

Excerpts from Phase II Environmental Report

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4. Analytical Results

4.1. Soil Samples

Laboratory analyses were performed on the soil samples and “grab” groundwater samples for VOCs, Priority Pollutant Metals, MA EPH + PAH, and/or MA VPH. The analytical results for the soil samples are presented in Tables 1 through 6 — Soil Sample Analytical Results. The analytical results for the “grab” groundwater samples are presented in Tables 7 through 9 — “Grab” Groundwater Analytical Results. Copies of the analytical results and chain-of-custody are included in Appendix D.

TABLE 1 – SOIL SAMPLE ANALYTICAL RESULTS				
Analytes	B-1, 12-14 ft (ppm)	B-2, 12-14 ft (ppm)	B-3, 12-14 ft (ppm)	RCS-1 (ppm)
Benzene	ND	ND	ND	10
Ethylbenzene	ND	ND	ND	80
Methyl-t-butylether	ND	ND	ND	0.3
Naphthalene	ND	ND	ND	4
o-Xylene	ND	ND	ND	500*
mp-Xylene	ND	ND	ND	500*
VPH C5-C8 Aliphatics	ND	ND	ND	100
VPH C9-C12 Aliphatics	ND	ND	ND	1,000
VPH C9-C10 Aromatics	ND	ND	ND	100
C9-C18 Aliphatic Hyd.	ND	ND	ND	1,000
C19-C36 Aliphatic Hyd.	ND	ND	ND	2,500
C11-C22 Aromatic Hyd.	ND	ND	ND	200
Naphthalene	ND	ND	ND	4
Acenaphthene	ND	ND	ND	20
Anthracene	ND	ND	ND	1,000
Fluoranthene	ND	ND	ND	1,000
Fluorene	ND	ND	ND	400
Pyrene	ND	ND	ND	700

TABLE 1 – SOIL SAMPLE ANALYTICAL RESULTS

Analytes	B-1, 12-14 ft (ppm)	B-2, 12-14 ft (ppm)	B-3, 12-14 ft (ppm)	RCS-1 (ppm)
Benzo(a)anthracene	ND	ND	ND	0.7
Benzo(a)pyrene	ND	ND	ND	0.7
Benzo(b)fluoranthene	ND	ND	ND	0.7
Benzo(k)fluoranthene	ND	ND	ND	7
Chrysene	ND	ND	ND	7
Dibenzo(a,h)anthracene	ND	ND	ND	0.7
Indeno(1,2,3-cd)pyrene	ND	ND	ND	0.7
Acenaphthylene	ND	ND	ND	100
Benzo(g,h,i)perylene	ND	ND	ND	1,000
Phenanthrene	ND	ND	ND	100
2-Methylnaphthalene	ND	ND	ND	4

TABLE 2 - SOIL SAMPLE ANALYTICAL RESULTS

Analytes	B-6, 10-12 ft (ppm)	B-7, 3-5 ft (ppm)	RCS-1 (ppm)
Benzene	ND	ND	10
Ethylbenzene	ND	ND	80
Methyl-t-butylether	ND	ND	0.3
o-Xylene	ND	ND	4
Naphthalene	ND	ND	500*
mp-Xylene	ND	ND	500*
VPH C5-C8 Aliphatics	ND	ND	100
VPH C9-C12 Aliphatics	185	ND	1,000
VPH C9-C10 Aromatics	51.8	ND	100
C9-C18 Aliphatic Hydrocarbons	61.6	ND	1,000
C19-C36 Aliphatic Hydrocarbons	61.6	ND	2,500
C11-C22 Aromatic Hydrocarbons	ND	ND	200
Naphthalene	ND	ND	4
Acenaphthene	ND	ND	20
Anthracene	ND	ND	1,000
Fluoranthene	ND	ND	1,000
Fluorene	ND	ND	400
Pyrene	ND	ND	700
Benzo(a)anthracene	ND	ND	0.7
Benzo(a)pyrene	ND	ND	0.7
Benzo(b)fluoranthene	ND	ND	0.7
Benzo(k)fluoranthene	ND	ND	7
Chrysene	ND	ND	7
Dibenzo(a,h)anthracene	ND	ND	0.7
Indeno(1,2,3-cd)pyrene	ND	ND	0.7
Acenaphthylene	ND	ND	100
Benzo(g,h,i)perylene	ND	ND	1,000
Phenanthrene	ND	ND	100

