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October 29, 2004

Mr. Jamie Ascher
Engineering Geologist 2
New York State Department of Environmental Conservation
Division of Environmental Remediation
Region One
Building 40 SUNY
Stony Brook, New York 11790-2356

Re: Results of ERD Pilot Study
Former Thypin Steel, Inc. Facility. Manorhaven, New York
Agreement Index Number: V00336-1

Dear Mr. Ascher:

On behalf of MBA-Manorhaven, LLC, Roux Associates, Inc. and Remedial Engineering, P.C. (Remedial Engineering) have prepared this letter to summarize the results of the enhanced reductive dechlorination (ERD) pilot study at the former Thypin Steel, Inc. facility in Manorhaven, New York (Site). The purpose of the pilot study was to determine Site-specific parameters needed to design a full-scale ERD system (i.e., barrier system). The pilot study was conducted in the onsite intermediate groundwater in the area of the existing Monitoring Well MW-35I. MW-35I was the location of the highest detection (5,500 micrograms per liter [µg/L]) of trichloroethene (TCE) on Site during the Site investigation in 2001. The layout of the ERD pilot study is shown on Figure 1. The ERD pilot study was conducted for eight weeks from June 11, 2004 to July 30, 2004. This letter presents an overview of the scope of work and results of the ERD pilot study.

ERD Pilot Study Scope Of Work

The scope of work associated with implementing the ERD pilot study consisted of the following elements:

Well Installation: One injection well (IW-1) was installed in the intermediate groundwater zone to a depth of approximately 52 feet below land surface (ft bls). The injection well was located approximately 10 feet upgradient and northeast of existing monitoring well MW-35I (Figure 1). The injection well was installed using hollow stem auger techniques, and is constructed of 2-inch diameter 0.002-inch slotted polyvinyl chloride (PVC) screen from 30 to 50 ft bls. Two additional observation wells (OW-1 and OW-2) were also installed prior to initiation of the pilot study, using the same installation techniques and screen intervals as the injection well. OW-1 was installed approximately 7.5 feet southeast of injection well IW-1, and OW-2 was installed approximately 5 feet west of injection well IW-1. This configuration was selected to allow for some variability

in the estimated groundwater flow direction and measure the effects of the pilot study in a shorter timeframe.

Groundwater Monitoring: A baseline groundwater monitoring event consisting of volatile organic compounds (VOCs) analysis and biogeochemical parameters was conducted at IW-1, MW-35I, OW-1 and OW-2 on May 5, 2004 prior to the initiation of injections. Field parameters and total organic carbon (TOC) were also collected from the four wells during the baseline event. To evaluate pilot study performance at the four wells, field parameters (pH, dissolved oxygen [DO], oxidation-reduction potential [ORP]) were measured weekly, TOC was collected four weeks into the pilot study, and a complete set of biogeochemical parameters were collected on August 5, 2004 following eight weeks of injections. VOCs were also collected from the monitoring and observation wells on August 5, 2004. The results of the baseline and performance monitoring events are discussed in the next section.

Injections: An easily biodegradable carbon source consisting of blackstrap molasses was injected in the injection well IW-1 for eight weeks. The carbon source was mixed with water using an aboveground tank and pumped into the injection well. The strength and quantity of the dilute carbon solution was adjusted weekly based on field parameters and TOC data. The mix was diluted when the pH was low (below 5.0) or if the TOC was higher than necessary. A summary of the injection mixes in provided in the injection log (see Appendix A). In addition, baking soda was added to the dilute carbon solution (as needed based on the field parameters) to prevent creating fermentative conditions by keeping the pH from going below 4.0 in the injection well.

During the pilot study, it was observed that the dilute carbon solution was accumulating in the bottom of the injection well and was not distributed efficiently. The lower portion of the screen zone was observed to be very low permeability (40 to 50 ft bls). In order to address this condition, the injection procedure was modified to include a drop tube and packer in order to push the dilute carbon solution away from the injection well within the higher permeability zone at a depth of 30 ft bls.

