ECM

environmental compliance monitoring, inc.

OPERABLE UNIT 1 MW–31 IN-SITU RESULTS REPORT

FORMER KAY FRIES SITE
STONY POINT, NEW YORK
SITE NO. 344023
ECM PROJECT NO. 1192

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1.0 INTRODUCTION

This *Operable Unit 1 (OU1) MW-31 Results Report (MW-31 RR)* has been prepared by Environmental Compliance Monitoring, Inc. (ECM) on behalf of Evonik Corporation (Evonik), presenting the in-situ remediation results at the Former Kay Fries, Inc. site, located in Stony Point, New York (herein referred to as the "site" or the “subject site”). The in-situ ground water remediation and post-remedial monitoring program were conducted in accordance with the implementation schedule presented in the New York State Department of Environmental Conservation (NYSDEC) approved MW-31 Workplan (WP) dated March 2012.

This report describes the in-situ subsurface application of the chemical oxidant (RegenOx®) combined with Advanced Formula Oxygen Release Compounds (ORC Advanced®) to enhance ground water remediation in the area proximal to MW-31 and the post-application ground water monitoring results. A summary of the MW-31 WP remedial activities and post-remedial monitoring results are presented in the following sections of this report.

1.1 BACKGROUND

The OU1 Ground Water Treatment System (GWTS) effectively processed ground water from the three on-site Recovery Trenches 1, 2, and 3, and was compliant with the NYSDEC effluent discharge criteria from inception of operation during 1995 through 2010.

To assess ground water quality upgradient and downgradient of Recovery Trenches 1, 2, and 3, ground water monitoring is conducted via the long-term ground water monitoring program that was approved by the NYSDEC during 1997. The samples have been historically analyzed for NYSDEC Target Compound List volatile organic compounds plus 15 library search compounds (VOC+15) including a search for methyl isobutyl ketone (MIBK) and 1,4-dioxane.

Based upon the successful remediation conducted from 1995 through 2013 and the relatively low compound concentrations remaining at the site, a ground water monitoring program combined with the MW-31 in-situ remediation was proposed to evaluate ground water quality conditions over time.

The NYSDEC approved suspension of the GWTS as a result of significantly decreased contaminant levels impacting groundwater below the OU1 section of the site. The current ground

water monitoring program within OU1 was proposed in lieu of continued GWTS operation. The NYSDEC approved permanent cessation of the GWTS in their 2012 PRR – Requested Modifications letter dated August 12, 2013 (Final NYSDEC PRR approval letter dated October 15, 2013). Subsequently, the NYSDEC approved the GWTS Decommissioning Plan dated August 2, 2013 in their letter dated August 15, 2013.

1.2 OCTOBER 2002 DISTRIBUTION ASSESSMENT AND JULY 2008 PILOT STUDY

Elevated VOCs within OU1 have been primarily limited to one area upgradient of Trench 2 (proximal to 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. From this assessment, the highest concentration of target VOC compounds reported in MW-31 were chloroethane (900 μg/L), dichloroethane (210 μg/L), toluene (46 μg/L), benzene (920 μg/L), and chlorobenzene (630 μg/L).

Based upon the results of the distribution assessment and the MW-31 monitoring data from inception of the GWTS operation, enhanced remediation through the application of a chemical oxidant (RegenOx®) in the area of MW-31 was previously proposed and conceptually approved by the NYSDEC in their letter dated August 28, 2006.

During July 2008, a pilot study using RegenOx® was conducted on-site. The pilot study was conducted to assess the optimum rate of injection and absorption of the RegenOx®/ORC Advanced® slurry into subsurface and from these variables, outline the field effort for the full scale application.

Review of the pilot study results indicated that the RegenOx®/ORC Advanced® slurry accepted delivery of the RegenOx® at a dosage rate of approximately 4.5 gallons/foot, which was proximal to the REGENESIS design dosage rate to be applied for the targeted treatment interval of two to nine feet below grade (BG) into the subsurface surrounding MW-31. Based on the pilot study results, it was expected that the full scale in-situ application would be successful.

