MACTEC

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June 11, 2010

Mr. Frank Sowers, P.E.
Environmental Engineer 2
New York State Department of Environmental Conservation
Region 8 – Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, NY 14414

Subject: Revised Work Plan for Accelerated Bioremediation and Permanent Decommissioning of the Remedial Treatment System
VCA Index #B8-0508-97-02
Former Taylor Instruments Site
Rochester, New York
MACTEC Project Number 3031052006/11

Dear Mr. Sowers:

On behalf of Combustion Engineering (CE), MACTEC Engineering and Consulting, Inc., (MACTEC) is pleased to present this Revised Work Plan (hereinafter referred to as the Plan) for Accelerated Bioremediation and Permanent Decommissioning of the Remedial Treatment System for the Former Taylor Instruments Site (the Site) located at 95 Ames Street in Rochester, New York. This Plan was originally submitted to the New York State Department of Environmental Conservation (NYSDEC) on October 9, 2008 (MACTEC, 2008a). The NYSDEC provided review comments on the Plan in a May 5, 2010 letter (NYSDEC, 2010). This revised Plan is being submitted to address NYSDEC's review comments.

This Plan is being submitted pursuant to a letter from NYSDEC dated May 2, 2008 (NYSDEC, 2008) and subsequent discussions during a meeting on July 29, 2008 between CE, MACTEC, Nixon Peabody, and NYSDEC (MACTEC, 2008b). At that meeting it was agreed that additional remediation, in the form of an expansion of the accelerated bioremediation project which has been proven to be effective at the Site, would be done as the final step in remediating the Site. More specifically, it was agreed that the expanded program would focus on the areas in the vicinity of where the levels of the contaminants of concern (COCs) in the overburden monitoring wells in the two source areas currently exceed NYSDEC Class GA Standards. Included in this Plan are:

- a Site description;

- a summary of remedial progress to date;
- a historical and current summary of Site groundwater conditions;
- CE's proposed activities including
  - an expanded accelerated bioremediation using Hydrogen Release Compound (HRC) HRC Advanced® (also known as 3-D Microemulsion™ [3DMe™]) in appropriate areas,
  - decommissioning the existing dual phase vapor extraction (DPVE) and bedrock groundwater remedial treatment systems, and
  - proposed post-closure monitoring and report preparation schedules.

The following figures (Attachment A) are included in this Plan:

- Figure 1 – Well Locations
- Figure 2 – Overburden Wells with COCs Exceeding NYSDEC Class GA Standards
- Figure 3 – Bedrock Wells with COCs Exceeding NYSDEC Class GA Standards
- Figure 4 – HRC Advanced® Pilot Test Results: OB-04 COC Concentration Trend Graph
- Figure 5 – HRC Advanced® Pilot Test Results: OB-08 COC Concentration Trend Graph
- Figure 6 – Proposed HRC Advanced® Injection Layout
- Figure 7 – Monitoring Wells for Post Closure Monitoring
- Figure 8 – Work Plan Implementation Schedule

The following tables (Attachment B) are also included in this Plan:

- Table 1 – Decline of Trichloroethene (TCE) Concentrations Over Time
- Table 2 – Wells to be Abandoned

HRC Advanced® Injection design calculations (Attachment C), a task-specific Health and Safety Plan (Attachment D), a Generic Community Air Monitoring Plan (Attachment E), and an acronym list (Attachment F) are also attached.

Site Description

The Site is located at 95 Ames Street in Rochester, New York. The approximately 14-acre Site was the location of the former Taylor Instruments facility that was operated from 1904 to 1994 under a variety of owners. In 1993, CE, the current owner, closed the facility. In 1997 a Voluntary Clean-up Agreement (VCA) between CE and NYSDEC (VCA Index #B8-0508-97-02) was signed. Remedial progress under the VCA is discussed in the next section.

The Site is currently vacant. Recently, potential purchasers have made serious offers to acquire the Site for redevelopment for commercial uses consistent with existing recorded use restrictions and institutional controls. The offers are contingent upon site closure under the VCA being achieved within a reasonable time.

Summary of Remedial Progress

Following extensive soil excavation, filling and capping and other remedial activities, a groundwater remedy was implemented from January 2001 to May 2006. This included an on-site remedial treatment system which consisted of a DPVE and bedrock groundwater extraction and treatment system. This remedy is described in detail in the *Remedial Work Plan* (Harding Lawson Associates, 2000). The DPVE system extracted both vapor and overburden groundwater from the North and South Trichloroethene (TCE) Source Areas. The extracted vapor and groundwater were conveyed through subsurface piping to a treatment building. Two bedrock extraction wells also extracted deeper groundwater from beneath the Site, which was conveyed to the treatment building. Within the treatment building, all collected groundwater and vapor condensate was treated and then discharged to the Monroe County sewer system. The locations of the wells and treatment building are shown on Figure 1 (Attachment A). The performance of the remedial treatment system is discussed in detail in the *Request for Permanent Shutdown of the Remedial Treatment System and Closure of the Remedial Process* dated April 11, 2008 (MACTEC, 2008c).

Upon reaching the conclusion that the remedial treatment system had reached asymptotic contaminant removal rates, in July 2006 MACTEC submitted an *Accelerated Bioremediation Pilot Test Work Plan* (MACTEC, 2006) to initiate a pilot-scale application of HRC Advanced® near monitoring wells OB-08 in the North TCE Source Area and OB-04 in the South TCE Source Area of the Site to evaluate the effectiveness of HRC Advanced® in accelerating the biodegradation of

the site COCs in lieu of further operation of the DPVE/bedrock groundwater extraction and remediation system. The results for the HRC Advanced® pilot-scale application are detailed in the *Accelerated Bioremediation Pilot Test Final Report* (MACTEC, 2008d). Figures 4 and 5 (Attachment A) depict the performance of HRC Advanced® in reducing COCs in the two source areas.

Summary of Site Groundwater Conditions

Twelve overburden monitoring wells and twelve bedrock monitoring wells located on the Site have been sampled regularly since 2001**.** We note that the sampling frequency of fourteen other monitoring wells (nine overburden and five bedrock) was modified over the course of remedial efforts; any changes to the sampling program were documented in the quarterly and annual progress reports submitted to NYSDEC. Figures 2 and 3 (Attachment A) depict the May 2008 analytical results for the monitoring wells on the Site. Overall decreases in TCE concentrations have been observed in all Site monitoring wells (Table 1, Attachment B). Details of the decline in TCE concentrations over time are discussed in depth in the *Request for Permanent Shutdown of the Remedial Treatment System and Closure of the Remedial Process* (MACTEC, 2008c).

As shown on Figure 2, analytical data from the May 2008 sampling event indicate that COC concentrations remain above Class GA Standards in five source area overburden monitoring wells (OB-04 and OB-06 in the South TCE Source Area, and OB-05, OB-08, and OB-09 in the North TCE Source Area), as well as in three perimeter overburden monitoring wells (W-5, TW-09, and TW-17). Similarly, as shown on Figure 3, analytical data from the May 2008 sampling event indicate that COC concentrations remain above Class GA Standards in eight source area bedrock monitoring wells (BR-04, BR-08, BR-09, BR-10, BR-11, and BR-17 in the South TCE Source Area and BR-05 and BR-15 in the North TCE Source Area), as well as in four perimeter bedrock monitoring wells (BR-01, BR-02, BR-03, and BR-07).

Expanded HRC Advanced® Application

Based on the approved *Remedial Work Plan* (Harding Lawson Associates, 2000); the results of the accelerated bioremediation pilot test (MACTEC, 2008d); the NYSDEC letter dated May 2, 2008 (NYSDEC, 2008); discussions held with NYSDEC during the July 29, 2008 meeting (MACTEC, 2008b); and the impending redevelopment of the Site, MACTEC proposes an expanded accelerated

bioremediation application followed by monitored natural attenuation as the final remedy for the Site.

MACTEC proposes to perform the expanded accelerated bioremediation application using HRC Advanced® in the vicinities of the source area overburden monitoring wells in which concentrations of COCs exceed Class GA Standards: Area 1 (OB-04 and OB-06) in the South TCE Source Area and Area 2 (OB-05, OB-08, and OB-09) in the North TCE Source Area. The treatment area in the North TCE Source Area has been expanded to include the nearby perimeter wells in Area 3 (W-5 and TW-17) to also accelerate the biodegradation of the COCs reported in these wells. At the request of the NYSDEC, as a precautionary measure, a row of injection points will also be placed along the eastern portion of the Site (Area 4) to further reduce the potential for contaminants in the groundwater to migrate off-site towards off-site residences. The proposed injection layout is illustrated on Figure 6 (Attachment A). By accelerating the biodegradation of COCs in the overburden groundwater, it is expected that the ongoing overall decreases in COC concentrations in all downgradient locations, as well as in the bedrock groundwater, will continue, but at a more rapid rate.

Details of the expanded HRC Advanced® application are provided in the subsequent paragraphs. Of note, the proposed design differs from the pilot test by the following:

- Due to modifications to the application procedures, the HRC Advanced® will be diluted at a 10:1 water/HRC Advanced® ratio rather than the 3:1 ratio cited in the pilot test. The 10:1 ratio will increase distribution of the HRC Advanced® into the aquifer.

- Due to the radius of influence observed during the pilot injection and observations made throughout pilot performance monitoring, the spacing between each injection boring has been increased from the 10-foot design spacing of the pilot injection. The spacing of injection borings in Areas 1 through 3 is 17 feet. The spacing of injection borings in Area 4 is 12 feet. This spacing is designed to provide complete coverage of the injection areas.

- The HRC Advanced® dose rates have been designed specifically for each area to facilitate biodegradation of the remaining contamination within the timeframe in which HRC Advanced® is expected to be effective (i.e., up to three years or more). The average dose rate for Areas 1 through 3 is 12 pounds of HRC Advanced® per vertical foot, while the average dose rate for Area 4 is 9 pounds of HRC Advanced® per vertical foot.

- HRC Primer® will be used to supplement the area surrounding monitoring well OB-05 due to the high levels of sulfate present around this well. More details regarding HRC Primer® are provided in the paragraphs below.

Prior to injection of the HRC Advanced®, an injection point (boring) will be drilled using a direct-push rig, and the HRC Advanced® will be diluted with water at a 10:1 water/HRC Advanced® ratio to increase distribution in the aquifer. The water volume will be measured by placing the water in a graduated holding tank with the tank volume (in gallons) marked on the side of the tank. The HRC Advanced® is provided by the supplier in buckets of specified volume (3.7 gallons of HRC Advanced® in each bucket). A total of 125 injection points are proposed. The proposed conceptual designs of injection Areas 1 through 3 are saw-tooth grid patterns of approximately 17 feet between points in each row and 17 feet between rows in each area, as shown on Figure 6 (Attachment A). The spacing between each row of injections is based on the results of the pilot test where effects of the HRC Advanced® (the presence of volatile fatty acids and decreases in oxygen reduction potential) on groundwater conditions downgradient of the pilot injection were observed six to nine months following the injection. Additionally, at the request of the NYSDEC, as a precautionary measure, MACTEC will add a row of injections points along the eastern portion of the Site to further reduce the potential for contaminants in the groundwater to migrate off-site towards off-site residences. This row is identified as Area 4 and is shown on Figure 6 (Attachment A). The injection points in Area 4 will have tighter spacing, approximately 12 feet, to increase the overlapping effect of the injection. Actual locations of the injection points may be altered based on Site constraints and field judgments. Each of the borings will be advanced to refusal, which is estimated to be near 24 feet below land surface (bls) in the North TCE Source Area, 19 feet bls in the South TCE Source Area, and 22 feet bls near the eastern portion of the Site. After the desired depth is reached, a specific amount of diluted HRC Advanced® product will be injected under pressure into the subsurface groundwater zone as the rods are being raised. The volume of injected material in each boring will be monitored with an in-line flow meter.

The HRC Advanced® application volumes are presented in the table below and are designed based on dissolved-phase volatile organic compound (VOC) and other geochemical parameter concentrations taken from historical data, and that HRC Advanced® has been proven to be effective for up to three years or longer. Design calculations for the injection in each area are provided in Attachment C. Similar to the pilot test, the HRC Advanced® will be injected over a vertical thickness of about 15 feet in each boring within the depth intervals presented in the table below.

Area	Approximate Depth Interval (feet bls)	Number of Injection Points	HRC Advanced® Emulsion		HRC Primer®	
			per Point (gallons)	per Area (gallons)	per Point (gallons)	per Area (gallons)
1	4 to 19	40	255[1]	10,200	NA	NA
2	9 to 24	35	236	8,260	6.5[2]	72
3	9 to 24	30	217	6,510	NA	NA
4	7 to 22	20	176	3,519	NA	NA
Total	**---**	**125**	**---**	**28,489**	**---**	**72**

[1] HRC Advanced® emulsion per point in the area surrounding monitoring well OB-06 will be 178 gallons. This reduced application rate is due to the lower contaminant concentrations present in this area.

[2] HRC Primer® only added in 11 points near OB-05.