TABLE 2 - SOIL SAMPLE ANALYTICAL RESULTS			
Analytes	B-6, 10-12 ft (ppm)	B-7, 3-5 ft (ppm)	RCS-1 (ppm)
2-Methylnaphthalene	ND	ND	4

ND = None Detected (Below analytical method detection limit)

ppm = parts per million (mg/kg)

RCS-1 = Reportable Concentration (MADEP)

* = Total xylenes

TABLE 3 - SOIL SAMPLE ANALYTICAL RESULTS		
Sample No.	VOC (ppm)	RCS-1 (ppm)
R-4, 2-4 ft	Acetone - 0.1380	3
B-4, 10-12 ft	Acetone - 0.05680	3
B-5, 1-3 ft	Acetone - 0.1910	3
	Tetrachloroethene - 0.00400	0.5
B-6, 10-12 ft	ND	NA
B-7, 3-5 ft	Tetrachloroethene - 0.00290	0.5
H-1, 1-3 ft	ND	NA
H-1, 4-6 ft	Acetone - 0.06250	3
H-2, 1-3 ft	Naphthalene - 0.01560	4
	1,2,4-Trimethylbenzene - 0.01380	1,000
	1,3,5-Trimethylbenzene - 0.00410	10
H-3, 1-3 ft	ND	NA
H-3, 4-6 ft	ND	NA
H-4, 1-4 ft	ND	NA

ND = None Detected (Below analytical method detection limit)

ppm = parts per million (mg/kg)

NA = Not applicable

RCS-1 = Reportable Concentration (MADEP)

TABLE 4 - SOIL SAMPLE ANALYTICAL RESULTS

Analytes	B-4, 2-4 ft (ppm)	B-4, 10-12 ft (ppm)	B-5, 1-3 ft (ppm)	B-6, 10-12 ft (ppm)	RCS-1
Antimony	ND	ND	ND	ND	10
Arsenic	1.00	ND	ND	2.82	30
Beryllium	ND	ND	ND	ND	0.7
Cadmium	ND	ND	ND	ND	30
Chromium	4.62	4.53	3.79	13.6	1,000
Copper	4.22	3.74	6.99	13.4	1,000
Lead	1.41	1.38	1.40	3.52	300
Mercury	ND	ND	ND	ND	20
Nickel	3.01	4.13	4.59	9.39	300
Selenium	ND	ND	ND	ND	400
Silver	ND	ND	ND	ND	100
Thallium	ND	ND	ND	ND	8
Zinc	ND	ND	12.2	22.1	2,500

TABLE 5 - SOIL SAMPLE ANALYTICAL RESULTS					
Analytes	B-7, 3-5 ft (ppm)	H-1, 1-3 ft (ppm)	H-1, 4-6 ft (ppm)	H-2, 1-3 ft (ppm)	RCS-1 (ppm)
Antimony	ND	ND	ND	ND	10
Arsenic	ND	ND	1.21	ND	30
Beryllium	ND	ND	ND	ND	0.7
Cadmium	ND	ND	ND	ND	30
Chromium	9.89	6.06	8.25	5.11	1,000
Copper	3.23	3.23	7.04	3.93	1,000
Lead	1.41	1.14	2.21	1.57	300
Mercury	ND	ND	ND	ND	20
Nickel	5.65	3.64	6.64	3.93	300
Selenium	ND	ND	ND	ND	400
Silver	ND	ND	ND	ND	100
Thallium	ND	ND	ND	ND	8
Zinc	ND	ND	11.3	ND	2,500

