

# ECM

environmental compliance monitoring inc.

October 17, 2008

Mr. James Schreyer  
Construction Inspector II  
New York State Department of Environmental Conservation  
21 South Putt Corner Road  
New Paltz, New York 12561

**RE: OU-1 Remedial Action Workplan  
MW-31 Enhanced Bioremediation  
Former Kay Fries Site; Stony Point, New York  
Site No. 344023  
ECM Project #1192**

Dear Mr. Schreyer:

Environmental Compliance Monitoring, Inc. (ECM), on behalf of Evonik Degussa Corporation (Evonik), has prepared this letter in response to the New York State Department of Environmental Conservation (NYSDEC) request to provide details relative to the Evonik proposal to implement enhanced in-situ remediation proximal to monitoring well MW-31. The NYSDEC required an in-situ Remedial Action Workplan (RAW) in accordance with Division of Environmental Remediation (DER) – 10 Technical Guidance for Site Investigation and Remediation. This letter presents the RAW planned for the application of chemical oxidation (RegenOx<sup>®</sup>) to enhance ground water remediation in the area of MW-31. The RAW is presented below in general accordance with the format outlined under NYSDEC Section 5.3 of DER-10.

## 1.0 BACKGROUND

The Operable Unit – 1 (OU-1) Ground Water Treatment System (GWTS) has been effectively processing ground water and has been compliant with the NYSDEC effluent discharge criteria from inception of operation during 1995.

Elevated volatile organic compounds (VOCs) within OU-1 have been primarily limited to one area upgradient of Trench 2. Specifically, VOCs have been reported in monitoring well MW-31.

During October 2002, a distribution assessment was conducted of the compounds historically reported in monitoring well MW-31. The findings of the assessment were reported to the NYSDEC in the ECM letter dated February 13, 2003. The findings from this program indicated that the compounds of concern were generally concentrated in the area proximal to MW-31, hydraulically upgradient of Recovery Trench 2. The distribution assessment concluded that natural attenuation (reductive dechlorination) was occurring in the area around MW-31. It was also concluded that the natural degradation processes could be accelerated through an enhanced bioremediation program, which was proposed to the NYSDEC.

Based upon the results of the distribution assessment, and the MW-31 monitoring data from inception of the GWTS, enhanced bioremediation in the area of MW-31 was approved by the NYSDEC in their letter dated August 28, 2006. The details of the enhanced remedial strategy through the application of RegenOx<sup>®</sup> are outlined below.

1192-MW-31RAW.9-08

Page 1

## 2.0 MW-31 REMEDIAL ACTION WORKPLAN

A review of the monitoring data indicated that the highest VOC concentrations were detected in monitoring well MW-31. As presented in previous submittals, compound concentrations in MW-31 have fluctuated but remain above the NYSDEC Ground Water Quality Standards (GWQS). A summary of the MW-31 results from inception of the monitoring plan is presented on Table 1. Based on the reported levels remaining in MW-31, enhanced in-situ remediation of the ground water will be conducted to accelerate the reduction of ground water impacts and target the highest VOC concentrations upgradient to MW-31. Recovery and treatment operations will remain activated during the in-situ remediation activities.

The results of the monitoring program and the data generated during the distribution assessment were provided to an in-situ treatment engineer (REGENESIS) to formulate a full-scale application design. Specifically, REGENESIS has formulated a remedial design for utilizing a chemical oxidation product (RegenOx<sup>®</sup>) upgradient of MW-31. Subsequent to the RegenOx<sup>®</sup> application, REGENESIS has formulated an optional (if required) application of Oxygen Release Compounds (ORC<sup>®</sup>) to target lower compound levels. The proposed design would accomplish a remedial strategy as outlined below.

- The RegenOx<sup>®</sup> product application design would chemically oxidize the elevated target compounds upgradient of MW-31 and provide an immediate reduction of compound concentrations. The application could potentially reduce compound levels up to 95%; and,
- The optional ORC<sup>®</sup> application (pending the results of the RegenOx<sup>®</sup> application) design would stimulate and enhance the naturally occurring aerobic biodegradation, reducing the levels reported downgradient of MW-31 while acting as an intercepting barrier for the remaining compound concentrations that may migrate towards Recovery Trench 2 from the RegenOx<sup>®</sup> application area.