ERD Pilot Study Groundwater Monitoring Program

A groundwater monitoring program was developed to; (1) assess whether the injection program was delivering adequate concentrations of organic carbon to groundwater in the pilot study area, (2) monitor how biogeochemical conditions were affected by the dilute carbon injections, and (3) evaluate the overall objective of the pilot study in degrading VOCs in groundwater. The monitoring program consisted of the following elements:

- baseline groundwater sampling to characterize select biogeochemical conditions and VOC concentrations at the start of the pilot study;
- weekly monitoring of field parameters and the collection of TOC data during the course of the pilot study; and
- sampling and analysis of select biogeochemical parameters and VOCs at the conclusion of the study in August 2004.

A discussion of these sampling events is provided below.

Baseline Groundwater Sampling
The purpose of the baseline groundwater sampling was to determine the baseline conditions of the groundwater in the pilot study area before the injection of the carbon source. This was accomplished by collecting field parameters and groundwater samples on May 5, 2004, prior to the initiation of the injection program, from IW-1, MW-35I, OW-1 and OW-2. The results of field parameters measured at the injection well and monitoring wells is presented in Table 1. Table 2 presents the results of biogeochemical analyses for the injection and monitoring wells. The results of VOC analyses for the injection and monitoring wells are provided in Table 3. Baseline groundwater conditions in the pilot study area are summarized as follows:

- The primary chlorinated VOCs in detected in the groundwater are TCE and cis-1,2-dichloroethene (1,2-DCE);
- DO was measured in groundwater in the range of 0.21 to 0.98 milligrams per liter (mg/L);
- ORP was measured in groundwater in the range of 11.9 to 91.1 millivolts (mV);
- Dissolved iron was detected in groundwater in the range of non-detect (ND) to 0.773 mg/L; and
- TOC concentration in groundwater was in the range of non-detect (ND) to 2 mg/L.

These baseline data indicate an anaerobic environment with low levels of organic carbon present in groundwater limiting bacterial growth.

Weekly Performance Groundwater Monitoring
The objective of the weekly performance groundwater sampling events was to evaluate whether the injection of the dilute carbon solution was establishing a more anaerobic and reducing environment in the groundwater in the area of the pilot study. This reducing environment will promote bacterial growth and accelerate dechlorination of TCE and 1,2-DCE. Field parameters from the injection well and monitoring wells were monitored throughout the pilot study on a weekly basis to monitor if an anaerobic environment was being established. Additionally, TOC data was collected from the injection well and monitoring wells at approximately midway through the pilot study and is summarized in Table 2. Observations from the field parameters and TOC measurements from the ERD pilot study wells are discussed below.

<u>IW-1</u>
The field parameters and the TOC concentrations indicate that a reducing environment with high levels of organic carbon was being achieved. Key observations based on data collected from this well are as follows:

- ORP was lowered from the baseline measurement of 31.7 mV to a range of 1.0 to –89.0 mV;

- DO increased slightly from the baseline measurement of 0.32 mg/L to a range of 0.41 to 0.75 mg/L; and
- TOC concentration increased from ND to 16,000 mg/L.

OW-1
OW-1 is located approximately 7.5 feet southeast and cross-gradient of injection well IW-1. Key observations based on data collected from this well are as follows:

- ORP was lowered from the baseline measurement of 71.5 mV to a range of –101 to –190 mV;
- DO was in the range of 0.35 to 3.52 mg/L, as compared to the baseline value of 0.57 mg/L; and
- TOC level decreased from 1.5 mg/L to 0.23 mg/L.

OW-2
OW-2 is located approximately 5 feet west and downgradient of injection IW-1. Key observations based on data collected from this well are as follows:

- ORP was lowered from the baseline measurement of 11.9 mV to a range of –85 to –443 mV;
- DO increased slightly from the baseline value of 0.21 mg/L to a range of 0.41 to 0.73 mg/L; and
- TOC levels increased only slightly.

MW-35I
MW-35I is located approximately 10 feet southwest and downgradient of injection IW-1. Key observations based on data collected from this well are as follows:

- ORP was lowered from the baseline measurement of 91.1 mV to a range of –33 to –187 mV;
- DO was in the range of 0.41 to 3.24 mg/L, as compared to the baseline value of 0.98 mg/L; and
- TOC levels did not change.