ND = None Detected (Below analytical method detection limit)

ppm = parts per million (mg/kg)

RCS-1 = Reportable Concentration (MADEP)

TABLE 6 - SOIL SAMPLE ANALYTICAL RESULTS

Analytes	H-3, 1-3 ft (ppm)	H-3, 4-6 ft (ppm)	H-4, 1-4 ft (ppm)	RCS-1 (ppm)
Antimony	ND	ND	ND	10
Arsenic	1.16	ND	0.969	30
Beryllium	ND	ND	ND	0.7
Cadmium	ND	ND	ND	30
Chromium	7.72	2.91	10.7	1,000
Copper	5.40	3.10	5.62	1,000
Lead	2.51	1.55	2.13	300
Mercury	ND	ND	ND	20
Nickel	6.56	2.91	5.62	300
Selenium	ND	ND	ND	400
Silver	ND	ND	ND	100
Thallium	ND	ND	ND	8
Zinc	ND	ND	12.2	2,500

ND = None Detected (Below analytical method detection limit)

ppm = parts per million (mg/kg)

RCS-1 = Reportable Concentration (MADEP)

TABLE 7 - "GRAB" GROUNDWATER SAMPLE ANALYTICAL RESULTS

Analytes	B-2 (ppm)	B-5 (ppm)	B-8 (ppm)	B-9 (ppm)	RCGW-2 (ppm)
Benzene	ND	ND	ND	ND	2
Ethylbenzene	ND	ND	ND	ND	4
Methyl-t-butylether	ND	ND	ND	ND	50
Naphthalene	ND	ND	ND	ND	6
o-Xylene	ND	ND	ND	ND	6*
mp-Xylene	ND	ND	ND	ND	6*
VPH C5-C8 Aliphatics	ND	ND	ND	ND	1
VPH C9-C12 Aliphatics	ND	ND	ND	ND	1
VPH C9-C10 Aromatics	ND	ND	ND	ND	4
C9-C18 Aliphatic Hyd.	ND	ND	ND	ND	1
C19-C36 Aliphatic Hyd.	ND	ND	ND	ND	20
C11-C22 Aromatic Hyd.	ND	ND	ND	ND	30
Naphthalene	ND	ND	ND	ND	6
Acenaphthene	ND	ND	ND	ND	5
Anthracene	ND	ND	ND	ND	3
Fluoranthene	ND	ND	ND	ND	0.2
Fluorene	ND	ND	ND	ND	3
Pyrene	ND	ND	ND	ND	3
Benzo(a)anthracene	ND	ND	ND	ND	3
Benzo(a)pyrene	ND	ND	ND	ND	3
Benzo(b)fluoranthene	ND	ND	ND	ND	3
Benzo(k)fluoranthene	ND	ND	ND	ND	3
Chrysene	ND	ND	ND	ND	3
Dibenzo(a,h)anthracene	ND	ND	ND	ND	3
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	3
Acenaphthylene	ND	ND	ND	ND	3
Benzo(g,h,i)perylene	ND	ND	ND	ND	3
Phenanthrene	ND	ND	ND	ND	0.05

TABLE 7 - "GRAB" GROUNDWATER SAMPLE ANALYTICAL RESULTS					
Analytes	B-2 (ppm)	B-5 (ppm)	B-8 (ppm)	B-9 (ppm)	RCGW-2 (ppm)
2-Methylnaphthalene	ND	ND	ND	ND	3

ND = None Detected (Below analytical method detection limit)

ppm = parts per million (mg/l)

RCGW-2 Reportable Concentration for Groundwater Category GW-2 (MAPED)

* = Total xylenes

TABLE 8 - "GRAB" GROUNDWATER SAMPLE ANALYTICAL RESULTS		
Sample No.	VOC (ppm)	RCGW-2 (ppm)
B-2	ND	NA
B-5	Tetrachloroethene - 0.01180	3
B-8	Tetrachloroethene - 0.01670	3
B-9	ND	NA