The treatment will be accomplished by arranging a grid of injection points throughout the target area and utilizing direct push technologies to deliver the RegenOx<sup>®</sup> into the subsurface. Figure 1 depicts the RegenOx<sup>®</sup> treatment area. The RegenOx<sup>®</sup> is designed for oxidation/destruction of the target compounds immediately after the application, which would continue for approximately four weeks.

The details of the enhanced remedial design for the application of RegenOx<sup>®</sup> upgradient of MW-31 are presented below.

- RegenOx<sup>®</sup> – Upgradient of MW-31  
Design estimates provided by REGENESIS propose application of up to 2,240 pounds of RegenOx material into the subsurface upgradient of MW-31. The proposed application would consist of mixing the RegenOx<sup>®</sup> with water and injecting the material from two feet below grade to a depth of approximately nine feet below grade via direct-push technologies. The design consists of the following:

Targeted Treatment Area of 40 feet x 80 feet  
Spacing between injection points = 10 feet  
8 injection points per row x 4 rows = 32 injection points  
Seven feet injection interval (2 – 9 feet BG) per point  
32 injection points x 10 lbs RegenOx<sup>®</sup>/ft x seven feet treatment interval = 2,240 lbs. of RegenOx<sup>®</sup>

If the compound concentrations remain elevated subsequent to the initial RegenOx<sup>®</sup> application, a second application may be proposed for the area upgradient of MW-31. However, if the initial

results indicate a significant decrease in the target compound levels to near the GWQS the optional ORC® application may be proposed as an effective treatment to target lower compound levels.

The ground water recovery and treatment operation from Trench 2 will continue during the enhanced remedial activity.

### **3.0 POST-APPLICATION MONITORING PROGRAM**

Post-application monitoring will be conducted using existing site monitoring well MW-31 and downgradient monitoring wells MW-36 and MW-37. The monitoring plan is outlined below.

1. Prior to the RegenOx® application, baseline sampling will be conducted in MW-31 to assess pre-application compound levels.
2. Post-application groundwater monitoring of MW-31, MW-36 and MW-37 (Figure 1) will be conducted approximately four weeks after the application to assess the effectiveness of the RegenOx®.
3. Subsequent to the initial application, the RegenOx® product typically liberates the organics in the subsurface soils and the compound levels may initially “spike” reporting elevated levels in these wells. If the initial monitoring results are reported at elevated levels, a second round of post-application monitoring will be conducted approximately eight weeks after the first monitoring event to assess ground water quality conditions.
4. The groundwater samples will be analyzed for the chlorinated volatile organic compounds reported in MW-31 above the NYSDEC Ground Water Quality Standards (GWQS), which would include 1,1-dichloroethane, chloroethane, benzene, chlorobenzene and toluene. Additionally, RegenOx® indicator parameters (total iron, manganese, and oxidation redox potential [ORP]) will be analyzed to monitor the performance of the program.

### **4.0 RECOMMENDATIONS**

If the compound levels in the post-application monitoring wells (MW-31, MW-36 and MW-37) remain elevated above the NYSDEC-GWQS a second RegenOx® application may be proposed for the area upgradient of MW-31. However, if the initial results indicate a significant decrease in the target compound levels to near the GWQS the optional ORC® application may be proposed downgradient of MW-31 as an effective treatment to target lower compound levels.

The proposed ORC® application design would be accomplished by arranging a grid of injection points throughout the target area downgradient of MW-31 and utilizing direct push technologies to deliver the ORC® into the subsurface. The monitoring wells (MW-31, MW-36 and, MW-37) will then be sampled quarterly for one year to assess the effectiveness of the ORC® application and natural attenuation processes. Upon completion of the first year of monitoring and evaluation, the results with recommendations will be forwarded to the NYSDEC.

If the post-application monitoring results demonstrate successful application and reduction of the target compounds to less than the NYSDEC-GWQS, cessation of Recovery Trench 2 will be proposed.

### **5.0 PROJECT SCHEDULE**

The estimated project schedule for the RegenOx® application is presented as Attachment 1. The commencement of field activity is based upon the NYSDEC RAW approval.

Your time and attention to this submission and project is greatly appreciated. Should you have any questions pertaining to this information, or to other matters, please do not hesitate to contact our office.

Sincerely,

Environmental Compliance Monitoring, Inc.