The details of the in-situ workplan were submitted to the NYSDEC in a letter entitled *OU-1 Remedial Action Workplan MW-31 Enhanced Bioremediation* dated October 2008. The NYSDEC response to the WP dated March 10, 2010, required the plan be revised to include the results of

the on-site pilot test conducted during July 2008, the installation of additional monitoring wells (MW-70, MW-71, and MW-72), and the details of the in-situ treatment application.

During 2012, the in-situ design was re-evaluated by ECM and REGENISIS (the in-situ treatment engineer) due to the decreasing (lower) levels reported in MW-31, technological advancements in the field of in-situ remediation, and the potential for OU1 site development, which would limit the in-situ application to possibly one event. Based on the evaluation, the in-situ treatment design was modified to the application of RegenOx® combined with ORC Advanced®. The objective of the design change was to achieve a mass reduction through RegenOx® oxidation with continued degradation through ORC Advanced® bioremediation over time. As such, implementation of the full scale application was recommended and implemented as described below.

2.0 FULL-SCALE IN-SITU APPLICATION

As previously stated the NYSDEC March 25, 2010 letter required the MW-31 WP be revised to include the results of the pilot study described above, installation of additional monitoring wells to assess the pre and post in-situ treatment ground water quality and the details of the in-situ treatment application. The MW-31 WP was revised and submitted to the NYSDEC on March 8, 2012. The NYSDEC approved the WP requesting minor modifications in their letter dated March 26, 2012. The modifications were incorporated into the WP and re-submitted to the NYSDEC on April 12, 2012, and received final approval by the NYSDEC in their e-mail dated April 23, 2012. As previously stated, the in-situ design was enhanced by using chemical oxidation (RegenOx®) combined with the application of ORC Advanced® primarily as a result of lower levels reported in MW-31 and OU1 site development. The details of in-situ remedial application and monitoring program are presented below.

2.1 BASELINE MONITORING PROGRAM

To aid the assessment of the in-situ remediation effectiveness, additional delineation monitoring wells were installed up-gradient and cross-gradient of MW-31, to the north, south and west of the targeted treatment area as depicted on Figure 1. Existing monitoring wells MW-36 and MW-37 provided delineation points in the downgradient, eastern direction (Figure 1) and therefore, additional wells to the east were not required.

The delineation monitoring wells, designated as MW-70, MW-71, and MW-72 were installed on July 16, 2012, via hollow stem auger drilling techniques. The well construction specifications are outlined below.

Well ID	Well Depth (BGS)	Screen Type/Interval (ft)	Riser Type/ Interval (ft)	#1 Sand Pack (ft)	Grout (ft)
MW-70	14	4"-0.01"slot PVC/4-14	4"-PVC/0-4	3-14	0-3
MW-71	20	4”-0.01”slot PVC/10-20	4"-PVC/0-10	3-20	0-3
MW-72	25	4”-0.01”slot PVC/15-25	4"-PVC/0-15	3-25	0-3

- The monitoring well screen intervals were based on the depth to water and the difference in surface elevation at the location of each well. The screened interval is representative of the shallow ground water zone within the OU1 section of the site.

- MW-71 was completed with a flush-mount watertight protective housing and MW-70 and MW-72 were completed with steel, stick-up protective casings. The three wells have watertight locking plugs and steel well caps protected by concrete collars.

- The three monitoring wells were developed at a flow rate of approximately one-gallon per minute (gpm) until a turbid-free discharge was maintained. The wells were allowed to equilibrate for four weeks prior to the baseline monitoring event.

Baseline ground water samples were collected from the newly installed wells, as well as MW-31, MW-36, and MW-37 to assess pre-application VOC concentrations. The baseline sampling event was conducted on July 31 and August 1, 2012.

The ground water samples were analyzed for VOCs+15 and a search for MIBK and 1,4-dioxane, and oxygen inhibitor parameters (total iron, manganese, and oxidation redox potential [ORP]). The sampling results are presented in Section 3.0.