ND = None Detected (Below analytical method detection limits)

ppm = parts per million (mg/l)

RCGW-2 Reportable Concentration for Groundwater Category GW-2 (MAPED)

TABLE 9 - "GRAB" GROUNDWATER SAMPLE ANALYTICAL RESULTS

Analytes	B-2 (ppm)	B-5 (ppm)	B-8 (ppm)	B-9 (ppm)	RCGW-2 (ppm)
Antimony	ND	ND	ND	ND	0.3
Arsenic	0.0060	0.0090	0.0050	ND	0.4
Beryllium	ND	ND	ND	ND	0.05
Cadmium	ND	0.0030	ND	ND	0.01
Chromium	ND	0.133	ND	ND	2
Copper	ND	0.0280	ND	ND	100
Lead	ND	0.0050	ND	ND	0.03
Mercury	ND	ND	ND	ND	0.001
Nickel	ND	0.331	ND	ND	0.08
Selenium	ND	0.0220	ND	ND	0.08
Silver	ND	ND	ND	ND	0.007
Thallium	ND	ND	ND	ND	0.04
Zinc	ND	0.149	ND	ND	0.9

ND = None Detected (Below analytical method detection limit)

ppm = parts per million (mg/l)

RCGW-2 Reportable Concentration for Groundwater Category GW-2 (MAPED)

5.1. Soil and Groundwater Classification

5.1.1. Soil Classification

In accordance with the Massachusetts Contingency Plan (MCP, 310 CMR 40.0000), reporting category RCS-1 shall be applied to all soil samples collected at or within 500 feet of a residential dwelling, residentially zoned property, school, playground, recreational area, or park. Reporting category RCS-2 shall be applied to all soil samples that are not collected within RCS-1 areas.

No abutting properties of the Project were observed to be residential properties, schools, playgrounds, recreational areas, or parks. However, EMG has used a conservative estimate that residences might be located within a 500-foot radius of the Project. Therefore, for the purposes of regulatory reporting, soil samples at the Project shall be compared to RCS-1 Reportable Concentrations.

5.1.2. Groundwater Classification

Reporting category RCGW-1 shall be applied to all groundwater samples collected within a Current Drinking Water Source Area or Potential Drinking Water Source Area, as defined in the MCP. Reporting category RCGW-2 shall be applied to all groundwater samples that are not collected within RCGW-1 areas.

Based on review of Priority Resource Maps, published by the MADEP, the Project is not located within a Current or Potential Drinking Water Source Area. Records at the Springfield Health Department do not indicate that private wells are located within 500 feet of the Project. Therefore, for the purposes of regulatory reporting, groundwater samples at the Project shall be compared to RCGW-2 Reportable Concentrations.

5.2. Former UST Area

5.2.1. Soil Sample Results

Results of the analyses of three soil samples (B-1, 12-14 feet; B-2, 12-14 feet; and B-3, 12-14 feet) collected in the area of the former UST did not reveal the presence of any petroleum parameters above the respective method limits of detection (see Table 1).

5.2.2. “Grab” Groundwater Sample Results

Results of the analysis of one “grab” groundwater sample (B-2) collected in the area of the former UST did not reveal the presence of any petroleum parameters or VOCs above their respective method detection limits (see Tables 7 and 8).

A trace of arsenic (0.0060 ppm) was detected in the sample (see Table 9); however, the presence of arsenic at this location is not attributed to the former UST. In addition, the level of arsenic present is well below its respective RCGW-2 Reportable Concentration. No other metals were detected in this sample.

5.2.3. Recommendation

No further investigative action is recommended with respect to the former UST at this time.