Bruce Manganiello  
Operations Manager

cc: A. Kruczek, Evonik Degussa  
S. Posten, AMEC  
R. Pergadia, NYSDEC  
M. Valenti, Insl-x  
J. Weil, Insl-x

Table 1

Summary of Detected Volatile Organic Compounds Monitoring Well MW-31(ug/L)

Former Kay Fries Site

Evonik Degussa Corporation, Stony Point, New York

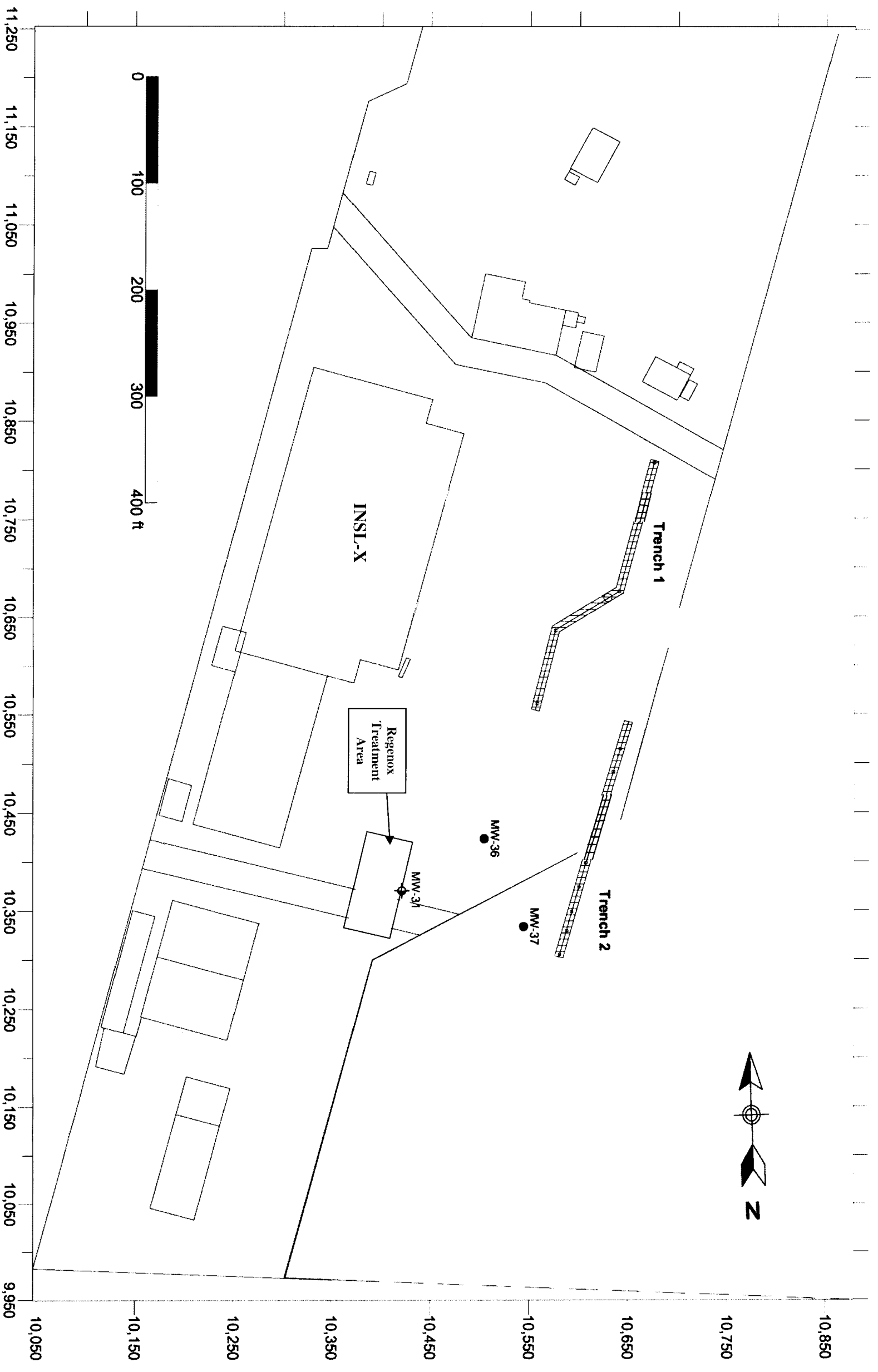
ECM Project #1192

Volatile Organics	Dec-90	Feb-97	May-97	Aug-97	Nov-97	May-98	Aug-98	May-98	Nov-99	May-99	Nov-99	May-00	Nov-00	May-01	Nov-01	Apr-02	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Oct-05	Jun-06	Oct-06	Apr-07	Oct-07	Apr-08	GWOS
1,1,1-Trichloroethane	310	17	80	ND	ND	ND	ND	4.5	ND	ND	ND	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
1,1-Dichloroethane	1,700	1300	1500	570	98	200	87	200	19	1	43	1.8	6.6	ND	ND	ND	ND	12	ND	12	ND	ND	ND	36	ND	ND	5	
Chloroethane	780	370	290	390	240	120	460	120	59	190	190	500	50	350	1000	900	900	550	570	270	150	5.7	190	18	670	3.6	440	5
Vinyl Chloride	ND	11	ND	8.8	2.9	2.5	2.3	2.5	ND	ND	ND	3.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	2	
Chlorobenzene	55	160	180	210	81	41	110	110	18	49	66	84	84	27	72	140	140	110	270	53	200	250	110	230	100	190	150	5