In summary, the field parameters, TOC concentration show that the dilute carbon injections were establishing a reducing environment in the groundwater within the pilot study area but with limited influence over the course of the eight-week pilot study. The ORP data proved to be the most reliable indicator and, due to the reduced environment, the DO data was inconclusive.

Performance Groundwater Monitoring After Eight Weeks
On August 5, 2004, field parameters and biogeochemical parameters were collected from IW-1, MW-35I, OW-1, and OW-2. Furthermore, VOC analysis was performed on

groundwater samples collected from MW-35I, OW-1, and OW-2. This data was collected following approximately eight weeks of dilute carbon solution injections at the Site. The results of the field and biogeochemical parameters show continued evidence that the groundwater environment is maintaining an anaerobic and reduced state. The results of VOC sampling also showed that transformation of the VOCs is occurring. The results obtained from OW-2, the downgradient observation well nearest the injection well, were particularly encouraging, showing a 91 percent reduction of TCE without the accumulation of daughter products (e.g., 1,2-DCE and vinyl chloride). The results of the biogeochemical and VOC analyses for the monitoring wells used in the pilot study are summarized below.

OW-1
Key observations based on groundwater data collected from this well are as follows.

- ORP decreased to –257 mV;
- DO level was 0.73 mg/L, approximately the same level as previous measurements;
- Chloride concentrations increased by 45 percent, from the baseline level of 670 mg/L to 974 mg/L;
- Dissolved iron concentrations increased from ND to 1.08 mg/L; and
- TCE levels remained about the same.

OW-2
Key observations based on data collected from this well are as follows.

- ORP was –256 mV, indicating a strongly reducing environment was being maintained;
- DO level was 0.54 mg/L, approximately the same level as previous measurements;
- Chloride concentrations increased by 87 percent, from the baseline level of 706 mg/L to 1,320 mg/L;
- Dissolved iron concentrations increased by more than two orders of magnitude, from the baseline level of 0.078 mg/L to 28.1 mg/L;
- TCE levels decreased by 91 percent, from the baseline level of 1,000 mg/L to 93 mg/L; and
- Accumulation of TCE daughter products (e.g., 1,2-DCE and vinyl chloride) was not observed.

MW-35I
Key observations based on data collected from this well are as follows.

- ORP decreased to –230 mV;
- DO level was 0.54 mg/L, approximately the same level as previous measurements;
- Chloride concentrations increased by 25 percent, from the baseline level of 336 mg/L to 421 mg/L;
- Dissolved iron concentrations increased slightly, from the baseline value of 0.773 mg/L to 0.815 mg/L;
- TCE levels stayed about the same; and
- Accumulation of TCE daughter products (e.g., cis-1,2-DCE and vinyl chloride) was not observed.

The field and biogeochemical parameters collected at the end of eight weeks indicate that a reducing environment was established in the groundwater in the area of the pilot study. Although a considerable decrease in TCE concentration was observed at OW-2 only, elevated chloride levels at all three monitoring wells suggest that reductive dechlorination occurred throughout the pilot study area. TCE transformation at the other two monitoring wells would be slower because they are further away from the injection well than OW-2. Therefore, decreases in TCE concentrations could have been masked by desorption of sorbed TCE into the groundwater.

Summary

Data collected during the pilot study indicate that injections of dilute carbon solution into Site groundwater were effective in establishing a zone conducive to reductive dechlorination. The trends in the field parameter and biogeochemical measurements indicate that a reducing environment was being developed in the groundwater in the pilot study area. The VOC data from OW-2 demonstrated that ERD was effective in transforming or degrading the VOCs.

The key observations that demonstrate the effectiveness of ERD at the Site are as follows:

- A reducing environment (ORP of –230 mV or greater) was established throughout the pilot study area;
- A significant reduction in TCE concentration was achieved at OW-2, the observation well closest to the injection well; and
- Chloride concentrations increased by 25 percent in MW-35I, 45 percent in OW-1, and 87 percent in OW-2.