5.3. Former Chemical Storage Shed

5.3.1. Soil Sample Results

Results of the analyses of three soil samples (B-4, 2-4 feet; B-4, 10-12 feet; and B-5, 1-3 feet) collected in the area of the former chemical storage shed revealed the presence of the following two VOCs (see Table 3): acetone (0.0568 ppm to 0.1910 ppm) and tetrachloroethene (PCE, 0.0040 ppm). Acetone was present in all three samples and might be a laboratory artifact. PCE was only present in sample B-5, 1-3 feet).

The following metals were detected in the soil samples (see Table 4): chromium (3.79 ppm to 4.62 ppm), copper (3.74 ppm to 6.99 ppm), lead (1.38 ppm to 1.41 ppm), nickel (3.01 ppm to 4.59 ppm), and zinc (12.2 ppm). Chromium, copper, lead, and nickel were present in all three samples. Zinc was only present in sample B-5, 1-3 feet.

All contaminants detected were present at levels below their respective RCS-1 Reportable Concentrations.

5.3.2. "Grab" Groundwater Sample Results

Results of the analysis of one "grab" groundwater sample (B-5) collected in the area of the former chemical shed revealed the presence of one VOC (see Table 8): PCE at 0.01180 ppm.

The following metals were detected in the "grab" groundwater sample B-5 (see Table 9): arsenic (0.0090 ppm), cadmium (0.0030 ppm), chromium (0.133 ppm), copper (0.0280 ppm), lead (0.0050 ppm), nickel (0.331 ppm), selenium (0.0220 ppm), and zinc (0.149 ppm).

No petroleum parameters were detected in this "grab" groundwater sample (see Table 7).

With the exception of nickel, all contaminants detected were present at levels below their respective RCGW-2 Reportable Concentrations.

5.3.3. Monitor Well Installation

Because a potential exceedance of nickel was observed in the "grab" groundwater sample collected from boring location B-5, a permanent groundwater monitor well was installed in this area of the Project to evaluate groundwater.

On April 12, 2002, one monitor well, designated MW-4, was installed as shown on the attached Site Sketch. The well was installed using direct-push drill rig. Soil samples were screened in the field using a PID. No VOCs were detected in soil samples throughout drilling.

The well was installed to a depth of approximately 14 feet below surface grade. Groundwater was observed at approximately 12 feet below grade. Ten feet of 1.00-inch schedule 40/10-slot screened piping was installed with sufficient riser (solid) pipe to reach surface grade. The well was finished with a permanent 6-inch road box, imbedded in concrete.

On the date of monitoring well installation, the well was developed by the over-pumping method in accordance with Section 4.5-2.1 in the MADEP's Standard References for Monitoring Wells, #WSC-310-91. Approximately 2 gallons of water were evacuated from the well.

Groundwater samples were collected on April 12, 2002. Prior to sample collection, the monitor well was purged of at least three times the standing volume of water. After purging, a groundwater sample was collected and stored in laboratory-prepared containers and placed in a refrigerated cooler for transport. The groundwater sample was filtered in the field using metals filters and a hand pump. Chain-of-custody was maintained utilizing laboratory chain-of-custody tracking forms. The samples were delivered to the laboratory and analyzed for dissolved nickel via EPA Method 200.7.

The results of the analysis revealed a concentration of 0.0560-ppm nickel, below the applicable MADEP Reportable Concentration of 0.08 ppm.

5.3.4. Discussion and Recommendations

No further investigative action with respect to soils in this area of the Project is recommended at this time.

Nickel was initially detected in groundwater from “grab” sample location B-5 at a concentration exceeding the applicable MADEP Reportable Concentration. Therefore, MADEP reporting was required within 120 days from the date of discovery. However, because the groundwater sample was collected from a temporary groundwater monitor well, a permanent groundwater monitor well was installed in the same area and sampled. This re-sampling revealed a nickel concentration below applicable Reportable Concentrations of the MADEP.