Benzene	ND	89	84	130	61	21	42	21	8.1	29	27	35	35	7.5	31	28	41	26	55	14	46	28	16	27	26	14	27	1
Toluene	7	1.9	2.4	1.9	1.8	ND	ND	ND	ND	0.5	ND	ND	ND	ND	ND	76	ND	ND	1.4	ND	0.7	1	ND	0.9	ND	0.9	ND	5
Total VOC	2,852	1949	2137	1312	486	390	703	107	270	238	627	94	457	1104	1181	698	897	356	397	284.7	317	275.9	832	208.5	617	NA		

Note:

ND = Compound Not Detected.

**Bold:** Results Exceeds NYSDES GWQS.



Base Map:  
 Hoch Surveyors and Engineers, P.C., Existing Conditions Sheet  
 Rockland Organics Inc. (11/30/90), and  
 Topographic and Grading Sheet 1 INSL-X Products Corp. (10/1/89)  
 Piezometer and Well Survey Control: Drabick (7/93, 3/97, 12/97)

**Figure 1**  
**Proposed Regenox Treatment Area**  
 Operable Unit 1 - Former Kay Fries Site  
 Stony Point Industrial Park  
 Rockland County, New York

**ECM**  
 environmental compliance monitoring, inc.  
 349 Route 206, Hillsborough, New Jersey 08844

ATTACHMENT 1  
 OU-1 REMEDIAL ACTION WORKPLAN  
 MW-31 ENHANCED BIOREMEDIATION ACTIVITY SCHEDULE  
 FORMER KAY FRIES SITE  
 EVONIK DEGUSSA CORPORATION, STONY POINT, NEW YORK  
 ECM PROJECT #1192