Notes: --- no data
bls = below land surface
HRC = hydrogen release compound
NA = not applicable

Prepared by/Date: KJD 5/31/10
Checked by/Date: CRW 5/31/10

Groundwater samples from monitoring well OB-05 (in Area 2) contained high concentrations of sulfate, a competing electron acceptor (CEA). Accelerated bioremediation occurs more readily under sulfate-reducing conditions. HRC Primer® (a thinner, less viscous form of the standard HRC compound that is injected into an aquifer where it releases lactic acid at a rate faster than standard HRC) is typically recommended to supplement the HRC Advanced® where high levels of CEAs such as sulfate exist. Therefore to enhance reducing conditions, HRC Primer® will be added to the volume of injected fluids in the points surrounding monitoring well OB-05. The table below presents the volume of HRC Advanced® emulsion and HRC Primer® that will be injected per treatment area. After injection is complete, each boring will be filled with grout to the surface and patched with asphalt.

Decommissioning of the DPVE System and Some Monitoring Wells

As discussed during the July 29, 2008 meeting between CE, MACTEC, Nixon Peabody, and NYSDEC, the expanded application of HRC Advanced® followed by monitored natural attenuation will complete the remedial requirements for the Site (MACTEC, 2008b). Based on this discussion and the demonstrated performance of the remedial treatment system in substantially reducing site-

wide COC concentrations while having reached asymptotic COC removal rates (MACTEC, 2008c), this Work Plan includes permanent decommissioning of the DPVE and bedrock groundwater remedial collection and treatment system. Decommissioning will include removing all above-ground components of the remedial treatment system, plugging all underground piping with grout, and abandoning all wells (extraction, monitoring, and vent wells) except for the 14 monitoring wells (BR-01, BR-02, BR-03, BR-04, BR-10, BR-15, OB-04, OB-06, OB-08, TW-04, TW-09, TW-17, TW-20, and W-5) that are included in the post-closure monitoring plan discussed below.

While chlorinated VOCs at concentrations above the NYSDEC Class GA Standards exist in some of the bedrock monitoring wells, CE believes that the abandonment of the bedrock groundwater remedial collection and treatment system (including bedrock extraction wells BREW-N-1 and BREW-S-1), as well as the 11 bedrock monitoring wells that are not included in the post-closure monitoring of natural attenuation (discussed below), is justified. This justification is made considering that the bedrock remedial treatment system had reached asymptotic COC removal rates (i.e., it is technically impractical and infeasible to achieve further remediation benefits); there are no known receptors of the Site groundwater; and treatment of contamination in the overburden groundwater will eliminate the source of the bedrock groundwater contamination.

The list of wells to be abandoned and the justification for abandonment of each well is presented in Table 2.

Post-Closure Monitoring of Natural Attenuation

Following the expanded HRC Advanced® application, post-closure monitoring of natural attenuation will be implemented until groundwater concentrations of the COCs are at or below NYSDEC Class GA Standards. Monitoring will be performed semi-annually at the remaining bedrock and overburden monitoring wells, consistent with the previous field protocols provided in the *Dual-Phase Vacuum Extraction Remediation System Operations and Maintenance Manual* (Harding ESE, 2001), until Class GA Standards are met. As an indicator of the effectiveness of the accelerated biodegradation efforts to monitor the ongoing reduction in COC concentrations, monitoring will be conducted in two overburden and two bedrock monitoring wells in the South TCE Source Area (OB-04, OB-06, BR-04, and BR-10); one overburden and one bedrock monitoring well in the North TCE Source Area (OB-08 and BR-15); and in the downgradient

monitoring wells BR-01, BR-02, BR-03, TW-04, TW-09, TW-17, TW-20, and W-5 (Figure 7, Attachment A). The samples collected from these monitoring wells will be analyzed for VOCs using Environmental Protection Agency (EPA) Method 8260B. The results of the sampling events will continue to be reported on an annual basis. Post-injection monitoring results will be evaluated by MACTEC to assess whether additional injections may be cost effective by reducing the long-term monitoring timeframe. When CE believes that the post closure monitoring has been sufficient to demonstrate that the VCA goals have been substantially achieved, it will prepare a Post Closure Summary Report containing an evaluation of the data and requesting approval to terminate the post-closure monitoring program.

Health and Safety

The original Health and Safety Plan (HASP) for the on-site remedial program was provided in Appendix J of the Final Engineering Report (MACTEC, 2003). As requested by the NYSDEC, MACTEC has added a task-specific HASP in Attachment D of this Plan for the upcoming injection, decommissioning, and sampling activities. The short form HASP will supplement the original HASP.

Also as requested by the NYSDEC, a Generic Community Air Monitoring Plan (CAMP) has been provided in Attachment E.

Schedule

A Work Plan Implementation Schedule is outlined on Figure 8, Attachment A of the Work Plan. This schedule assumes NYSDEC approval of this Plan by June 28, 2010.

Final Remedial Action

This proposal for an expanded application of HRC Advanced®, followed by post closure monitoring of natural attenuation is proposed as the final remedial action for the Site. CE's willingness to implement the expanded accelerated bioremediation program is contingent upon NYSDEC's approval of the decommissioning of the DPVE and bedrock groundwater remedial collection and treatment system including the abandoning of all wells (extraction, monitoring, and vent wells), except for the 14 monitoring wells (BR-01, BR-02, BR-03, BR-04, BR-10, BR-15,

OB-04, OB-06, OB-08, TW-04, TW-09, TW-17, TW-20, and W-5) that are included in the Post Closure Monitoring Plan as described above and shown on Figure 7. Upon completion of the expanded HRC Advanced® injection, MACTEC will prepare and submit a Construction Completion Report (CCR) and a revised Operations, Maintenance, and Monitoring (OM&M) Plan to the NYSDEC for written approval.

Further, when CE believes that the post closure monitoring has been sufficient to demonstrate that the VCA goals have been substantially achieved, it will prepare a Post Closure Summary Report containing an evaluation of the post closure data and requesting approval to terminate the post-closure monitoring program.

CE requests that the NYSDEC issue written approval of this revised Plan, which includes a confirmation of the above understanding. Upon receipt of this approval, MACTEC will begin preparations for the remedial activities and if timely approval is issued, will be prepared to commence the injection at the first opportunity that weather permits.

Should you have any questions, please contact me at (865) 588-8544 (ext. 1113), or via email at raryan@mactec.com. We look forward to further discussions and/or meeting with you.

Sincerely,

MACTEC Engineering and Consulting, Inc.

Ricky A. Ryan, P.E.
Senior Principal Engineer/Project Manager

K. Joe Deatherage
Senior Environmental Engineer

[996]

cc: Bart Putzig, NYSDEC (electronic)
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File

References

Harding ESE, 2001. *Dual-Phase Vacuum Extraction Remediation System Operations and Maintenance Manual, Former Taylor Instruments Site, 95 Ames Street, Rochester, New York.* Distributed to the New York State Department of Environmental Conservation (March).

Harding Lawson Associates, 2000. *Remedial Work Plan, Taylor Instruments Site, Rochester, New York.* (April).

MACTEC, 2003. *Final Engineering Report, Former Taylor Instruments Site, Rochester, New York.* Prepared for Combustion Engineering, 501 Merritt 7, Norwalk, CT 06851 (September).

MACTEC, 2006. *Accelerated Bioremediation Pilot Test Work Plan* (June 22).

MACTEC, 2008a. *Work Plan for Accelerated Bioremediation and Permanent Decommissioning of the Remedial Treatment System.* Prepared for the New York State Department of Environmental Conservation (October 9).

MACTEC, 2008b. Meeting between Combustion Engineering, Nixon Peabody, MACTEC, and NYSDEC to discuss requirements for final closure. July 29.

MACTEC, 2008c. *Request for Permanent Shutdown of the Remedial Treatment System and Closure of the Remedial Process.* April 11.

MACTEC, 2008d. *Accelerated Bioremediation Pilot Test Final Report.* April 4.

NYSDEC, 2008. Letter to Ricky A. Ryan with MACTEC Engineering and Consulting, Inc. May 2.

NYSDEC, 2010. Letter to Mr. Ricky A. Ryan with MACTEC. May 5.

ATTACHMENT A

FIGURES

N

HAGUE STREET

WEST AVENUE

GROUNDWATER TREATMENT BUILDING

STORAGE SHED

CONC. SLAB

BUILDING FOUNDATION

N/F NEW YORK CENTRAL RAILROAD RAILROAD TRACKS

LEGEND

- RAILROAD TRACKS
- CHAIN LINK FENCE
- WROUGHT IRON FENCE
- GUARD RAIL
- BEDROCK MONITORING WELL (BR)
- OVERBURDEN MONITORING WELL (OB, MW, TW, W)
- BEDROCK EXTRACTION WELL (BREW)
- DUAL-PHASE VACUUM EXTRACTION WELL (DPVE)
- VENT WELL

W-1, W-2, W-3, W-4, W-5, W-6

BR-01, BR-02, BR-03, BR-04, BR-05, BR-06, BR-07, BR-08, BR-09, BR-10, BR-11, BR-12, BR-13, BR-14, BR-15, BR-16, BR-17

OB-04, OB-05, OB-06, OB-07, OB-08, OB-09

CB-5

MW-00

TW-01, TW-04, TW-07, TW-09, TW-13, TW-17, TW-20, TW-74

BREW-N-1, BREW-S-1

EW-N-1, EW-N-2, EW-N-3, EW-N-4, EW-N-5, EW-N-6

EW-S-2, EW-S-3, EW-S-4, EW-S-5, EW-S-6, EW-S-7, EW-S-8, EW-S-9, EW-S-10, EW-S-11, EW-S-12, EW-S-13, EW-S-14, EW-S-15, EW-S-16

VW-N-1, VW-N-2, VW-N-3, VW-N-4, VW-N-5, VW-N-6, VW-N-7

VW-S-1, VW-S-2, VW-S-3, VW-S-4, VW-S-5, VW-S-6, VW-S-7, VW-S-8, VW-S-9, VW-S-10, VW-S-11, VW-S-12, VW-S-13, VW-S-14

0 80'

SCALE: 1"=80'

NOTE:
THE AREA IS COVERED WITH BITUMINOUS PAVEMENT INSIDE FENCED AREA.

MACTEC
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WELL LOCATIONS
FORMER TAYLOR INSTRUMENTS SITE, ROCHESTER, NEW YORK

1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
DSR	3031052006	JD	07/22/08	09/16/08

Z

HAGUE STREET

WEST AVENUE

AMES STREET

Site ID: W-2	(units µg/L)	
Analyte	Dec-05	May-08
PCE	1 U	NS
TCE	1 U	NS
cis-1,2-DCE	1 U	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: W-4	(units µg/L)	
Analyte	Dec-02	May-08
PCE	1 U	NS
TCE	1	NS
cis-1,2-DCE	1 U	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: MW-00	(units µg/L)	
Analyte	May-00	May-08
PCE	1 U	NS
TCE	1 U	NS
cis-1,2-DCE	1 U	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: W-3	(units µg/L)	
Analyte	May-99	May-08
PCE	5 U	NS
TCE	5 U	NS
cis-1,2-DCE	5 U	NS
trans-1,2-DCE	5 U	NS
1,1-DCE	5 U	NS
Vinyl Chloride	5 U	NS

Site ID: TW-13	(units µg/L)	
Analyte	Dec-02	May-08
PCE	1 U	NS
TCE	1 U	NS
cis-1,2-DCE	1 U	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: OB-04	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	125
cis-1,2-DCE	875
trans-1,2-DCE	5.72
1,1-DCE	1.60
Vinyl Chloride	145

Site ID: OB-05	(units µg/L)
Analyte	May-08
PCE	2.39
TCE	210
cis-1,2-DCE	1.97
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: OB-08	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	1 U
cis-1,2-DCE	41.4
trans-1,2-DCE	8.07
1,1-DCE	1 U
Vinyl Chloride	47.8

Site ID: W-5	(units µg/L)
Analyte	May-08
PCE	2.41
TCE	1180
cis-1,2-DCE	314
trans-1,2-DCE	4.41
1,1-DCE	1 U
Vinyl Chloride	6.77

Site ID: W-6	(units µg/L)	
Analyte	Dec-05	May-08
PCE	1 U	NS
TCE	1 U	NS
cis-1,2-DCE	1.76	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: OB-09	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	55
cis-1,2-DCE	2.05
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: OB-06	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	72.6
cis-1,2-DCE	3.90
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: TW-74	(units µg/L)	
Analyte	May-99	May-08
PCE	5 U	NS
TCE	16J	NS
cis-1,2-DCE	5 U	NS
trans-1,2-DCE	5 U	NS
1,1-DCE	5 U	NS
Vinyl Chloride	5 U	NS

Site ID: TW-09	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	50.5
cis-1,2-DCE	4.70
trans-1,2-DCE	4.87
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: TW-20	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	4.50
cis-1,2-DCE	1 U
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: W-1	(units µg/L)	
Analyte	May-99	May-08
PCE	5 U	NS
TCE	5 U	NS
cis-1,2-DCE	5 U	NS
trans-1,2-DCE	5 U	NS
1,1-DCE	5 U	NS
Vinyl Chloride	5 U	NS

Site ID: OB-07	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	3.57
cis-1,2-DCE	1 U
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: TW-07	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	1 U
cis-1,2-DCE	1 U
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: TW-17	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	477
cis-1,2-DCE	4.19
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: TW-01	(units µg/L)	
Analyte	Jan-01	May-08
PCE	5 U	NS
TCE	5 U	NS
cis-1,2-DCE	5 U	NS
trans-1,2-DCE	5 U	NS
1,1-DCE	5 U	NS
Vinyl Chloride	1 U	NS

Site ID: TW-04	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	4.40
cis-1,2-DCE	1 U
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

BR-06 W-2 BR-04 OB-04 BR-17 BR-08 BR-09 OB-06 BR-10 BR-11 OB-07 W-1 W-6 TW-01 BR-03 TW-04 W-3 MW-00 TW-13 BR-05 OB-05 BR-12 BR-13 BR-16 W-5 BR-14 OB-08 BR-15 OB-09 BR-01 TW-17 TW-74 TW-07 BR-02 TW-09 TW-20 W-4 BR-07 GROUNDWATER TREATMENT BUILDING STORAGE SHED

530 529 528 527 526 525 524 521 520

NEW YORK CENTRAL RAILROAD N/F RAILROAD TRACKS

CONC. SLAB

BUILDING FOUN.