In light of the limited radius of influence observed in the pilot study, Roux Associates is recommending a second phase for the pilot study using weekly dilute carbon solution injections. The injection and monitoring wells installed for the first phase of the pilot

study were screened from 30 to 50 ft bls. Six new injection wells are proposed to be installed in the area of the pilot study and along the southern Site boundary (along Toms Point Lane) as shown on Figure 2, and will be screened from a range of 10 to 25 ft bls to target the sandy to silty transition zone at 20 ft bls and deeper between the shallow and intermediate groundwater monitoring well zones. The rationale for the screen interval of the six new injection wells is to provide better dispersion of the dilute carbon solution by injecting in more permeable soil and taking advantage of the dilute carbon solution being more dense than groundwater, which makes it tend to "sink" downward. The monitoring well network from the first phase of the pilot study along with the following additional wells: MW-35S, MW-2, MW-2I, MW-26S, MW-26I, MW-30S, and MW-30I will be used to observe the effects of the dilute carbon solution injections. Baseline sampling and performance monitoring similar to the first phase of the pilot study will be conducted to evaluate the effectiveness of the second phase of the pilot study.

Please call if you have any questions or require additional information.

Sincerely,

ROUX ASSOCIATES, INC.

Glenn Netuschil, P.E.
Senior Engineer

REMEDIAL ENGINEERING, P.C.

Charles J. McGuckin, P.E.
Principal Engineer

Attachments

cc: Richard Thypin, MBA Manorhaven, LLC
Barry S. Cohen, Esq., Certilman Balin Adler & Hyman, LLP
Richard Izzo, CA Rich, Inc.
Joseph Duminuco, Roux Associates, Inc.

Table 1. Summary of Field Parameters Measured in Groundwater, Enhanced Reductive Dechlorination Pilot Test
Former Thypin Steel, Inc., Manorhaven, New York

CONSTITUENT	SAMPLE ID:	IW-1	IW-1	IW-1	IW-1	IW-1	IW-1	IW-1
	DATE:	5/5/04	6/11/04	6/18/01	6/25/04	7/2/04	7/9/04	7/16/04
Field Flow through Cell Parameters								
	Units							
pH	pH units	6.95	6.47	4.86	5.59	4.95	4.61	4.86
ORP	mV	31.7	57.7	97.1	82.1	-1.0	-80.0	-89.0
Conductivity	umhos/cm	4.896	--	--	--	--	--	--
Temperature	Celsius	14.06	--	--	--	--	--	--
Dissolved oxygen	mg/L	0.32	0.32	0.24	0.79	0.41	0.52	0.53

NOTES: Values represent field readings obtained at time of sample collection.

-- Not analyzed.
mg/L Milligrams per liter.
mV Millivolts.
umhos/cm Microohms per centimeter

Baseline sampling event on 5/5/04.

Field parameters on 6/11/04 were only taken from IW-1 due to problems with DO meter.

Table 1. Summary of Field Parameters Measured in Groundwater, Enhan Former Thypin Steel, Inc., Manorhaven, New York

CONSTITUENT	SAMPLE ID:	IW-1	IW-1	IW-1	MW-35I	MW-35I	MW-35I	MW-35I	MW-35I	MW-35I	MW-35I
	DATE:	7/23/04	7/30/04	8/5/04	5/5/04	6/18/01	6/25/04	7/2/04	7/9/04	7/16/04	7/23/04
Field Flow through Cell Parameters											
	Units										
pH	pH units	4.19	4.73	4.99	6.66	6.22	6.66	6.86	7.06	7.15	7.14
ORP	mV	1.0	-69.0	-120	91.1	169.7	146.8	-37	-104	-187	-33
Conductivity	umhos/cm	--	--	--	2.00	--	--	--	--	--	--
Temperature	Celsius	--	--	--	13.06	--	--	--	--	--	--
Dissolved oxygen	mg/L	0.56	0.75	0.29	0.98	0.21	0.39	3.24	0.76	0.56	0.41

NOTES: Values represent field readings obtained at time of sample collection.

-- Not analyzed.
mg/L Milligrams per liter.
mV Millivolts.
umhos/cm Microohms per centimeter

Baseline sampling event on 5/5/04.