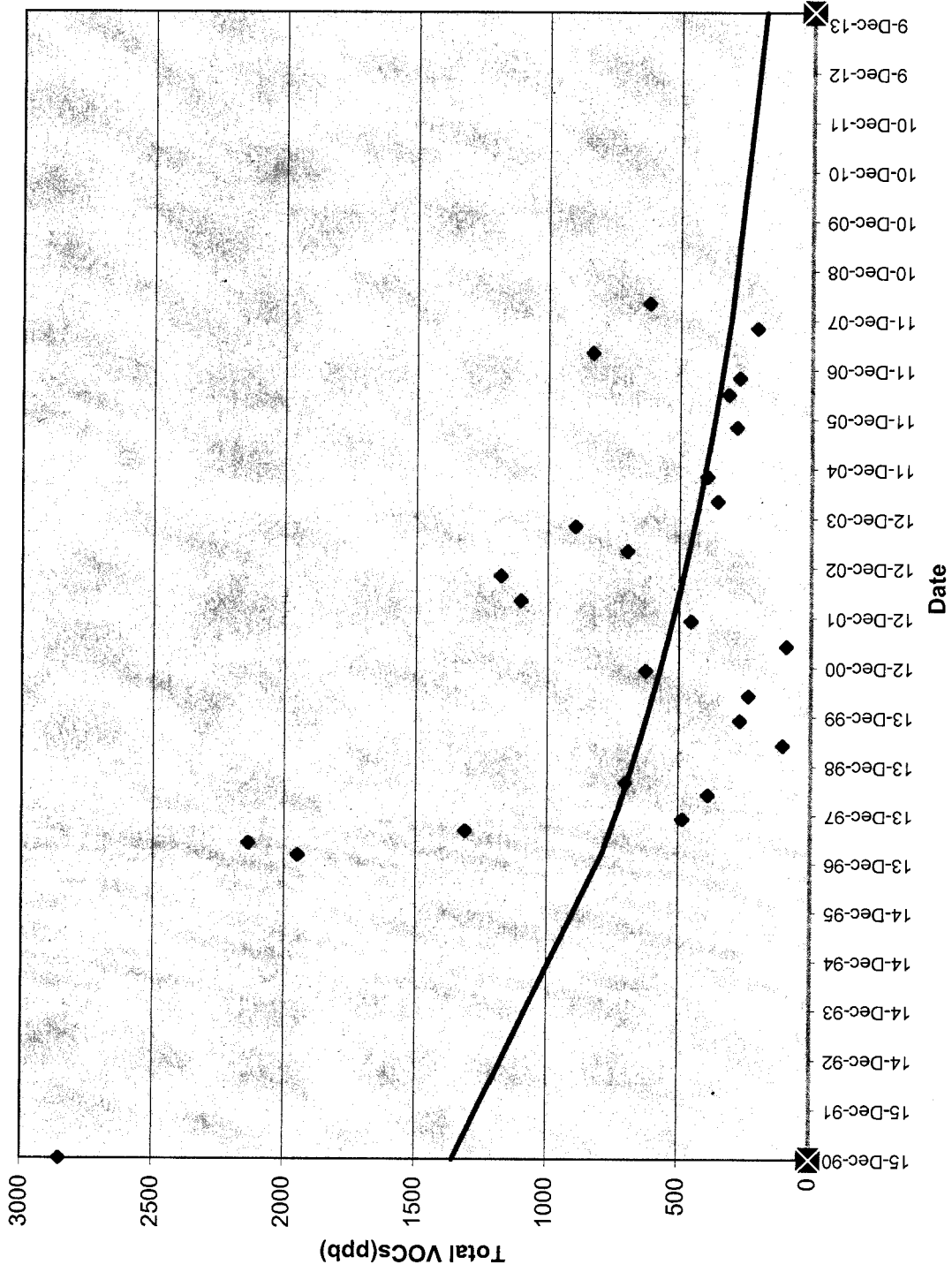
Task Description	2008												2009																																						
	October			November			December			January			February			March			April			May			June			July			August			September			October			November			December								
	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	1	8	15	22	29	6	13	20	27	3	10	17	24	1	8	15	22
MW-31 Enhanced Bioremediation RAW Submitted to NYSDEC	[Bar spanning Oct 7 to Oct 28, 2008]																																																		
NYSDEC RAW Approval <sup>1</sup>	[Bar spanning Oct 21 to Oct 28, 2008]																																																		
Baseline Monitoring MW-31	[Bar spanning Nov 12 to Dec 9, 2008]																																																		
Schedule Driller/Product Procurement	[Bar spanning Jan 7 to Feb 4, 2009]																																																		
Remedial Application/Installation <sup>2</sup>	[Bar spanning Feb 18 to Mar 15, 2009]																																																		
Post-Application Monitoring MW-31, MW-36, and MW-37	[Bar spanning Apr 6 to May 27, 2009]																																																		
Second Round of Sampling MW-31, MW-36, and MW-37	[Bar spanning Jun 11 to Jun 18, 2009]																																																		
Remediation Evaluation and Recommendation Report	[Bar spanning Aug 11 to Aug 18, 2009]																																																		

Notes:

- 1 - Anticipated NYSDEC approval of Remedial Action Workplan.
- 2 - Remedial application/installation may be slightly delayed due to unforeseen inclement weather/winter conditions. The NYSDEC will be kept updated as to the start of the field activity.
- 3 - If required based on first round post-application sampling results. Schedule will be updated with additional tasks (i.e., second round of RegenOx application) as necessary.

[White box] = Activities Scheduled  
 [Black box] = Activities Completed

Kay Fries Well MW-31



*Handwritten notes:*  
Fund  
Syid  
10/20

◆ Conc.  
— Ct=Ca+C0e-Kt  
---x--- Asymptotic Value

*Handwritten note:* 10/20