DAVENPORT MACHINE

RESIDENCE RESIDENCE RESIDENCE

0 80'

SCALE: 1"=80'

LEGEND

- OVERBURDEN MONITORING WELL (OB, MW, TW, W)
- COC CONTAMINANTS OF CONCERN
- DCE DICHLOROETHENE
- PCE TETRACHLOROETHENE (PERCHLOROETHENE)
- TCE TRICHLOROETHENE
- J ESTIMATED VALUE
- U NON DETECT
- ESTIMATED GROUNDWATER FLOW DIRECTION
- 520 GROUNDWATER ELEVATION CONTOUR (MAY 2008)

SCREENING CRITERIA

- WELLS WITH COCs EXCEEDING NYSDEC CLASS GA STANDARDS
- RESULTS ABOVE NYSDEC CLASS GA STANARD

Site ID: OB-XX	NYSDEC CLASS GA groundwater standard	(units: ug/L) MAY 08
Analyte		
PCE	5	1 U
TCE	5	1 U
cis-1,2-DCE	5	41.4
trans-1,2-DCE	5	8.07
1,1-DCE	5	NS
Vinyl Chloride	2	47.8

SITE ID — DATE SAMPLED — NOT DETECTED AT THE INDICATED QUANTITATION LIMIT — DETECTED — NOT SAMPLED

MACTEC
Engineering and Consulting, Inc.
1725 Louisville Drive
Knoxville, TN 37921
(865) 588-8544

OVERBURDEN MONITORING WELLS WITH COCs EXCEEDING NYSDEC CLASS GA STANDARDS MAY 2008
TAYLOR INSTRUMENTS SITE, ROCHESTER, NEW YORK

2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RAE	3031052006	JD	07/22/08	09/29/08

Z

HAGUE STREET

WEST AVENUE

AMES STREET

Site ID: BR-06	(units µg/L)	
Analyte	Dec-07	May-08
PCE	1 U	NS
TCE	1 U	NS
cis-1,2-DCE	1 U	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: BR-07	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	1 U
cis-1,2-DCE	2.46
trans-1,2-DCE	2.70
1,1-DCE	1 U
Vinyl Chloride	7.06

Site ID: BR-13	(units µg/L)	
Analyte	Dec-05	May-08
PCE	1 U	NS
TCE	1 U	NS
cis-1,2-DCE	1 U	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: BR-12	(units µg/L)	
Analyte	Dec-05	May-08
PCE	1 U	NS
TCE	1 U	NS
cis-1,2-DCE	7.33	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: BR-04	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	332
cis-1,2-DCE	647
trans-1,2-DCE	17.7
1,1-DCE	2.83
Vinyl Chloride	1.37

Site ID: BR-17	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	47.8
cis-1,2-DCE	221
trans-1,2-DCE	41.6
1,1-DCE	1.83
Vinyl Chloride	5.3

Site ID: BR-08	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	5.05
cis-1,2-DCE	99.2
trans-1,2-DCE	6.12
1,1-DCE	1 U
Vinyl Chloride	12.8

Site ID: BR-05	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	65.2
cis-1,2-DCE	126
trans-1,2-DCE	7.39
1,1-DCE	1 U
Vinyl Chloride	11.6

Site ID: BR-09	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	2.88
cis-1,2-DCE	7.81
trans-1,2-DCE	1 U
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: BR-15	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	43.4
cis-1,2-DCE	449
trans-1,2-DCE	2.94
1,1-DCE	1.38
Vinyl Chloride	28.2

Site ID: BR-11	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	10.7
cis-1,2-DCE	45.0
trans-1,2-DCE	8.03
1,1-DCE	1 U
Vinyl Chloride	1.54

Site ID: BR-16	(units µg/L)	
Analyte	Dec-02	May-08
PCE	2 U	NS
TCE	2 U	NS
cis-1,2-DCE	2 U	NS
trans-1,2-DCE	2 U	NS
1,1-DCE	2 U	NS
Vinyl Chloride	2 U	NS

Site ID: BR-01	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	4.19
cis-1,2-DCE	10.7
trans-1,2-DCE	1.63
1,1-DCE	1 U
Vinyl Chloride	1 U

Site ID: BR-14	(units µg/L)	
Analyte	Dec-05	May-08
PCE	1 U	NS
TCE	1 U	NS
cis-1,2-DCE	1 U	NS
trans-1,2-DCE	1 U	NS
1,1-DCE	1 U	NS
Vinyl Chloride	1 U	NS

Site ID: BR-10	(units µg/L)
Analyte	May-08
PCE	2.94
TCE	357
cis-1,2-DCE	94.6
trans-1,2-DCE	10.7
1,1-DCE	1 U
Vinyl Chloride	1.4

Site ID: BR-03	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	588
cis-1,2-DCE	5.20
trans-1,2-DCE	1 U
1,1-DCE	1.81
Vinyl Chloride	1 U

Site ID: BR-02	(units µg/L)
Analyte	May-08
PCE	1 U
TCE	153
cis-1,2-DCE	74.2
trans-1,2-DCE	14.0
1,1-DCE	1 U
Vinyl Chloride	1 U

BR-06 W-2 BR-07 W-4 MW-00 TW-13 W-3 BR-13 BR-12 BR-05 BR-16 OB-05 W-5 BR-14 OB-08 BR-15 OB-09 BR-01 TW-2 W-6 BR-04 OB-04 BR-17 BR-08 BR-09 OB-06 BR-11 TW-74 BR-10 OB-07 W-1 BR-03 TW-04 TW-01 BR-02 TW-09 TW-07 TW-20

GROUNDWATER TREATMENT BUILDING

STORAGE SHED

CONC. SLAB

BUILDING FOOTPRINT

NEW YORK CENTRAL RAILROAD N/F RAILROAD TRACKS

GATE POST GATE POST GV

RESIDENCE RESIDENCE RESIDENCE

LEGEND

- BEDROCK MONITORING WELL (BR)
- COC CONTAMINANTS OF CONCERN
- DCE DICHLOROETHENE
- PCE TETRACHLOROETHENE (PERCHLOROETHENE)
- TCE TRICHLOROETHENE
- J ESTIMATED VALUE
- U NON DETECT

SCREENING CRITERIA

- WELLS WITH COCs EXCEEDING NYSDEC CLASS GA STANDARDS
- RESULTS ABOVE NYSDEC CLASS GA STANARD

SITE ID

Site ID: 08-XX	NYSDES CLASS GA groundwater standard	(units: ug/L) MAY 08
Analyte		
PCE	5	1 U
TCE	5	1 U
cis-1,2-DCE	5	41.4
trans-1,2-DCE	5	8.07
1,1-DCE	5	NS
Vinyl Chloride	2	47.8

DATE SAMPLED
NOT DETECTED AT THE INDICATED QUANTITATION LIMIT
DETECTED
NOT SAMPLED

0 80'

SCALE: 1"=80'

MACTEC
Engineering and Consulting, Inc.
1725 Louisville Drive
Knoxville, TN 37921
(865) 588-8544

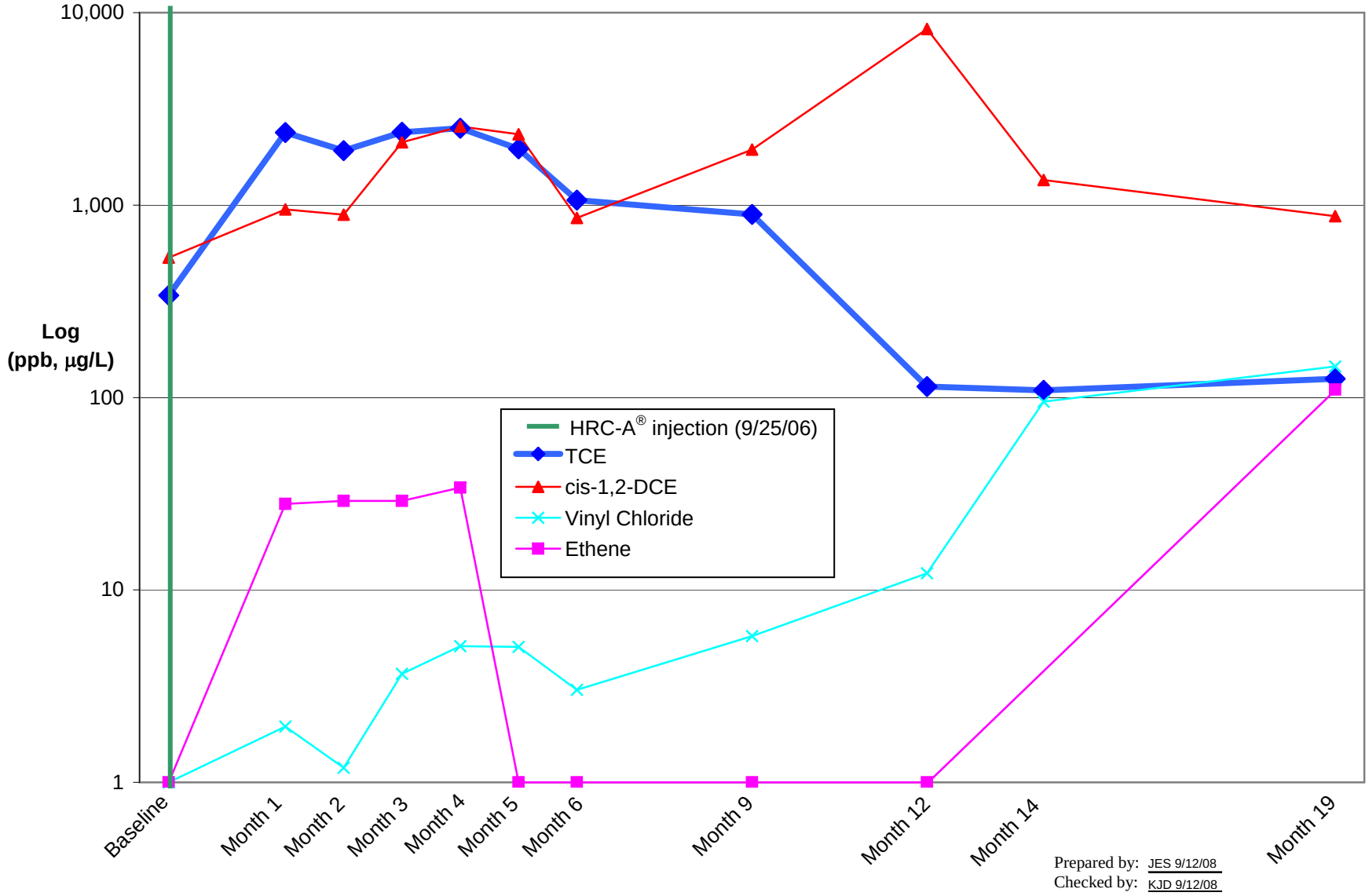
BEDROCK MONITORING WELLS WITH COCs EXCEEDING NYSDEC CLASS GA STANDARDS MAY 2008
TAYLOR INSTRUMENTS SITE, ROCHESTER, NEW YORK

3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RAE	3031052006	JD	07/22/08	09/25/08