Field parameters on 6/11/04 were only taken from IW-1 due to problems with DO meter.

Table 1. Summary of Field Parameters Measured in Groundwater, Enhan
Former Thypin Steel, Inc., Manorhaven, New York

CONSTITUENT	SAMPLE ID:	MW-35I	MW-35I	OW-1	OW-1	OW-1	OW-1	OW-1	OW-1	OW-1	OW-1	OW-1
	DATE:	7/30/04	8/5/04	5/5/04	6/18/01	6/25/04	7/2/04	7/9/04	7/16/04	7/23/04	7/30/04	8/5/04
Field Flow through Cell Parameters												
	Units											
pH	pH units	7.11	7.27	6.93	6.96	7.31	7.15	7.38	7.34	7.06	7.24	7.59
ORP	mV	-160	-230	71.5	107.6	75.6	-107	-179	-190	-101	-171	-257
Conductivity	umhos/cm	--	--	3.105	--	--	--	--	--	--	--	--
Temperature	Celsius	--	--	13.54	--	--	--	--	--	--	--	--
Dissolved oxygen	mg/L	1.09	0.54	0.57	0.19	0.35	0.35	0.82	0.71	0.43	3.52	0.73

NOTES: Values represent field readings obtained at time of sample collection.

-- Not analyzed.
mg/L Milligrams per liter.
mV Millivolts.
umhos/cm Microohms per centimeter

Baseline sampling event on 5/5/04.

Field parameters on 6/11/04 were only taken from IW-1 due to problems with DO meter.

Table 1. Summary of Field Parameters Measured in Groundwater, Enhan
Former Thypin Steel, Inc., Manorhaven, New York

CONSTITUENT	SAMPLE ID:	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2
	DATE:	5/5/04	6/18/01	6/25/04	7/2/04	7/9/04	7/16/04	7/23/04	7/30/04	8/5/04
Field Flow through Cell Parameters										
	Units									
pH	pH units	6.81	6.6	7.15	6.89	7.22	6.11	6.37	7.17	7.7
ORP	mV	11.9	119.6	122.9	-85	-181	-443	-93	-223	-256
Conductivity	umhos/cm	3.353	--	--	--	--	--	--	--	--
Temperature	Celsius	13.99	--	--	--	--	--	--	--	--
Dissolved oxygen	mg/L	0.21	0.4	0.27	0.53	0.67	0.41	0.41	0.73	0.54

NOTES: Values represent field readings obtained at time of sample collection.

-- Not analyzed.
mg/L Milligrams per liter.
mV Millivolts.
umhos/cm Microohms per centimeter

Baseline sampling event on 5/5/04.

Field parameters on 6/11/04 were only taken from IW-1 due to problems with DO meter.

Table 2. Summary of Biogeochemical Parameters Measured in Groundwater, Enhanced Reductive Dechlorination Pilot Test
Former Thypin Steel, Inc., Manorhaven, New York

CONSTITUENT / SAMPLE ID: / SAMPLING DATE:	IW-1 5/5/04	IW-1 7/2/04	IW-1 8/4/04	OW-1 5/5/04	OW-1 7/2/04	OW-1 8/4/04	OW-2 5/5/04	OW-2 7/2/04	OW-2 8/4/04	MW-35I 5/5/04	MW-35I 7/2/04	MW-35I 8/4/04
Inorganic Parameters (units in mg/L)												
Chloride	1,060	--	2,470	670	--	974	706	--	1,320	336	--	421
Iron, Dissolved	0.465	--	460	0.200U	--	1.08	0.078	--	28.1	0.773	--	0.815
Iron, Total	0.538	--	609	0.198	--	0.941	0.127	--	23.7	1.75	--	0.974
Manganese, Dissolved	10.9	--	25.8	8.35	--	9.54	10.7	--	21.1	6.51	--	4.81
Manganese, Total	10.6	--	34.7	8.55	--	8.77	10.6	--	19.7	6.58	--	4.96
Nitrate (NO3)	0.36	--	1U	0.299	--	0.1U	0.36	--	0.1U	0.12	--	0.271
Nitrite (NO2)	10U	--	50.7	10U	--	1U	10U	--	1U	1U	--	1U
Sulfate	144	--	987	135	--	101	95	--	49.3	125	--	99
Sulfide	1U	--	7.4	1U	--	1U	1U	--	1U	1U	--	1U
Total Organic Carbon	1U	16,000	17,000	1.5	0.23	0.18	1U	1U	1.9	2	2	0.65