Through installation of a permanent well, significantly more groundwater could be “purged” from the well prior to sample collection, offering a more representative sample of groundwater in the vicinity. Because this re-sampling within the 120-day reporting window determined that the concentration of nickel is within Reportable Concentration limits, and MADEP notification is not required using published MADEP exemptions (310CMR 40.0317(14)). Therefore, no further investigative action with respect to groundwater in this area of the Project is recommended at this time.

5.4. Area of “Sludge” Burial

5.4.1. Soil Sample Results

Results of the analyses of two soil samples (B-6, 10-12 feet and B-7, 3-5 feet) collected in the area of “sludge” burial revealed the presence of the following petroleum parameters in soil sample B-6, 10-12 feet (see Table 2): VPH C9-C12 aliphatics (185 ppm), VPH C9-C10 aromatics (51.8 ppm), C9-C18 aliphatic hydrocarbons (61.6 ppm), and C19-C36 aliphatic hydrocarbons (61.6 ppm). No petroleum parameters were identified in soil sample B-7, 3-5 feet.

The following VOC was detected in soil sample B-7, 3-5 feet (see Table 3): PCE (0.00290 ppm). No VOCs were detected in soil sample B-6, 10-12 feet.

The following metals were detected in the soil samples (see Tables 4 and 5): arsenic (2.82 ppm), chromium (9.89 ppm and 13.6 ppm), copper (3.23 ppm and 13.6 ppm), lead (1.41 ppm and 3.52 ppm), nickel (5.65 ppm and 9.39 ppm), and zinc (22.1 ppm). Arsenic and zinc were only present in sample B-6, 10-12 feet.

All contaminants detected were present at levels below their respective RCS-1 Reportable Concentrations.

5.4.2. Discussion and Recommendations

No further investigative action with respect to soils in this area of the Project is recommended at this time.

5.5. Machine Shop Area

5.5.1. Soil Sample Results

Results of the analyses of six soil samples (H-1, 1-3 feet; H-1, 4-6 feet; H-2, 1-3 feet; H-3, 4-6 feet; and H-4, 1-4 feet) collected in machine shop revealed the presence of the following VOCs (see Table 3): acetone (0.06250 ppm) in soil sample H-1, 1-3 feet; and naphthalene (0.01560 ppm), 1,2,4-trimethylbenzene (0.01380 ppm), and 1,3,5-trimethylbenzene (0.00410 ppm) in soil sample H-2, 1-3 feet. Acetone might be a laboratory artifact.

The following metals were detected in the soil samples (see Tables 5 and 6): arsenic (0.969 ppm to 1.21 ppm), chromium (2.91 ppm to 10.7 ppm), copper (3.10 ppm to 7.04 ppm), lead (1.14 ppm to 2.51 ppm), nickel (2.91 ppm to 6.64 ppm), and zinc (11.3 ppm and 12.2 ppm). Arsenic was only detected in soil samples H-1, 4-6 feet; H-3, 1-3 feet; and H-4, 1-4 feet; and zinc was only detected in soil samples H-1, 4-6 feet and H-4, 1-4 feet.

All contaminants detected were present at levels below their respective RCS-1 Reportable Concentrations.

5.5.2. Discussion and Recommendations

No further investigative action with respect to soils in this area of the Project is recommended at this time.

5.6. General Groundwater in Northern and Southern Portions of Project

5.6.1. "Grab" Groundwater Sample Results

Results of the analysis of two "grab" groundwater samples (B-8 and B-9) collected in the northern and southern portions of the Project, respectively, did not reveal the presence of any petroleum parameters above the respective method limits of detection (Table 7).

The following VOC was detected in "grab" groundwater sample B-8 (see Table 8): PCE (0.01670 ppm). No VOCs were detected in "grab" groundwater sample B-9.

A trace of arsenic (0.0050 ppm) was detected in "grab" groundwater sample B-8 (see Table 9).

Both contaminants detected were present at levels below their respective RCGW-2 Reportable Concentrations.

5.6.2. Discussion and Recommendations

No further investigative action with respect to groundwater in these areas of the Project is recommended at this time.