Figure 4

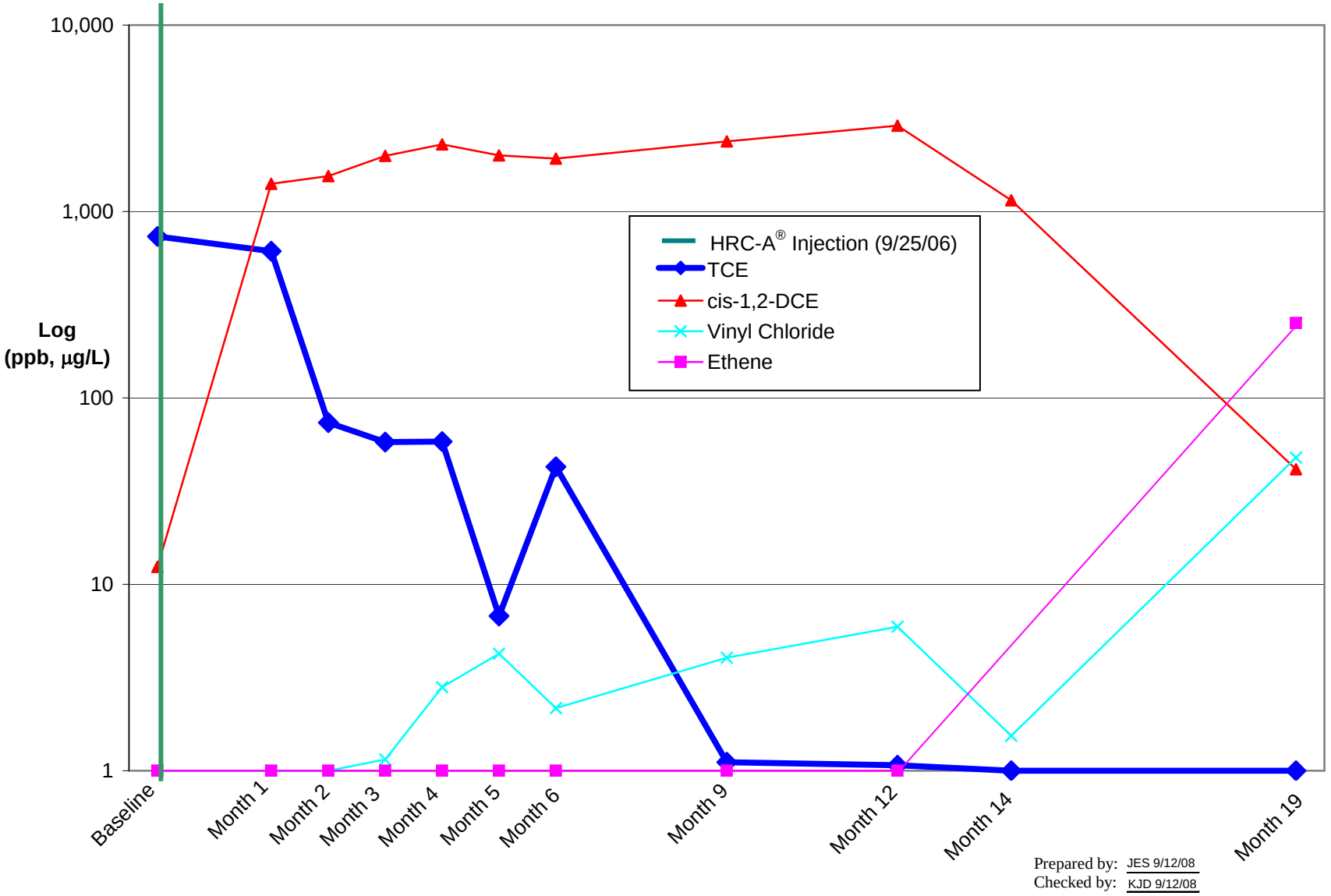
HRC Advanced® Pilot Test Results: OB-04 COC Concentration Trend Graph



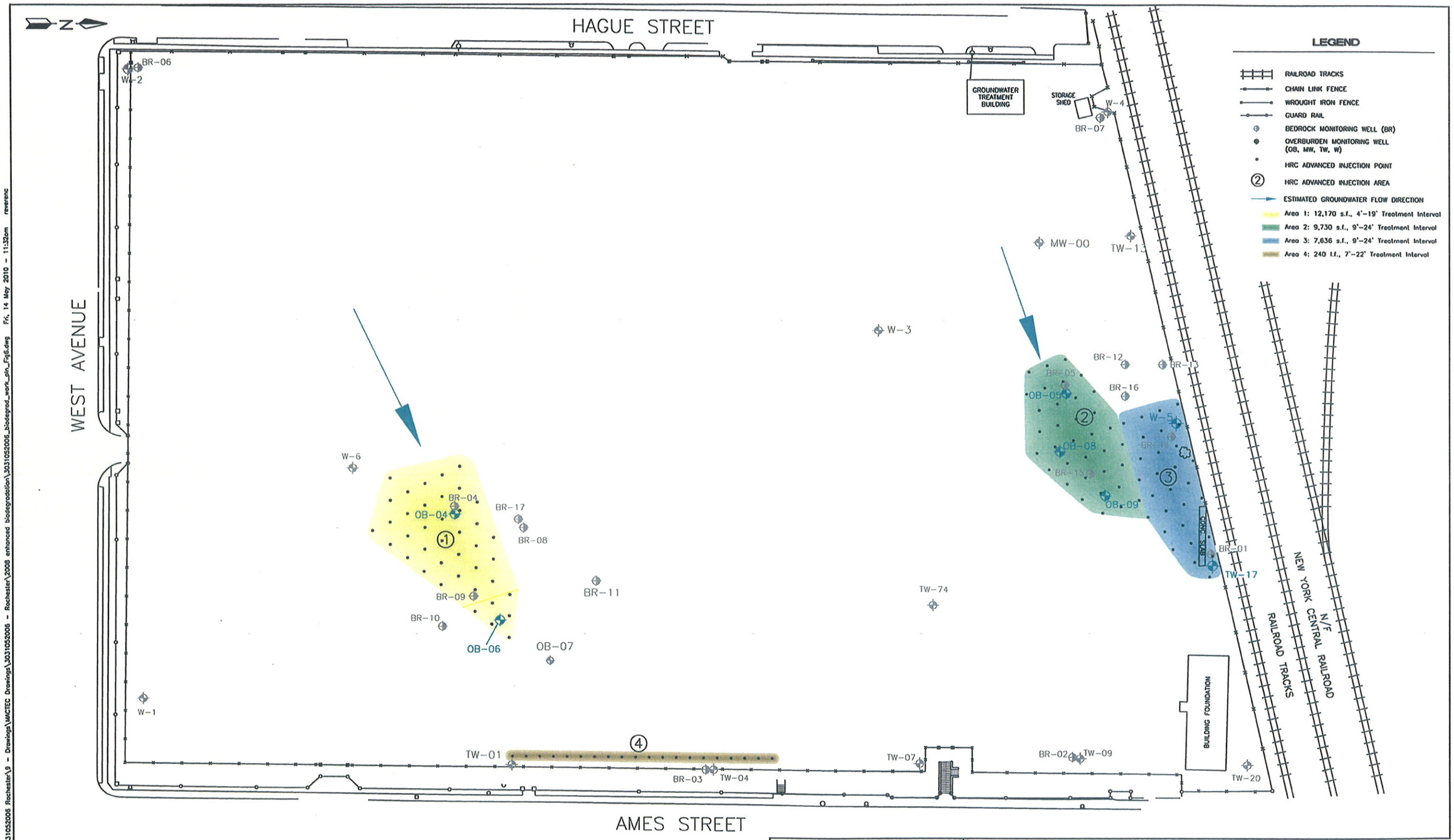
Prepared by: JES 9/12/08
Checked by: KJD 9/12/08

Figure 5

HRC Advanced® Pilot Test Results: OB-08 COC Concentration Trend Graph



Prepared by: JES 9/12/08
Checked by: KJD 9/12/08



0 80'

SCALE: 1"=80'

NOTE:
THE AREA IS COVERED WITH BITUMINOUS PAVEMENT INSIDE FENCED AREA.

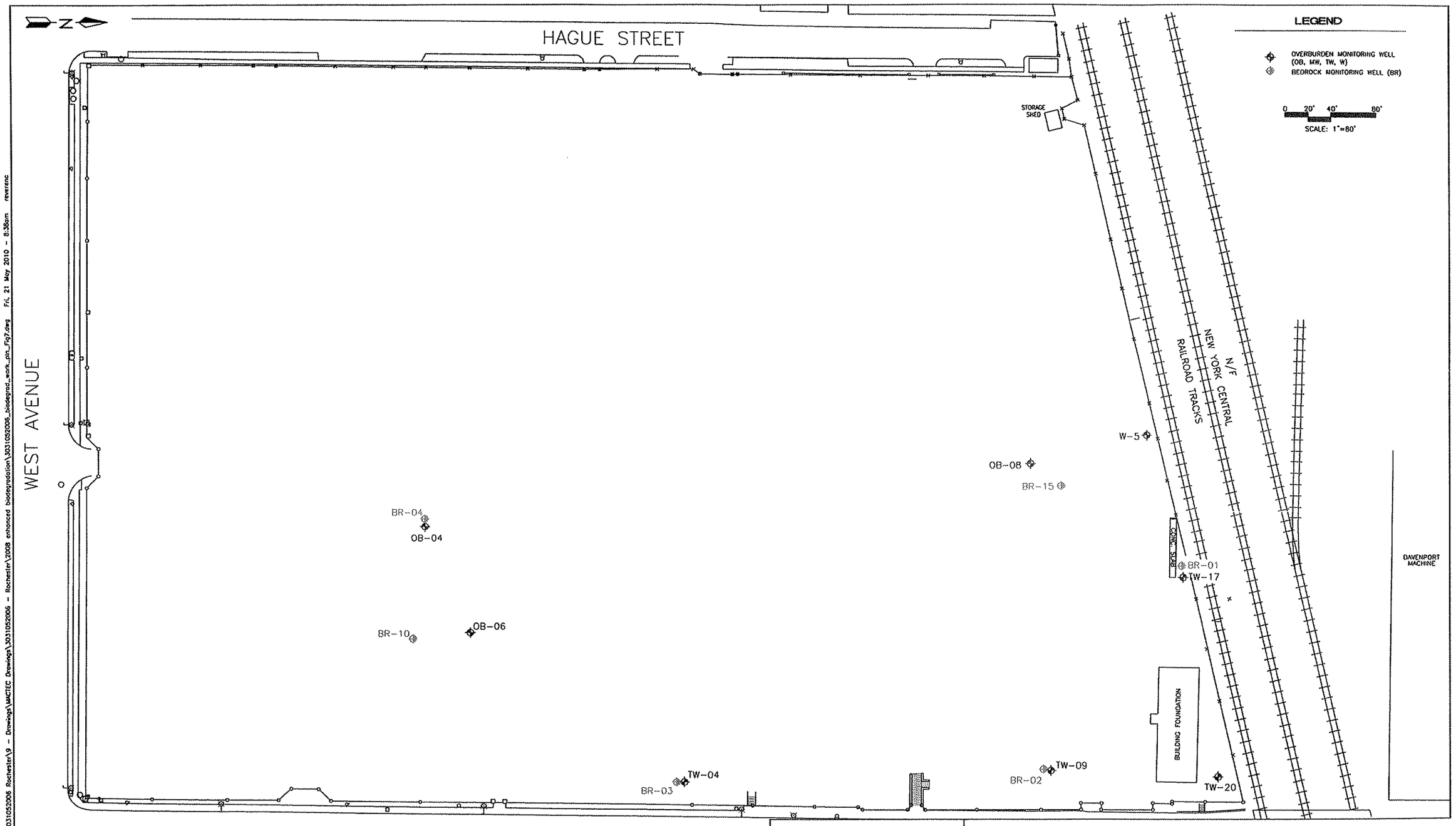
MACTEC
Engineering and Consulting, Inc.
9725 Cogdill Road
Knoxville, TN 37932
(865) 588-8544

PROPOSED HRC ADVANCED® INJECTION LAYOUT
FORMER TAYLOR INSTRUMENTS SITE, ROCHESTER, NEW YORK

6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PSK	3031052006	JD	07/22/08	05/14/10

P:\WB Business Services\3031052006 Rochester\9 - Drawings\MACTEC Drawings\3031052006 - Rochester\2008 enhanced biodegradation\3031052006_biodegrad_work_pln_Fig6.dwg Fri, 14 May 2010 - 11:32am rewerenc



P:\488 Business Services\3031052006 Rochester\9 - Drawings\MACTEC Drawings\3031052006 - Rochester\2008 enhanced biodegradation\3031052006_biodegrad_work_pln_Fig7.dwg Fri, 21 May 2010 - 8:38am reverenc

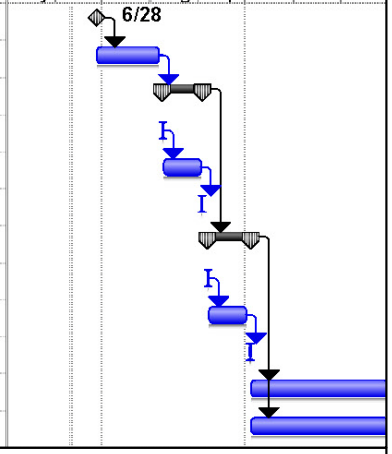
MACTEC
Engineering and Consulting, Inc.
9725 Cogdill Road
Knoxville, TN 37932
(865) 588-8544

MONITORING WELLS FOR POST CLOSURE MONITORING
FORMER TAYLOR INSTRUMENTS SITE, ROCHESTER, NEW YORK

7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RSS	3031052006	JD	07/22/08	05/14/10

ID	Task Name	Duration	Start	Finish
1	**NYSDEC Approval of Work Plan**	**0 days**	**Mon 6/28/10**	**Mon 6/28/10**
2	**Procurement & Scheduling of Contractors**	**30 days**	**Mon 6/28/10**	**Fri 8/6/10**
3	**Decommissioning of the Remediation System**	**20 days**	**Mon 8/9/10**	**Fri 9/3/10**
4	Mobilization	1 day	Mon 8/9/10	Mon 8/9/10
5	Decommissioning Field Activities	18 days	Tue 8/10/10	Thu 9/2/10
6	Demobilization	1 day	Fri 9/3/10	Fri 9/3/10
7	**HRC Advanced Injection**	**20 days**	**Tue 9/7/10**	**Mon 10/4/10**
8	Mobilization	1 day	Tue 9/7/10	Tue 9/7/10
9	Injection Field Activities	18 days	Wed 9/8/10	Fri 10/1/10
10	Demobilization	1 day	Mon 10/4/10	Mon 10/4/10
11	**Construction Completion Report**	**64 days**	**Tue 10/5/10**	**Fri 12/31/10**
12	**OM&M Plan**	**64 days**	**Tue 10/5/10**	**Fri 12/31/10**



Project: Former Taylor Site
Date: Fri 6/11/10

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Prepared/Date: RAR 6/8/2010
Checked/Date: KJD 6/9/2010