NOTES:

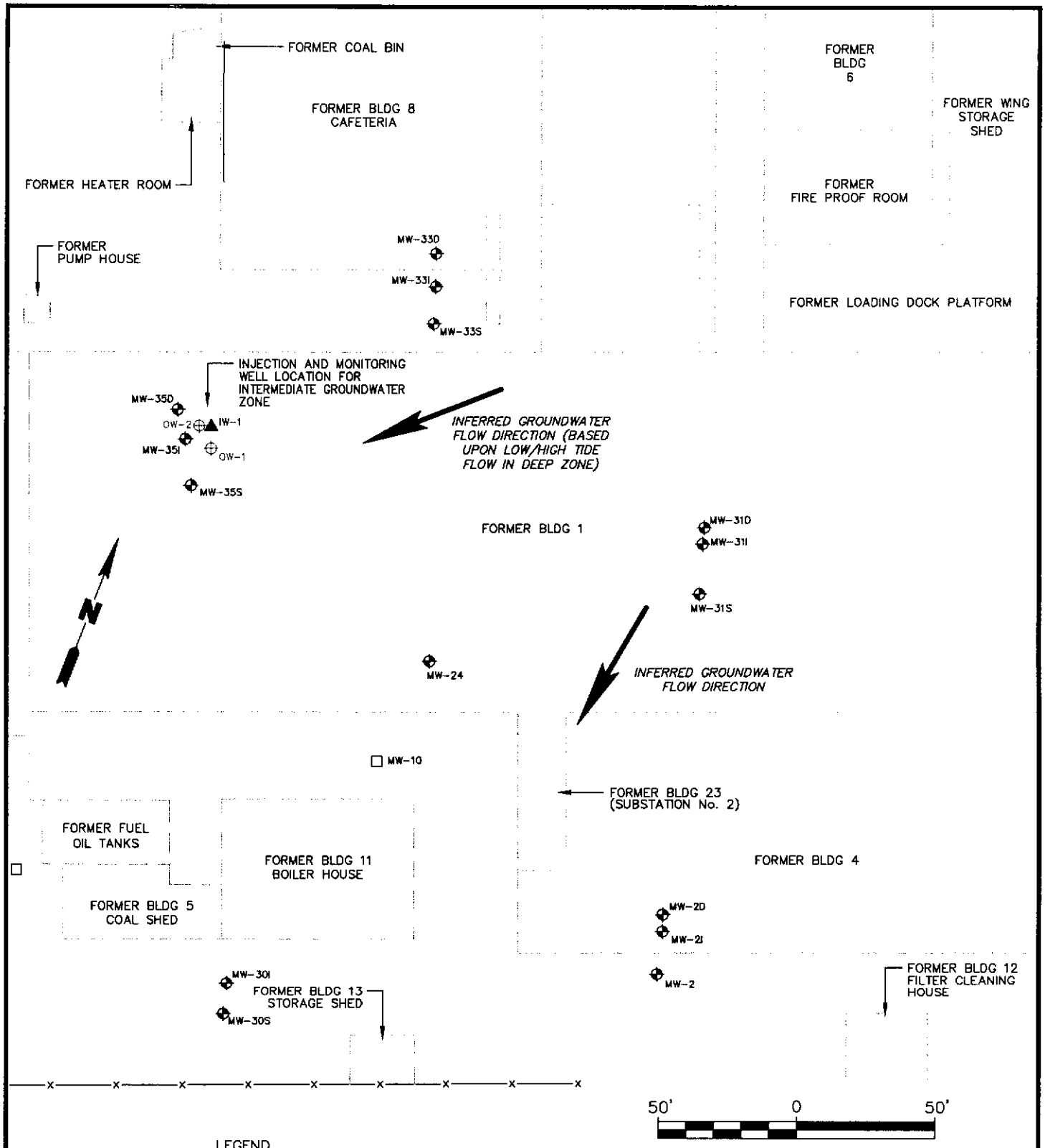
-- Not analyzed.
mg/L Milligrams per liter.
Baseline sampling event on 5/5/04