2.2 FULL-SCALE IN-SITU APPLICATION

The in-situ field application was executed from October 22, 2012 through November 13, 2012. A total of 118 injection points were completed in the primary area of concern, upgradient, cross-gradient and downgradient of MW-31. Figure 1 depicts the RegenOx® ORC Advanced® treatment area.

Based on the OU1 long-term ground water monitoring program results and the data evaluated during distribution assessment, REGENESIS formulated a full-scale combined RegenOx® ORC Advanced® application design upgradient and proximal to MW-31. The areas primarily north, south and west of MW-31 were targeted as the treatment area. As determined during the on-site meeting on January 27, 2012, between the NYSDEC, Evonik, and ECM, the northern extent of the treatment area required adjustment to avoid the former aboveground storage tank concrete foundation slab. The location of the slab (north of MW-31) obstructed injection of reagent into the subsurface in that immediate area. The treatment area was extended to the west and northwest to further target the area upgradient of MW-31. This area contained the highest distribution of contaminant levels surrounding and reported in MW-31.

The combined RegenOx® ORC Advanced® application was designed for the RegenOx® to chemically oxidize the elevated target compounds and provide a mass reduction of compound concentrations after delivery of the oxidant into the subsurface, which would continue for approximately four weeks. The ORC Advanced® would provide a time-controlled release of oxygen into the groundwater to enhance aerobic biodegradation of the contaminants for a period of up to 12 months.

Design estimates provided by REGENESIS proposed application of up to 5,900 pounds of RegenOx® and 2,800 pounds of ORC Advanced® product into the subsurface in the target area around MW-31. The treatment application was designed with a grid of injection points throughout the target area (Figure 1). The targeted injection interval was based on the screen interval of MW-31 (two feet to nine feet below grade surface (BGS) and the variation in the depth to ground water west of MW-31 due to the steep change in elevation (i.e., treatment interval depth increased to 10 feet to 17 feet BGS west of MW-31). The application of the RegenOx® ORC Advanced® entailed the combination with water and an activator and injecting the slurry from the targeted depth ranging from approximately nine feet (directly surrounding MW-31) to 17 feet (west of MW-31 above the escarpment) BGS at a flow rate ranging from one to nine gallons per minute (gpm) BGS via direct-push technologies. The field RegenOx® ORC Advanced® Injection Logs presenting the injection point, the depth interval, the pump rate and volume/boring is presented in Appendix 1. The field design application consisted of the following:

Targeted Treatment Area (ft)	Rows in Grid	Injection Points per Row	Injection Points Spacing (ft)	Number of Injection Points	Treatment Zone (ft BGS)	RegenOx®– ORC Advanced® (lbs/ft)	RegenOx®– ORC Advanced® (gals./ft)	Total RegenOx®- ORC Advanced® (lbs)
120 x 140	12	7-12	~10	118	2 to 17	9.5	9.0	8,700

Please note that the grid dimensions, injections points and total volume of product were modified during field operations as warranted by actual site conditions. The product application was additionally concentrated in the areas of known elevated compounds by reducing the injection point spacing (i.e., spacing the injections points closer together).

To maximize contact time of the RegenOx® ORC Advanced® with the ground water contaminants, the application of the reagents was started with the injection points at the western perimeter of the grid and progressed eastward in the down-gradient direction.

2.3 POST-REMEDIAL MONITORING PROGRAM

The MW-31 WP included quarterly ground water monitoring for four quarters subsequent to conducting the full-scale RegenOx® ORC Advanced® application. The first quarterly round of post-remedial ground water monitoring was conducted on December 19 and 20, 2012, four weeks after the field application, to assess the initial response and effectiveness of the RegenOx® ORC Advanced® treatment. The quarterly post-remedial monitoring program was conducted during December 2012, and March, June, and September 2013. The monitoring program consisted of sampling MW-31, MW-36, MW-37, and the three newly installed delineation wells, MW-70, MW-71 and MW-72 (Figure 1).