Revised Work Plan for Accelerated Bioremediation and Permanent Decommissioning of the Remedial Treatment System
VCA Index #B8-0508-97-02
Former Taylor Instruments Site
Rochester, New York

MACTEC

Figure 8
Work Plan Implementation Schedule

Project 3031052006/11

ATTACHMENT B

TABLES

Table 1
Decline of TCE Concentrations Over Time

Revised Work Plan for Accelerated Bioremediation and Permanent Decommissioning of the Remedial Treatment System
Former Taylor Instruments Site
Rochester, New York

Well ID[1]	Area	High BL/ Post BL	May 2008 Result	% Decline[2]
Source Area Monitor Wells				
OB-04	South	71,500	125	99
OB-06	South	5,600	72.6	99
OB-05	North	25,000	210	99
OB-08	North	40,000	1 U	99
BR-04	South	10,000	332	97
BR-09	South	13,000	2.88	99
BR-10	South	8,700	357	96
BR-11	South	60,000	10.7	99
BR-17	South	6,900	47.8	99
BR-05	North	5,800	65.2	99
BR-15	North	6,590	43.4	99
BR-08 (deep)	South	1,100	5.05	99
Plume Monitor Wells				
OB-07	South	21.8	3.57	84
OB-09	North	180	55.0	69
Perimeter Monitor Wells				
TW-04	South	51.1	4.40	91
TW-07	South	74	1 U	99
TW-17	North	1,000	477	52
TW-20	Between	14.8	4.50	70
TW-09	Between	230	50.5	78
BR-02	South	7,000	153	98
BR-06	South	1.6 J	1 U[3]	38
BR-03	South	1,150	588	49
BR-01	North	551	4.19	99
BR-07	North	7.4	1 U	86
W-5	North	1,435	1,180	18

[1] Upgradient wells not shown include W-4, TW-13, MW-00, W-2, W-1, TW-01, TW-74, W-6, W-3, and BR-16. Other wells not shown: BR-12, BR-13, and BR-14. Removed from semi-annual sampling program based on historical groundwater results.
[2] Percent decline determined by comparing current value (May 2008) to the highest BL/Post BL value.
[3] BR-06 was last sampled on December 10, 2007.

Notes: Values are in parts per billion.

BL = baseline
ID = identification
J = estimated
TCE = trichloroethylene
U = no detections

Prepared by JES on 8/12/08
Checked by KJD on 9/12/08

Table 2
Wells to be Abandoned

Revised Work Plan for Accelerated Bioremediation and Permanent
Decommissioning of the Remedial Treatment System
Former Taylor Instruments Site
Rochester, New York Rochester, New York

Well ID	Well Purpose/Type	Boring Depth (feet)	Well Depth (feet)	Well Diameter (inches)	Screen Interval		Well Material	Completion			Justification for Abandonment
					Top	Bottom	Riser/Screen	Flush-mount	Vault	Stick-up	
MW-00	Monitor	10.0	10.0	4	5	10.0	PVC	X			COCs not detected
BR-05	Monitor	49.9	49.9	4	NA	NA	Stainless/Open	X			Plume will be monitored by sampling of BR-01, BR-02, and BR-15
BR-06	Monitor	42.6	42.6	4	NA	NA	Stainless/Open	X			COCs not detected
BR-07	Monitor	53.3	53.3	4	NA	NA	Stainless/Open	X		X	Plume will be monitored by sampling of BR-01, BR-02, and BR-15
BR-08	Monitor	73.0	73.0	6 from surface to 25'; 4 thereafter	NA	NA	Iron/Open	X			Plume will be monitored by sampling of BR-03 and BR-04
BR-09	Monitor	47.0	47.0	6	NA	NA	Iron/Open	X			Plume will be monitored by sampling of BR-03 and BR-04
BR-11	Monitor	52.0	52.0	6	NA	NA	Iron/Open	X			Plume will be monitored by sampling of BR-03 and BR-04
BR-12	Monitor	42.0	42.0	6	NA	NA	Iron/Open	X			Plume will be monitored by sampling of BR-01, BR-02, and BR-15
BR-13	Monitor	67.5	67.5	6	NA	NA	Iron/Open	X			COCs not detected

See notes at end of table.

Table 2 (Continued)
Wells to be Abandoned

Revised Work Plan for Accelerated Bioremediation and Permanent
Decommissioning of the Remedial Treatment System
Former Taylor Instruments Site
Rochester, New York Rochester, New York

Well ID	Well Purpose/Type	Boring Depth (feet)	Well Depth (feet)	Well Diameter (inches)	Screen Interval		Well Material	Completion			Justification for Abandonment
					Top	Bottom	Riser/Screen	Flush-mount	Vault	Stick-up	
BR-14	Monitor	75.3	75.3	6 from surface to 25'; 4 thereafter	NA	NA	Iron/Open	X			COCs not detected
BR-16	Monitor	55.0	55.0	6	NA	NA	Iron/Open	X			COCs not detected
BR-17	Monitor	52.0	52.0	6	NA	NA	Iron/Open	X			Plume will be monitored by sampling of BR-03 and BR-04
EW-N-1	Extraction	27.0	27.0	4	5.2	26.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-N-2	Extraction	27.0	27.0	4	5.5	26.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-N-3	Extraction	26.8	26.8	4	5.2	25.8	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-N-4	Extraction	26.0	26.0	4	7.2	25.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-N-5	Extraction	27.0	27.0	4	5.5	26.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-N-6	Extraction	25.5	25.0	4	6.1	24.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-1S	Extraction	14.0	13.7	4	4.3	13.7	Stainless		X (3' x 3' x 4')		System Decommission
EW-S-1D	Extraction	18.3	18.3	4	4.3	17.9	Stainless		X (3' x 3' x 4')		System Decommission
EW-S-2	Extraction	23.1	22.0	4	5.5	21.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-3	Extraction	23.5	22.0	4	5.5	21.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-4	Extraction	23.5	22.0	4	5.5	21.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-5	Extraction	23.5	22.5	4	5.8	21.5	Stainless/PVC		X (3' x 3' x 4')		System Decommission

See notes at end of table.

Table 2 (Continued)
Wells to be Abandoned

Revised Work Plan for Accelerated Bioremediation and Permanent
Decommissioning of the Remedial Treatment System
Former Taylor Instruments Site
Rochester, New York Rochester, New York

Well ID	Well Purpose/Type	Boring Depth (feet)	Well Depth (feet)	Well Diameter (inches)	Screen Interval		Well Material	Completion			Justification for Abandonment
					Top	Bottom	Riser/Screen	Flush-mount	Vault	Stick-up	
EW-S-6	Extraction	22.9	22.4	4	5.9	20.9	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-7	Extraction	23.1	22.5	4	5.9	21.6	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-8	Extraction	23.0	22.5	4	5.8	21.5	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-9	Extraction	23.0	22.5	4	6.0	21.5	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-10	Extraction	22.6	22.5	4	6.0	21.5	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-11	Extraction	22.6	22.5	4	5.9	22.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-12	Extraction	22.3	22.3	4	5.8	21.3	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-13	Extraction	22.0	22.0	4	6.0	21.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-14	Extraction	22.0	22.0	4	5.6	21.0	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-15	Extraction	22.0	21.8	4	5.2	20.8	Stainless/PVC		X (3' x 3' x 4')		System Decommission
EW-S-16	Extraction	21.3	21.3	4	5.2	20.3	Stainless/PVC		X (3' x 3' x 4')		System Decommission
BREW-S-1	Extraction	61.8	61.8	6	26.6	56.4	Stainless/PVC		X (4' x 4' x 5')		System Decommission
BREW-N-1	Extraction	75.8	75.8	6	25.8	70.3	Stainless/PVC		X (4' x 4' x 5')		System Decommission
OB-05	Monitor	18.0	18.0		4.0	18.0	PVC	X			Plume will be monitored by sampling of OB-08, TW-09, TW-17, TW-20, and W-5
OB-07	Monitor	20.5	20.5	2	10.2	20.2	PVC	X			Plume will be monitored by sampling of OB-04 and TW-04

See notes at end of table.

Table 2 (Continued)
Wells to be Abandoned

Revised Work Plan for Accelerated Bioremediation and Permanent
Decommissioning of the Remedial Treatment System
Former Taylor Instruments Site
Rochester, New York Rochester, New York

Well ID	Well Purpose/Type	Boring Depth (feet)	Well Depth (feet)	Well Diameter (inches)	Screen Interval		Well Material	Completion			Justification for Abandonment
					Top	Bottom	Riser/Screen	Flush-mount	Vault	Stick-up	
OB-09	Monitor	23.5	23.3		13.3	23.1	PVC	X			Plume will be monitored by sampling of OB-08, TW-09, TW-17, TW-20, and W-5
TW-01	Monitor	22.0	22.0	2	17.0	22.0	PVC	X			COCs not detected
TW-07	Monitor	17.5	17.5	2	12.5	17.5	PVC	X			COCs not detected
TW-13	Monitor	15.0	15.0	2	10.0	15.0	PVC	X			COCs not detected
TW-74	Monitor	15.0	15.0	2	7.5	15.0	PVC	X			Plume will be monitored by sampling of OB-08, TW-09, TW-17, TW-20, and W-5
W-1	Monitor	14.0	14.0	2	7.0	13.9	PVC			X	COCs not detected
W-2	Monitor	21.0	18.0	2	13.0	18.0	PVC			X	COCs not detected
W-3	Monitor	24.0	17.0	2	16.0	21.0	PVC	X			COCs not detected
W-4	Monitor	29.0	26.0	2	21.0	26.0	PVC			X	COCs detected below NYSDEC Class GA Standards
W-6	Monitor	16.5	15.0	2	13.0	15.0	PVC	X			COCs detected below NYSDEC Class GA Standards
VW-N-1	Vent	25.5	25.3	2	5.3	25.3	PVC		X (3' x 3' x 4')		System Decommission
VW-N-2	Vent	28.0	27.8	2	7.8	27.8	PVC		X (3' x 3' x 4')		System Decommission

See notes at end of table.

Table 2 (Continued)
Wells to be Abandoned

Revised Work Plan for Accelerated Bioremediation and Permanent
Decommissioning of the Remedial Treatment System
Former Taylor Instruments Site
Rochester, New York Rochester, New York

Well ID	Well Purpose/Type	Boring Depth (feet)	Well Depth (feet)	Well Diameter (inches)	Screen Interval		Well Material	Completion			Justification for Abandonment
					Top	Bottom	Riser/Screen	Flush-mount	Vault	Stick-up	
VW-N-3	Vent	26.0	25.8	2	5.8	25.8	PVC		X (3' x 3' x 4')		System Decommission
VW-N-4	Vent	27.6	27.4	2	7.4	27.4	PVC		X (3' x 3' x 4')		System Decommission
VW-N-5	Vent	26.0	25.8	2	5.8	25.8	PVC		X (3' x 3' x 4')		System Decommission
VW-N-6	Vent	25.4	25.2	2	5.2	25.2	PVC		X (3' x 3' x 4')		System Decommission
VW-N-7	Vent	25.3	25.1	2	5.1	25.1	PVC		X (3' x 3' x 4')		System Decommission
VW-S-1	Vent	24.7	24.45	2	4.45	24.45	PVC		X (3' x 3' x 4')		System Decommission
VW-S-2	Vent	24.5	24.25	2	4.25	24.25	PVC		X (3' x 3' x 4')		System Decommission
VW-S-3	Vent	23.5	23.3	2	5.5	23.3	PVC		X (3' x 3' x 4')		System Decommission
VW-S-4	Vent	24.7	24.45	2	4.45	24.45	PVC		X (3' x 3' x 4')		System Decommission
VW-S-5	Vent	24.5	24.25	2	4.25	24.25	PVC		X (3' x 3' x 4')		System Decommission
VW-S-6	Vent	23.5	23.25	2	3.25	23.25	PVC		X (3' x 3' x 4')		System Decommission
VW-S-7	Vent	24.7	24.45	2	4.45	24.45	PVC		X (3' x 3' x 4')		System Decommission
VW-S-8	Vent	24.8	24.55	2	4.55	24.55	PVC		X (3' x 3' x 4')		System Decommission
VW-S-9	Vent	24.7	24.45	2	4.45	24.45	PVC		X (3' x 3' x 4')		System Decommission
VW-S-10	Vent	22.9	22.65	2	2.65	22.65	PVC		X (3' x 3' x 4')		System Decommission
VW-S-11	Vent	24.7	24.45	2	4.45	24.45	PVC		X (3' x 3' x 4')		System Decommission
VW-S-12	Vent	24.7	24.45	2	4.45	24.45	PVC		X (3' x 3' x 4')		System Decommission

See notes at end of table.