Table 3. Summary of VOCs Detected in Groundwater, Enhanced Reductive Dechlorination Pilot Test
Former Thypin Steel, Inc., Manorhaven, New York

Parameter (concentrations in ug/L)	NYSDEC AWQSGVs[1]	IW-1 5/5/04	OW-1 5/5/04	OW-1 8/4/04	OW-2 5/5/04	OW-2 8/4/04	MW-35I 5/5/04	MW-35I 8/4/04
Chloromethane	5	5U	5U	5U	5U	5U	5U	5U
Vinyl Chloride	2	5U	1 J	5U	3 J	5U	10	7
Bromomethane	5	5U	5U	5U	5U	5U	5U	5U
Chloroethane	5	5U	5U	5U	5U	5U	5U	5U
1,1-Dichloroethene	5	5U	1 J	1 J	1 J	5U	6	4J
Acetone	50	10U	4 J	9 JB	10U	4J	10U	10U
Carbon Disulfide	--	5U	0.7 J	5U	5U	5U	5U	5U
Methylene Chloride	5	5U	5U	5U	5U	5U	5U	5U
trans-1,2-Dichloroethene	5	5U	5U	5U	5U	5U	.7 J	0.5J
1,1-Dichloroethane	5	5U	5U	5U	5U	5U	3 J	3J
cis-1,2-Dichloroethene	5	1 J	7	3J	15	2J	52	41
2-Butanone	--	10U	10U	10U	10U	120	10U	10U
Chloroform	7	5U	5U	5U	5U	5U	5U	5U
1,1,1-Trichloroethane	5	5U	5U	5U	5U	5U	5U	3J
Carbon Tetrachoride	5	5U	5U	5U	5U	5U	5U	5U
Benzene	1	5U	5U	5U	5U	5U	5U	5U
1,2-Dichloroethane	0.6	5U	5U	5U	5U	5U	5U	5U
Trichloroethene	5	330	1,100	1,200 A	1,000	93	3,300	3,200 A
1,2-Dichloropropane	1	5U	5U	5U	5U	5U	5U	5U
Bromodichloromethane	50	5U	5U	5U	5U	5U	5U	5U
cis-1,3-Dichloropropene	5	5U	5U	5U	5U	5U	5U	5U
4-methyl-2-pentanone	--	10U	10U	10U	10U	10U	10U	10U
Toluene	5	4 J	17	0.9J	4	5U	5U	5U
trans-1,3-Dichloropropene	5	5U	5U	5U	5U	5U	5U	5U
1,1,2-Trichloroethane	1	5U	5U	0.8J	5U	5U	2 J	2 J
Tetrachloroethene	5	5U	5U	5U	0.8 J	5U	2 J	2 J
2-Hexanone	50	10U	10U	10U	10U	10U	10U	10U
Dibromochloromethane	50	5U	5U	5U	5U	5U	5U	5U
Chlorobenzene	5	5U	5U	5U	5U	5U	5U	5U
Ethyl Benzene	5	5U	5U	5U	5U	5U	5U	5U
Xylenes (total)	5	5U	5U	5U	5U	5U	5U	5U
Styrene	5	5U	5U	5U	5U	5U	5U	5U
Bromoform	50	5U	5U	5U	5U	5U	5U	5U
1,1,2,2-Tetrachloroethane	5	5U	5U	5U	5U	5U	5U	5U
Ethene	--	5U	5U	5U	5U	5U	5U	5U
Ethane	--	5U	5U	5U	5U	5U	5U	5U

NOTES:

1 New York State Department of Environmental Conservation (NYSDEC) Ambient Water-Quality Standards and Guidance Values (AWQSGVs)
-- No NYSDEC AWQSGV available
ug/L micrograms per liter
U Compound was analyzed for but not detected
J Estimated value
B Compound detected in blank and sample
A Compound exceeds the instrument calibration range



