\$7,500 ls	1	\$7,500
n.	Final report preparation and submittal	\$20,000 ls	1	\$20,000
			Subtotal	\$246,250
			Admin. (10%)	\$24,625
			Eng. (10%)	\$24,625
			Contingency (40%)	\$98,500
			Estimated Capital Costs	\$394,000

2. Annual Operating Costs

Item	Description	Unit Price	Quantity	Cost
a.	None ⁽¹⁾	\$0 yr	1	\$0
			Estimated Operating Costs	\$0

3. Present Worth - Capital Costs and Annual Operating Costs

	Cost
Estimated Capital Costs	\$394,000
PV of Estimated Annual Operating Costs (40 yrs, 3%)	\$0
Total Present Worth	\$394,000

⁽¹⁾ Costs are not included for any inspection and certification fees associated with the Art Room Floor.

Note: The remedial alternative costs provided herein are engineer's estimates for planning purposes and to permit an evaluation of alternatives. The actual project costs may vary at the time of implementation based on changes in the project scope and the actual contractor pricing.



REMEDIAL ALTERNATIVES REPORT
FORMER INDOOR RIFLE RANGE
ISLAND TREES HIGH SCHOOL

Table 5.1. Comparison of Remedial Alternatives

Evaluation Criteria	Remedial Alternative I – No Action	Remedial Alternative II - Capping	Remedial Alternative III - Excavation
Overall Protection of Human Health and the Environment	Not Protective over long term. RAOs not satisfied.	Protective due to impermeable cap installation. RAOs satisfied.	Protective due to lead impacted soil removal. RAOs satisfied.
Compliance with Standards, Criteria and Guidance (SCGs)	SCGs not satisfied.	SCGs not satisfied.	SCGs satisfied. All impacted soil removed.
Long Term Effectiveness and Permanence	Low. Polyethylene sheeting in tunnels to be maintained. Exposure pathways remain in access spaces.	High. Most durable concrete cap used in impacted areas.	Maximum. All impacted soil removed.
Reduction of Toxicity, Mobility, or Volume	None. Exposure pathways remain in access spaces.	No reduction in toxicity or volume. Mobility recued. Exposure pathways eliminated.	Maximum. Exposure pathways eliminated.
Short Term Effectiveness	Maximum due to no field operations.	Moderate due to engineering control measures.	Low due to engineering control measures.
Implementability	Simplest.	Moderately Complex.	Moderately Complex.
Cost	Low Cost. PW = \$30K	More expensive. PW = \$440K (Capital Cost = \$284K)	More expensive. PW = \$394K
Community Acceptance	Not anticipated.	Likely.	Likely.