Table 2 (Continued)
Wells to be Abandoned

Revised Work Plan for Accelerated Bioremediation and Permanent
Decommissioning of the Remedial Treatment System
Former Taylor Instruments Site
Rochester, New York Rochester, New York

Well ID	Well Purpose/Type	Boring Depth (feet)	Well Depth (feet)	Well Diameter (inches)	Screen Interval		Well Material	Completion			Justification for Abandonment
					Top	Bottom	Riser/Screen	Flush-mount	Vault	Stick-up	
VW-S-13	Vent	24.7	24.45	2	4.45	24.45	PVC		X (3' x 3' x 4')		System Decommission
VW-S-14	Vent	24.6	24.35	2	4.35	24.35	PVC		X (3' x 3' x 4')		System Decommission

Notes: ' = feet

COC = contaminant of concern
ID = identification
NA = not applicable
NYSDEC = New York State Department of Environmental Conservation
PVC = polyvinyl chloride

Prepared by JES on 9/04/08

Checked by KJD on 9/12/08

ATTACHMENT C

HRC ADVANCED® DESIGN CALCULATIONS

Location: Area 1 - OB-04

3DMe Design Software for Grid Treatment

Regenesis Technical Support: USA (949) 366-8000 www.regenesis.com

Site Name: Former Taylor Instruments, Rochester
Location: Area 1 - OB-04
Consultant: Mactec, Knoxville

Site Conceptual Model/Extent of Plume Requiring Remediation

Width of plume (intersecting gw flow direction)	79	ft			
Length of plume (parallel to gw flow direction)	140	ft	=	11,060	ft^2
Depth to contaminated zone	9	ft			
Thickness of contaminated saturated zone	15	ft			
Nominal aquifer soil (gravel, sand, silty sand, silt, clay, etc.)	silty sand				
Total porosity	0.4		Effective porosity:	0.2	
Hydraulic conductivity	0.9	ft/day	=	3.2E-04	cm/sec
Hydraulic gradient	0.0108	ft/ft			
Seepage velocity	17.7	ft/yr	=	0.049	ft/day
Treatment Zone Pore Volume	66,360	ft^3		496,439	gallons

Dissolved Phase Electron Donor Demand

	Contaminant Conc (mg/L)	Contaminant Mass (lb)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb)
Tetrachloroethene (PCE)	0.00	0.0	20.7	0.00
Trichloroethene (TCE)	0.13	0.5	21.9	0.02
cis-1,2-dichloroethene (DCE)	0.88	3.6	24.2	0.15
Vinyl Chloride (VC)	0.15	0.6	31.2	0.02
1,1,1-Trichloroethane (TCA)	0.00	0.0	22.2	0.00
1,1-Dichlorochloroethane (DCA)	0.00	0.0	24.7	0.00
User added, also add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	n/a
User added, also add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	n/a

carbon tetrachloride <- pull-down menu

Sorbed Phase (SP) Electron Donor Demand:

Soil bulk density	1.76	g/cm^3 =	110	lb/cf
Fraction of organic carbon (foc)	0.01	range: 0.0001 to 0.01		

(Values are estimated using SP = foc*Koc*Cgw)
(Adjust Koc as necessary to provide realistic estimates)

	Koc (L/kg)	Contaminant Conc (mg/kg)	Contaminant Mass (lb)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb)
Tetrachloroethene (PCE)	371	0.00	0.0	20.7	0.00
Trichloroethene (TCE)	122	0.15	2.8	21.9	0.13
cis-1,2-dichloroethene (DCE)	80	0.70	12.8	24.2	0.53
Vinyl Chloride (VC)	2.5	0.00	0.1	31.2	0.00
1,1,1-Trichloroethane (TCA)	304	0.00	0.0	22.2	0.00
1,1-Dichlorochloroethane (DCA)	33	0.00	0.0	24.7	0.00
User added, also add stoich. demand and Koc (see pull-down)	0	0.00	0.0	0.0	n/a
User added, also add stoich. demand and Koc (see pull-down)	0	0.00	0.0	0.0	n/a

Add Menu from A:43-C:43

Competing Electron Acceptors:

	CEA Conc (mg/L)	CEA Mass (lb)	Stoich. (wt/wt) e^- acceptor/H_2	H_2 Req. (lb)
Oxygen Demand	2.50	10	8.0	1.29
Nitrate Demand	0.66	3	12.4	0.22
Bioavailable Manganese Demand	1.00	4	27.5	0.15
Bioavailable Iron Demand	0.17	1	55.9	0.01
Sulfate Demand	213	880	12.0	73.30

(Not all SO4 must be reduced, try 100 mg/l for prelim est. and call Regenesis for current info on SO4 demand)

Microbial Demand Factor	3	Recommend 1-4x
Safety Factor	2	Recommend 1-4x

3DMe Weight and Volume Estimations

Project 3DMe Concentrate Material Requirements:

Amount of 3DMe Concentrate Required (lbs): 6,927 — Volume of 3DMe Concentrate Required (gals): 831
Minimum Dose Override

Standard 10:1 Vol (H2O):Vol (3DMe) Emulsion Production Requirements:

	Lbs.		Gallons
3DMe Concentrate	6,927	3DMe Concentrate	831
Water	69,305	Water	8,310
Total	76,232	**Total**	9,141

Delivery Array Evaluation:

Injection spacing within rows (ft)	17.0	# points per row:	5
Injection spacing between rows (ft)	17.0	# of rows:	9
Advective travel time between rows (days)	350	Total # of points:	34

3DMe Application Evaluation:

	Lbs.		Gallons
10:1 V/V Emulsion App. Rate per Foot	149.5	10:1 V/V Emulsion App. Rate per Foot	17.9
10:1 V/V Emulsion App. Rate per Point	2242	10:1 V/V Emulsion App. Rate per Point	269

Est.% of Effective Pore Vol. Displaced by 3DMe Emulsion: 3.7%

Project Summary:

Number of 3DMe delivery points (adjust as necessary for site)		34
3DMe Emulsion application rate in Lbs/ft		149.5
Mass of 3DMe Emulsion per point (lb)		2,242
Number of 30 lb 3DMe concentrate buckets/application point		6.8
Total 30 lb 3DMe concentrate buckets		231
Total mass of 3DMe concentrate (lb)		6,930
Mass of 10:1(V:V) 3DMe Emulsion (lb)	**Total**	**76,232**

Location: Area 1 - OB-06

3DMe Design Software for Grid Treatment

Regenesis Technical Support: USA (949) 366-8000 www.regenesis.com

Site Name: Former Taylor Instruments, Rochester
Location: Area 1 - OB-06
Consultant: Mactec, Knoxville

Site Conceptual Model/Extent of Plume Requiring Remediation

Width of plume (intersecting gw flow direction)	32	ft			
Length of plume (parallel to gw flow direction)	35	ft	=	1,120	ft^2
Depth to contaminated zone	9	ft			
Thickness of contaminated saturated zone	15	ft			
Nominal aquifer soil (gravel, sand, silty sand, silt, clay, etc.)	silty sand				
Total porosity	0.4		Effective porosity:	0.2	
Hydraulic conductivity	0.9	ft/day	=	3.2E-04	cm/sec
Hydraulic gradient	0.0108	ft/ft			
Seepage velocity	17.7	ft/yr	=	0.049	ft/day
Treatment Zone Pore Volume	6,720	ft^3		50,272	gallons

Dissolved Phase Electron Donor Demand

	Contaminant Conc (mg/L)	Contaminant Mass (lb)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb)
Tetrachloroethene (PCE)	0.00	0.0	20.7	0.00
Trichloroethene (TCE)	0.07	0.0	21.9	0.00
cis-1,2-dichloroethene (DCE)	0.00	0.0	24.2	0.00
Vinyl Chloride (VC)	0.00	0.0	31.2	0.00
1,1,1-Trichloroethane (TCA)	0.00	0.0	22.2	0.00
1,1-Dichlorochloroethane (DCA)	0.00	0.0	24.7	0.00
User added, also add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	n/a
User added, also add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	n/a

carbon tetrachloride <- pull-down menu

Sorbed Phase (SP) Electron Donor Demand:

Soil bulk density	1.76	g/cm^3 =	110	lb/cf
Fraction of organic carbon (foc)	0.01	range: 0.0001 to 0.01		

(Values are estimated using SP = foc*Koc*Cgw)
(Adjust Koc as necessary to provide realistic estimates)

	Koc (L/kg)	Contaminant Conc (mg/kg)	Contaminant Mass (lb)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb)
Tetrachloroethene (PCE)	371	0.00	0.0	20.7	0.00
Trichloroethene (TCE)	122	0.09	0.2	21.9	0.01
cis-1,2-dichloroethene (DCE)	80	0.00	0.0	24.2	0.00
Vinyl Chloride (VC)	2.5	0.00	0.0	31.2	0.00
1,1,1-Trichloroethane (TCA)	304	0.00	0.0	22.2	0.00
1,1-Dichlorochloroethane (DCA)	33	0.00	0.0	24.7	0.00
User added, also add stoich. demand and Koc (see pull-down)	0	0.00	0.0	0.0	n/a
User added, also add stoich. demand and Koc (see pull-down)	0	0.00	0.0	0.0	n/a

Add Menu from A:43-C:43

Competing Electron Acceptors:

	CEA Conc (mg/L)	CEA Mass (lb)	Stoich. (wt/wt) e^- acceptor/H_2	H_2 Req. (lb)
Oxygen Demand	2.50	1	8.0	0.13
Nitrate Demand	0.62	0	12.4	0.02
Bioavailable Manganese Demand	1.00	0	27.5	0.02
Bioavailable Iron Demand	0.14	0	55.9	0.00
Sulfate Demand	213	89	12.0	7.42

(Not all SO4 must be reduced, try 100 mg/l for prelim est. and call Regenesis for current info on SO4 demand)

Microbial Demand Factor	3	Recommend 1-4x
Safety Factor	2	Recommend 1-4x

3DMe Weight and Volume Estimations

Project 3DMe Concentrate Material Requirements:

Amount of 3DMe Concentrate Required (lbs): 805 — Volume of 3DMe Concentrate Required (gals): 97
Minimum Dose Override

Standard 10:1 Vol (H2O):Vol (3DMe) Emulsion Production Requirements:

	Lbs.		Gallons
3DMe Concentrate	805	3DMe Concentrate	97
Water	8,090	Water	970
Total	8,894	**Total**	1,067

Delivery Array Evaluation:

Injection spacing within rows (ft)	17.0	# points per row:	2
Injection spacing between rows (ft)	17.0	# of rows:	3
Advective travel time between rows (days)	350	Total # of points:	6

3DMe Application Evaluation:

	Lbs.		Gallons
10:1 V/V Emulsion App. Rate per Foot	98.8	10:1 V/V Emulsion App. Rate per Foot	11.9
10:1 V/V Emulsion App. Rate per Point	1482	10:1 V/V Emulsion App. Rate per Point	178

Est.% of Effective Pore Vol. Displaced by 3DMe Emulsion: 4.2%

Project Summary:

Number of 3DMe delivery points (adjust as necessary for site)		6
3DMe Emulsion application rate in Lbs/ft		98.8
Mass of 3DMe Emulsion per point (lb)		1,482
Number of 30 lb 3DMe concentrate buckets/application point		4.5
Total 30 lb 3DMe concentrate buckets		27
Total mass of 3DMe concentrate (lb)		810
Mass of 10:1(V:V) 3DMe Emulsion (lb)	**Total**	**8,894**

Location: Area 2 - OB-05/OB-09

3DMe Design Software for Grid Treatment

Regenesis Technical Support: USA (949) 366-8000 www.regenesis.com

Site Name: Former Taylor Instruments, Rochester
Location: Area 2 - OB-05/OB-09
Consultant: Mactec, Knoxville

Site Conceptual Model/Extent of Plume Requiring Remediation

Width of plume (intersecting gw flow direction)	68	ft			
Length of plume (parallel to gw flow direction)	150	ft	=	10,200	ft^2
Depth to contaminated zone	9	ft			
Thickness of contaminated saturated zone	15	ft			
Nominal aquifer soil (gravel, sand, silty sand, silt, clay, etc.)	silty sand				
Total porosity	0.4		Effective porosity:	0.2	
Hydraulic conductivity	0.9	ft/day	=	3.2E-04	cm/sec
Hydraulic gradient	0.0108	ft/ft			
Seepage velocity	17.7	ft/yr	=	0.049	ft/day
Treatment Zone Pore Volume	61,200	ft^3		457,837	gallons

Dissolved Phase Electron Donor Demand

	Contaminant Conc (mg/L)	Contaminant Mass (lb)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb)
Tetrachloroethene (PCE)	0.00	0.0	20.7	0.00
Trichloroethene (TCE)	0.13	0.5	21.9	0.02
cis-1,2-dichloroethene (DCE)	0.00	0.0	24.2	0.00
Vinyl Chloride (VC)	0.00	0.0	31.2	0.00
1,1,1-Trichloroethane (TCA)	0.00	0.0	22.2	0.00
1,1-Dichlorochloroethane (DCA)	0.00	0.0	24.7	0.00
User added, also add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	n/a
User added, also add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	n/a

carbon tetrachloride <- pull-down menu

Sorbed Phase (SP) Electron Donor Demand:

Soil bulk density	1.76	g/cm^3 =	110	lb/cf
Fraction of organic carbon (foc)	0.01	range: 0.0001 to 0.01		

(Values are estimated using SP = foc*Koc*Cgw)
(Adjust Koc as necessary to provide realistic estimates)

	Koc (L/kg)	Contaminant Conc (mg/kg)	Contaminant Mass (lb)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb)
Tetrachloroethene (PCE)	371	0.00	0.0	20.7	0.00
Trichloroethene (TCE)	122	0.16	2.7	21.9	0.12
cis-1,2-dichloroethene (DCE)	80	0.00	0.0	24.2	0.00
Vinyl Chloride (VC)	2.5	0.00	0.0	31.2	0.00
1,1,1-Trichloroethane (TCA)	304	0.00	0.0	22.2	0.00
1,1-Dichlorochloroethane (DCA)	33	0.00	0.0	24.7	0.00
User added, also add stoich. demand and Koc (see pull-down)	0	0.00	0.0	0.0	n/a
User added, also add stoich. demand and Koc (see pull-down)	0	0.00	0.0	0.0	n/a