LEGEND

MW-2 ⊕ LOCATION AND DESIGNATION OF EXISTING MONITORING WELL

IW-1 ▲ LOCATION AND DESIGNATION OF INJECTION WELL

OW-1 ⊕ LOCATION AND DESIGNATION OF PILOT STUDY MONITORING WELL

WELL DEPTH DESIGNATIONS

D – DEEP

I – INTERMEDIATE

S – SHALLOW

Title:

ERD PILOT STUDY
FIRST PHASE LAYOUT

FORMER THYPIN STEEL FACILITY
MANORHAVEN, NEW YORK

Prepared For:

MBA MANORHAVEN, LLC
PRINCETON, NEW JERSEY

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: G.N.	Date: 13FEB04	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	1
Project Mgr: G.N.	Office: NY	
File No: MBA0119701	Project: 77101Y	

BAY

MANHASSET

REMAINS OF TIMBER RAMP

MW-25

MW-3

MW-23I

MW-23

MW-35D

IW-3

OW-2

IW-1

MW-35I

OW-1

MW-35S

IW-2

MW-33D

MW-33I

MW-33S

INFERRED GROUNDWATER FLOW DIRECTION
(BASED UPON LOW/HIGH TIDE FLOW IN DEEP ZONE)

MW-34D

MW-34I

MW-34S

MW-31D

MW-31I

MW-31S

MW-24

MW-29D

MW-29I

MW-29S

MW-2D

MW-2I

IW-4

IW-5

MW-2

IW-6

MW-30I

MW-30S

MW-26D

IW-7

MW-26I

MW-26

CHAIN LINK FENCE

CONCRETE WALL

ROOF OVER PARKING AREA

LINE OF ROOF OVERHANG

OVERHEAD WIRES

TOMS POINT LANE

LEGEND

- PROPERTY BOUNDARY
- MW-1 LOCATION AND DESIGNATION OF MONITORING WELL
  - D DEEP
  - I INTERMEDIATE
  - S SHALLOW
- OW-1 LOCATION AND DESIGNATION OF OBSERVATION WELL
- IW-1 LOCATION AND DESIGNATION OF INJECTION WELL
- IW-2 LOCATION AND DESIGNATION OF PROPOSED INJECTION WELL

NOTE:
MONITORING WELLS WITHOUT D, I, OR S DESIGNATION INDICATE SHALLOW WELL.

60' 0 60'

Title:
PROPOSED SECOND PHASE ERD PILOT STUDY INJECTION LOCATIONS

FORMER THYPIN STEEL FACILITY
MANORHAVEN, NEW YORK

Prepared For:
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Environmental Consulting

Compiled by: G.N.	Date: 04OCT04	FIGURE
Prepared by: R.K.	Scale: AS SHOWN	
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Dilute Carbon Solution Injection Log

Date	Injection Volume (gallons)	Molasses Volume (gallons)	Ratio of Water to Molasses	Pounds of Carbohydrates (Total)	Comments
6/11/2004	50	2.5	20:1	18	Injected with peristaltic pump;drop tube to bottom of well.
6/18/2004	50	1.0	50:1	7	Injected with peristaltic pump;drop tube to bottom of well.
6/25/2004	100	6.5	15:1	47	Injected with submersible pump/seal at top of well (no drop tube). Added baking soda due to low pH.
7/2/2004	100	10	10:1	72	Injected with submersible pump/seal at top of well (no drop tube). Added baking soda due to low pH.
7/9/2004	100	--	--	0	Injected water solution only due to high TOC levels in IW-1 using submersible pump and drop tube to 20 ft.
7/16/2004	100	5	20:1	36	Injected with peristaltic pump & surge block at 40 ft (drop tube to 40 ft). No baking soda.
7/23/2004	100	5	20:1	36	Injected with submersible pump & packer at 40 ft (drop tube to 30 ft). Added baking soda due to low pH.
7/30/2004	100	5	20:1	36	Injected with submersible pump & packer at 40 ft (drop tube to 30 ft).
	Total Carbohydrates			252	