Add Menu from A:43-C:43

Competing Electron Acceptors:

	CEA Conc (mg/L)	CEA Mass (lb)	Stoich. (wt/wt) e^- acceptor/H_2	H_2 Req. (lb)
Oxygen Demand	2.50	10	8.0	1.19
Nitrate Demand	4.94	19	12.4	1.52
Bioavailable Manganese Demand	0.12	0	27.5	0.02
Bioavailable Iron Demand	0.35	1	55.9	0.02
Sulfate Demand	164	624	12.0	52.01

Microbial Demand Factor	3	Recommend 1-4x
Safety Factor	2	Recommend 1-4x

3DMe Weight and Volume Estimations

Project 3DMe Concentrate Material Requirements:

Amount of 3DMe Concentrate Required (lbs): 6,263 — Volume of 3DMe Concentrate Required (gals): 752
Minimum Dose Override

Standard 10:1 Vol (H2O):Vol (3DMe) Emulsion Production Requirements:

	Lbs.		Gallons
3DMe Concentrate	6,263	3DMe Concentrate	752
Water	62,717	Water	7,520
Total	68,980	**Total**	8,272

Delivery Array Evaluation:

Injection spacing within rows (ft)	15.0	# points per row:	5
Injection spacing between rows (ft)	15.0	# of rows:	10
Advective travel time between rows (days)	309	Total # of points:	35

3DMe Application Evaluation:

	Lbs.		Gallons
10:1 V/V Emulsion App. Rate per Foot	131.4	10:1 V/V Emulsion App. Rate per Foot	15.8
10:1 V/V Emulsion App. Rate per Point	1971	10:1 V/V Emulsion App. Rate per Point	236

Est.% of Effective Pore Vol. Displaced by 3DMe Emulsion: 3.6%

Project Summary:

Number of 3DMe delivery points (adjust as necessary for site)		35
3DMe Emulsion application rate in Lbs/ft		131.4
Mass of 3DMe Emulsion per point (lb)		1,971
Number of 30 lb 3DMe concentrate buckets/application point		6.0
Total 30 lb 3DMe concentrate buckets		209
Total mass of 3DMe concentrate (lb)		6,270
Mass of 10:1(V:V) 3DMe Emulsion (lb)	**Total**	**68,980**

Location: Area 3 - W-5/TW-17

3DMe Design Software for Grid Treatment

Regenesis Technical Support: USA (949) 366-8000 www.regenesis.com

Site Name: Former Taylor Instruments, Rochester
Location: Area 3 - W-5/TW-17
Consultant: Mactec, Knoxville

Site Conceptual Model/Extent of Plume Requiring Remediation

Width of plume (intersecting gw flow direction)	45	ft			
Length of plume (parallel to gw flow direction)	170	ft	=	7,650	ft^2
Depth to contaminated zone	9	ft			
Thickness of contaminated saturated zone	15	ft			
Nominal aquifer soil (gravel, sand, silty sand, silt, clay, etc.)	silty sand				
Total porosity	0.4		Effective porosity:	0.2	
Hydraulic conductivity	0.9	ft/day	=	3.2E-04	cm/sec
Hydraulic gradient	0.0108	ft/ft			
Seepage velocity	17.7	ft/yr	=	0.049	ft/day
Treatment Zone Pore Volume	45,900	ft^3		343,378	gallons

Dissolved Phase Electron Donor Demand

	Contaminant Conc (mg/L)	Contaminant Mass (lb)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb)
Tetrachloroethene (PCE)	0.00	0.0	20.7	0.00
Trichloroethene (TCE)	0.82	2.3	21.9	0.11
cis-1,2-dichloroethene (DCE)	0.16	0.5	24.2	0.02
Vinyl Chloride (VC)	0.01	0.0	31.2	0.00
1,1,1-Trichloroethane (TCA)	0.00	0.0	22.2	0.00
1,1-Dichlorochloroethane (DCA)	0.00	0.0	24.7	0.00
User added, also add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	n/a
User added, also add stoich. demand and Koc (see pull-down)	0.00	0.0	0.0	n/a

carbon tetrachloride <- pull-down menu

Sorbed Phase (SP) Electron Donor Demand:

Soil bulk density	1.76	g/cm^3 =	110	lb/cf
Fraction of organic carbon (foc)	0.01	range: 0.0001 to 0.01		

(Values are estimated using SP = foc*Koc*Cgw)
(Adjust Koc as necessary to provide realistic estimates)

	Koc (L/kg)	Contaminant Conc (mg/kg)	Contaminant Mass (lb)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb)
Tetrachloroethene (PCE)	371	0.00	0.0	20.7	0.00
Trichloroethene (TCE)	122	1.00	12.6	21.9	0.58
cis-1,2-dichloroethene (DCE)	80	0.13	1.6	24.2	0.07
Vinyl Chloride (VC)	2.5	0.00	0.0	31.2	0.00
1,1,1-Trichloroethane (TCA)	304	0.00	0.0	22.2	0.00
1,1-Dichlorochloroethane (DCA)	33	0.00	0.0	24.7	0.00
User added, also add stoich. demand and Koc (see pull-down)	0	0.00	0.0	0.0	n/a
User added, also add stoich. demand and Koc (see pull-down)	0	0.00	0.0	0.0	n/a

Add Menu from A:43-C:43

Competing Electron Acceptors:

	CEA Conc (mg/L)	CEA Mass (lb)	Stoich. (wt/wt) e^- acceptor/H_2	H_2 Req. (lb)
Oxygen Demand	2.50	7	8.0	0.89
Nitrate Demand	2.31	7	12.4	0.53
Bioavailable Manganese Demand	0.12	0	27.5	0.01
Bioavailable Iron Demand	0.35	1	55.9	0.02
Sulfate Demand	91	259	12.0	21.59

Microbial Demand Factor	3	Recommend 1-4x
Safety Factor	2	Recommend 1-4x

3DMe Weight and Volume Estimations

Project 3DMe Concentrate Material Requirements:

Amount of 3DMe Concentrate Required (lbs): 4,932 (Minimum Dose Override)
Volume of 3DMe Concentrate Required (gals): 592

Standard 10:1 Vol (H2O):Vol (3DMe) Emulsion Production Requirements:

	Lbs.		Gallons
3DMe Concentrate	4,932	3DMe Concentrate	592
Water	49,373	Water	5,920
Total	54,305	**Total**	6,512

Delivery Array Evaluation:

Injection spacing within rows (ft)	17.0	# points per row:	3
Injection spacing between rows (ft)	17.0	# of rows:	10
Advective travel time between rows (days)	350	Total # of points:	30

3DMe Application Evaluation:

	Lbs.		Gallons
10:1 V/V Emulsion App. Rate per Foot	120.7	10:1 V/V Emulsion App. Rate per Foot	14.5
10:1 V/V Emulsion App. Rate per Point	1810	10:1 V/V Emulsion App. Rate per Point	217

Est.% of Effective Pore Vol. Displaced by 3DMe Emulsion: 3.8%

Project Summary:

Number of 3DMe delivery points (adjust as necessary for site)		30
3DMe Emulsion application rate in Lbs/ft		120.7
Mass of 3DMe Emulsion per point (lb)		1,810
Number of 30 lb 3DMe concentrate buckets/application point		5.5
Total 30 lb 3DMe concentrate buckets		165
Total mass of 3DMe concentrate (lb)		4,950
Mass of 10:1(V:V) 3DMe Emulsion (lb)	**Total**	**54,305**

Location: Area 4 - TW-01/TW-04

3DMe Design Software for Barrier Treatment

Regenesis Technical Support: USA (949) 366-8000 www.regenesis.com

Site Name: Former Taylor Instruments, Rochester
Location: Area 4 - TW-01/TW-04
Consultant: Mactec, Knoxville

Site Conceptual Model/Extent of Plume Requiring Remediation

Length of Barrier (intersecting gw flow direction)	240	ft			
Depth to contaminated zone	9	ft			
Thickness of contaminated saturated zone	15	ft	=	3600	ft^2 cross-section
Aquifer soil type (gravel, sand, silty sand, silt, clay, etc.)	silty sand				
Effective porosity	0.2				
Hydraulic conductivity	0.9	ft/day	=	3.2E-04	cm/sec
Hydraulic gradient	0.0108	ft/ft			
Seepage velocity	17.7	ft/yr	=	0.049	ft/day

Dissolved Phase Electron Donor Demand:

	Contaminant Conc (mg/L)	Contaminant Mass (lb/yr)	Stoichiometry cont/H_2 (wt/wt)	H_2 Req. (lb/yr)
Tetrachloroethene (PCE)	0.00	0.00	20.7	0.00
Trichloroethene (TCE)	0.01	0.00	21.9	0.00
cis-1,2-dichloroethene (DCE)	0.00	0.00	24.2	0.00
Vinyl Chloride (VC)	0.00	0.00	31.2	0.00
1,1,1-Trichloroethane (TCA)	0.00	0.00	22.2	0.00
1,1-Dichlorochloroethane (DCA)	0.00	0.00	24.7	0.00
User added, also add stoichiometric demand (see pull-down)	0.00	0.00	0.0	0.00
User added, also add stoichiometric demand (see pull-down)	0.00	0.00	0.0	0.00

Competing Electron Acceptors:

	CEA Conc (mg/L)	CEA Mass (lb/yr)	Stoich. (wt/wt) e^- acceptor/H_2	H_2 Req. (lb/yr)
Oxygen Demand	2.50	1.99	8.0	0.25
Nitrate Demand	0.62	0.49	12.4	0.04
Bioavailable Manganese Demand	1.00	0.80	27.5	0.03
Bioavailable Iron Demand	0.14	0.11	55.9	0.00
Sulfate Demand	213	169.55	12.0	14.13

(Not all SO4 must be reduced, try 100 mg/l for prelim est. and call Regenesis for current info on SO4 demand)

Microbial Demand Factor	3	Recommend 1-4x
Safety Factor	2	Recommend 1-4x

3DMe Weight and Volume Estimations

Project 3DMe Concentrate Material Requirements:

	Mass (lbs)	Volume (gals)
Amount of 3DMe Concentrate Required	**2,670**	**320**

Minimum Contributed TOC 1500.0 (mg/L) * Minimum Dose Override due to TOC contribution minimum requirement.

Standard 10:1 Vol (H2O):Vol (3DMe) Emulsion Production Requirements:

	Lbs.		Gallons
3DMe Concentrate	2,670	3DMe Concentrate	320
Water	26,700	Water	3,199
Total	29,370	Total	3,519

Delivery Array Evaluation:

Number of rows in barrier	1	rows	
Spacing within rows	12.0	ft on center	Virtual pore vol. (gal)
Spacing between rows	12.0		129,263
Effective spacing perpendicular to flow (ft)	12.0		
Total number of 3DMe injection locations	20	points	

3DMe Application Evaluation:

	Lbs.		Gallons
10:1 V/V Emulsion App. Rate per Foot	98	10:1 V/V Emulsion App. Rate per Foot	11.7
10:1 V/V Emulsion App. Rate per Point	1,469	10:1 V/V Emulsion App. Rate per Point	176.0

Approximate 3DMe Solution Weights and Volumes:

Water : 3DMe	3DMe Concentrate Lbs.	3DMe Gallons	Water Lbs.	Water Gallons	3DMe + Water Emulsion (Gals)	Est. Eff. Pore Space Used* (%)
10:1	2,670	320	26,700	3,199	3,519	2.7%

Additional 3DMe Dilution Calculations:

	Gallons
Effective Pore Space Used	**7.7%**
Add. Water Required to Mix with Standard Emulsion	6,401
Total Vol. of Water Required	9,600
Total Vol. of Diluted Emulsion	9,920
Vol. of Diluted Emulsion applied per ft	33.1
Vol. of Diluted Emulsion applied per pt	496

Number of 3DMe delivery points (adjust as necessary for site)		20
3DMe emulsion application rate in lbs/ft		98
Mass of 3DMe emulsion per point (lb)		1,469
Number of 30 lb 3DMe concentrate buckets/application point		4.5
Total number of 30 lb 3DMe concentrate buckets		89
Total mass of 3DMe concentrate (lb)		2,670
Mass of 10:1 (V:V) 3DMe Emulsion (lb)	**Total**	**29,370**

ATTACHMENT D

SHORT FORM HEALTH AND SAFETY PLAN

MACTEC, Inc.

MACTEC Short Form HASP

Site: Former Taylor Instruments Job Number: 3031052006
Street Address: 95 Ames Street, Rochester, NY
Proposed Date(s) of Investigation: Various Dates
Prepared by: Joe Deatherage Date: 5/12/10
*Approved by: Rachel Everence Date:
Site Description: The Site is developed with a building housing a remediation system on approximately
(attach map) 14 acres of asphalt covered land.
Proposed Activity(s): Groundwater sampling, supplemental remedial activities (underground injection of .
HRC Advanced), and system decommissioning.
*Approval also serves as certification of a Hazard Assessment as required by 29 CFR 1910.132

Known or Suspected Contaminants (include PELs/TLVs):

Contaminants of Concern	PEL/TLV (part per million units)
Tetrachloroethene (PCE)	25/50 (PEL/TVL)
Trichloroethene (TCE)	10 (TVL)
1,1-Dichloroethene	5 (TLV)
cis-1,2-Dichloroethene (DCE)	200 (PEL)
trans-1,2-Dichloroethene (DCE)	200 (PEL)
Vinyl Chloride	1 Molar (OSHA -TWA)

JHAs: Check and attach all that apply:

Activity Specific JHAs:

☒	Mobilization/Demobilization and Site Preparation
☒	Field Work - General
☒	Groundwater Sampling
☒	Geoprobe Sampling & Injecting
☒	Static Water Level Readings
☒	Working with Preservatives
☒	Drilling Operations
☒	Drilling – Pre-ground Disturbance and Clearance Activities
☒	Environmental Drilling/Boring and Associated Soil Sampling
☒	Decontamination
☐	

Hazard Specific JHAs:

☒	Insect Stings and Bites
☒	Poisonous Plants
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	

All JHAs will be maintained at the job site.

Chemicals Brought to the Site:
List all chemicals brought to the site (e.g., preservatives, decontamination solutions, gasoline, etc.). Attach MSDS

Chemicals	MSDS Attached?
ISOPROPYL ALCOHOL 90 PERCENT	☒
LIQUINOX	☒
NITRIC ACID 70 PERCENT	☒
HYDROCHLORIC ACID 40 PERCENT	☒
SODIUM HYDROXIDE	☒

Chemicals will be kept in their original containers. If transferred to another container, aside from days use by one individual, the new container will be labeled with the name of the chemical and the hazard warnings.

NOTE: Material Safety Data Sheets for chemicals that will be brought to the site by subcontractors are also included.

HAZARD IDENTIFICATION SUMMARY

Complete the checklist for summarizing the hazards identified in the JHAs

Standard Hazards			
☐ Falling Objects	☒ Slips and trips	☒ Pinch points	☒ Rotating equipment
☒ Falls	☒ Power equipment/tools	☐ Elevated work surfaces	☐ _____
Eye Hazards			
☒ Particulates	☒ Liquid splashes	☐ Welding Arc	☐ _____
Hearing Hazards			
☐ None	☒ Impact noise	☐ High frequency noise	☒ High ambient noise
Respiratory Hazards			
☒ None	☐ Dust / aerosols / particulates	☐ Organic Vapors	☐ Acid Gases
☐ Oxygen deficient	☐ Metals	☐ Asbestos	☐ _____
Chemical Hazards			
☐ None	☐ Organic solvents	☐ Reactive metals	☐ PCBs
☒ Acids / bases	☐ Oxidizers	☒ Volatiles/Semi-volatiles	☐ _____
Environmental Hazards			
☐ None	☒ Temperature extremes ☒ Cold ☒ Heat	☐ Wet location	☒ Bio hazards (snakes, insects, spiders, poisonous plants, etc.)
☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	☐ _____
Electrical Hazards			
☒ None	☐ Energized equipment or circuits	☐ Overhead utilities ☐ Underground utilities	☐ Wet location
Fire Hazards			
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☐ Flammable materials present	☐ Oxygen enriched location
Ergonomic Hazards			
☒ Lifting	☒ Bending	☒ Twisting	☒ Pulling/tugging
Computer Use in the: ☒ Office ☐ Field	☐ Repetitive motion	☒ Carrying	☐ _____
Radiological Hazards			
☒ None	☐ Alpha	☐ Beta	☐ Gamma/X-rays
☐ Neutron	☐ Radon	☐ Non-Ionizing	☐
Other Hazards			
☐			
☐			

PPE and Monitoring Instruments

Initial Level of PPE *			
☐ Level D	☒ Modified Level D	☐ Level C	* Cannot use Short Form HASP for Level B or A work

Standard PPE			
☒ Hard Hat (During drilling operations)	☒ Safety boots	☒ Safety glasses (During demolition operations)	☐ Chemical Resistant Boots
☒ High visibility vest (During drilling operations)	☐ Other:_____		

Eye and Face Protection			
☐ Face shield	☐ Vented goggles	☐ Unvented goggles	☐ Indirect vented goggles

Hearing Protection			
☒ Ear plugs (During drilling and demolition operations)	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____

Respiratory Protection			
☒ None	☐ Dust mask	☐ Full Face APR ☐ Half Face APR	Cartridge Type: _____ Change Cartridges: _____

Protective Clothing			
☐ White uncoated Tyvek®	☐ Poly-coated Tyvek®	☐ Saranex®	☐ Work uniform
☐ Boot covers	☐ Reflective vest	☐ Chaps or Snake Legs	☐ Other _____

Hand Protection			
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Glove liners
☐ Outer Gloves List Type_____	☐ Inner Gloves List Type_____	☐ Cut-resistant gloves	☒ Other _Nitrile Gloves_

Monitoring Instruments Required			
☐ LEL/O2 Meter	☐ PID ☐ 10.0-10.6 eV Lamp ☐ 11.7 eV Lamp	☐ FID	☐ Hydrogen Sulfide/Carbon Monoxide

☐ Dräger Pump (or equivalent) List Tubes_____ _____	☐ Dust Meter ☐ Respirable dust ☐ Total dust	☐ Other _____

Air Monitoring Action Levels:

No air monitoring required at site due to history of very low PID readings

[1] Sustained readings measured in the breathing zone
[2] Readings at measured at the source (borehole, well, etc.)

PPE Selection Guidelines

When selecting the appropriate PPE for the job, consider the following:

- **Safety glasses** – general eye protection – source of hazard, typically coming from straight on, required at most sites
- **Tinted Safety Glasses** – same as above, but when working in direct sunlight. May need two both tinted and untinted if working in both sunlight and shade/overcast skys.
- **Safety goggles** – needed for splash hazard, more severe eye exposures coming from all directions. Non-vented or indirect venting for chemical splash, non-vented for hazardous gases or very fine dust, vented for larger particulates coming from all directions.
- **Face shield** – needed to protect face from cuts, burns, chemicals (corrosives or chemicals with skin notation), etc.
- **Safety boots** – needed if danger of items being dropped on foot that could injure foot
- **Hard hat** – danger from items falling on head – any overhead work, tools, equipment, etc that is above the head and could fall on head of item fails, or falls off work platform. Typically required at most sites as a general PPE
- **Thin, chemical protective inner gloves** (e.g., thin Nitrile, PVC – do not use latex – many people are allergic to latex) –needed to protect hands from incidental contact with low risk contamination at very low concentrations (ppb or low ppm concentrations in groundwater or soil) or used in combination with outergloves as a last defense against contamination. Need to specify type
- **Outer gloves** – thicker gloves (e.g., Nitrile, Butyl, Viton, etc.) – used when potential for high concentrations of contaminants (e.g., floating product, percent ranges of contaminant, opening drums, handling pure undiluted chemicals, etc.). Need to specify type.
- **Leather gloves, leather palm, cotton** – good in protecting hands against cuts – no protection from chemicals. May be used in combination with chemical protective gloves.
- **Boot Covers –** when there is contamination in surface soils or waking surface in general. When safety boots need protection from contact with contaminants.
- **White (uncoated) Tyveks** – protect clothing from getting dirty, good for protection against solid, non-volatile chemicals (e.g., asbestos, metals) – no chemical protection.
- **Polycoated Tyveks** – least protective of chemical protective clothing. Used when some risk of contamination getting on skin or clothing. Usually, lower ppm ranges of contaminants.
- **Saranex** – Greater protection against contamination than Polycoated Tyveks. Used to protect against PCBs or higher concentrations of contaminants in the soil or groundwater.
- **Other Chemical protective clothing** – if significant risk of dermal exposure, contact H&S to determine best kind.
- **Long sleeved shirts, long pants** – if working in areas with poison ivy/oak/sumac, poisonous insects, etc. and no chemicals exposure. May want to use uncoated Tyveks for work in areas where poisonous plants are know to be to protect clothing.
- **Cartridge Respirator (Level C PPE)** – Need to calculate change schedule (contact Division EH&S Manager for this) to determine length of use. To be able to use cartridge respirators, need to know contaminants, estimate levels to be encountered in the breathing zone, need to ensure that cartridge will be effective against COCs, and need to be able to monitor for COCs using PID, FID, Dräger tubes, etc.. If can't do any of these, then Level B PPE is probably going to be needed.
- **High Visibility Vest** – needed for any road work (with in 15 feet of a road) or when working on a site with vehicular traffic or working around heavy equipment. Needed if work tasks would take employee concentration away from movement of vehicles and workers would have to rely on the other driver's ability to see the employee in order not to hit them. This includes heavy equipment as well as cars and trucks, on public roads or the jobsite. Not needed if wearing Polycoated Tyveks – as they are already high visibility.
- **Reflective Vest** – see above, but for use at night.
- **Hearing Protection** – needed if working at noise levels above 85 dBA on a time weighted average. If noise measurements are not available, use around noisy equipment, or in general, if you have to raise your voice to be heard when talking to someone standing two feet away.
- **Protective Chaps –** required when using a machete or chain saw or any other cut hazard to legs.

Work Zones:

The work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of the sampling location. The Contamination Reduction Zone is considered to be the area with in a 20-foot diameter of the sampling location. The decontamination zone being located upwind of the work area. Work zones will be maintained through the use of:

_____ Warning Tape
X Visual Observations

Site Communication:

X Verbal
_____ Two-way radio
X Cellular telephone
_____ Hand signals

- Hand gripping throat ---------- Out of air, can't breathe
- Grip partner's wrist or both hands around waist ---------- Leave area immediately
- Hands on top of head ---------- Need assistance
- Thumbs up ---------- OK, I am all right, I understand
- Thumbs down ---------- No, negative

_____ Horn
_____ Siren
_____ Other:

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS	DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department	911	N/A
Hospital: St. Mary's Hospital	585-723-7000	N/A
Police Department	911	N/A
Site Health And Safety Officer: Joe Deatherage	865-218-1049 (w) 865-414-0351 (c)	N/A
Client Contact: Melody Christopher	860-285-3525 (w)	N/A
Project Manager: Rick Ryan Project Coordinator: Joe Deatherage	865-588-8544 (w) 865-414-0351 (c)	N/A
Division EH&S Manager: Cindy Sundquist	207-828-3309 (w) 207-650-7593 (c) 207-892-4402 (h)	N/A
Local Health and Safety Representative (LHSR): Rachel Everence	865-588-8544 (w) Ext. 1119 865-659-3981 (c)	N/A
OTHER: Ambulance	911	N/A
w = work, c = cell, h = home, N/A = Not Applicable		

Emergency Equipment:

The following emergency response equipment is required for this project and shall be readily available:

X Field First Aid Kit
X Fire Extinguisher (ABC type)
X Eyewash (Note: 15 minutes of free-flowing fresh water)
_____ Other: _____

EMERGENCY PROCEDURES

- The HSO (or alternate) should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.
- The HSO notifies the Project Manager and client contact of the emergency. The HSO shall then contact the Division ES&H Manager who will then contact the Corporate EH&S Manager.
- If applicable, the HSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the HSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs (if available), should be donned. If appropriate PPE is unavailable, site workers should evacuate and call in emergency personnel.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and wash affected area. Site worker should shower as soon as possible after incident.
- If a worker is injured, first aid shall be administered by certified first aid provider.
- If the emergency involves toxic gases, workers will back off and reassess. Prior to re-entering the work zone, the area must be determined to be safe. Entry will be using Level B PPE and utilize appropriate monitoring equipment to verify that the site is safe.
- An injured worker shall be decontaminated appropriately.
- After the response, the SHSO shall follow-up with the required company reporting procedures, including the completing the MACTEC Incident Analysis Report.

Site Specific Emergency Procedures are as follows: _____

FIELD TEAM REVIEW: I have read and reviewed the health and safety information in the HASP. I understand the information and will comply with the requirements of the HASP.

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Routes to Emergency Medical Facilities

PRIMARY HOSPITAL:

Facility Name: St. Mary's Hospital

Address: 89 Genesee St, Rochester, NY 14607

Telephone Number 585-723-7000

DIRECTIONS TO PRIMARY HOSPITAL (attach map):

From site, go South on Ames St. toward Danforth Street
Turn Left onto West Avenue
Turn slight Left onto W Main Street/NY-33
Turn Right onto Genesee Street
End at 89 Genesee Street #1 Rochester, NY 14611

(See attached map)

Additional Material Safety Data Sheet

(This product will be brought to the site by the subcontractor and is to be handled only by the subcontractor)

- Hydrogen Release Compound (HRC) Advanced

ATTACHMENT E

GENERIC COMMUNITY AIR MONITORING PLAN

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

P:\Bureau\Common\CommunityAirMonitoringPlan (CAMP)\GCAMPR1.DOC

ATTACHMENT F

ACRONYM LIST

ACRONYM LIST

3DMe™	3-D Microemulsion™
bls	below land surface
CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
CE	Combustion Engineering
CEA	competing electron acceptor
COC	contaminant of concern
DPVE	dual-phase vapor extraction
EPA	Environmental Protection Agency
HASP	Health and Safety Plan
HRC	hydrogen release compound
MACTEC	MACTEC Engineering and Consulting, Inc.
NYSDEC	New York State Department of Environmental Conservation
OM&M	Operations, Maintenance and Monitoring
Plan (the)	Work Plan for Bioremediation and Decommissioning of the Remedial Treatment System
Site (the)	Former Taylor Instruments Site
TCE	trichloroethene
VCA	Voluntary Corrective Action
VOC	volatile organic compound