3.0 MW-31 BASELINE AND POST-REMEDIAL MONITORING RESULTS

As previously stated, the baseline monitoring program was conducted during August 2012 and the quarterly post-remedial monitoring was conducted during December 2012, and March, June, and September 2013. The monitoring program consisted of sampling MW-31, MW-36, MW-37, and the three newly installed wells, MW-70, MW-71 and MW-72. The ground water samples were analyzed for VOCs+15 and a search for MIBK and 1,4-dioxane. The laboratory analysis was performed by Test America (TA) Laboratories of Edison, a New Jersey and New York State certified laboratory. The ground water monitoring results are summarized on Tables 1 through 5 and depicted on Figure 2. The analytical data package is included in Appendix 2. A summary of the results reported during the five sampling events is presented below.

Sample Event	Baseline August 2012	1st Event December 2012	2nd Event March 2013	3rd Event June 2013	4th Event September 2013	GWQC
MW-31						
1,1-dichlorethane	ND<0.13	ND<0.13	3.0	**190**	0.59J	5.0
1,2-dichlorethane	ND<0.19	ND<0.19	ND<0.19	**3.1J**	**0.82J**	0.6
Benzene	**13**	0.20J	0.15	**61**	**33**	1.0
Chlorobenzene	**230**	0.11	0.25J	**200**	**270**	5.0
Chloroethane	**320**	0.17	ND<0.17	**1,100**	**210**	5.0
Methylene Chloride	ND<0.18	ND<0.18	ND<0.18	**12**	0.92J	5.0
Vinyl Chloride	ND<0.14	ND<0.14	ND<0.14	**3.3J**	ND<0.14	2.0
MW-71						
Benzene	**13**	**19**	**15**	**11**	**12**	1.0
Chlorobenzene	**200**	**210**	**180**	**120**	**190**	5.0
MW-72						
1,1-dichlorethane	3.2	**6.2**	**150**	2.9	3.5	5.0
1,2-dichlorethane	ND<0.19	0.29J	**1.8**	ND<0.19	0.31J	0.6
Benzene	0.29J	0.28J	**24**	0.12J	0.26J	1.0
Chlorobenzene	0.30J	ND<0.11	**88**	ND<0.11	ND<0.11	5.0
Chloroethane	1.3	2.1	**460**	ND<0.17	ND<0.17	5.0
Methylene Chloride	ND<0.18	ND<0.18	**8.5**	ND<0.18	ND<0.18	5.0

The downgradient delineation wells MW-36 and MW-37 and MW 70 (cross-gradient well to the north) results reported VOCs as not detected or below the NYSDEC-GWQC during the baseline event and the four post-application sampling events.

3.1 BASELINE MONITORING RESULTS (AUGUST 2012)

Prior to the in-situ application, baseline ground water sampling was conducted on July 31 and August 1, 2012. The baseline sample results are summarized on Table 1 and illustrated on Figure 2. The results are summarized below.

a. The VOC results reported benzene, chlorobenzene, and chloroethane above the NYSDEC-Ground Water Quality Criteria (GWQC) in the baseline sample from MW-31, consistent with levels previously reported in this well (which is the primary area of contaminant concentration).

b. The results from the MW-71 (upgradient well) baseline sample reported benzene and chlorobenzene above the NYSDEC-GWQC.

c. The baseline results for delineation well MW-70 (cross-gradient well to the north) and MW-72 (cross-gradient well to the south) were reported below the NYSDEC-GWQC

d. The results from the downgradient delineation wells (MW-36 and MW-37) reported VOCs as not detected or below the NYSDEC-GWQC.

3.2 1ST QUARTERLY POST-REMEDIAL MONITORING RESULTS (DECEMBER 2012)

The first quarter post-remedial ground water sampling was conducted on December 19 and 20, 2012. The sampling results are presented on Table 2 and depicted on Figure 2. The results of the first quarter sampling reported an overall favorable response to the in-situ treatment application. The results are summarized below.

a. The VOC levels in MW-31 demonstrated a significant response to the RegenOx® ORC Advanced® treatment, decreasing to below the NYSDEC-GWQC. The reported results represent the first time since the installation and monitoring of MW-31 that VOC levels were reported below the GWQC (Table 2).

b. The results from the downgradient delineation wells (MW-36 and MW-37) reported VOCs as not detected or below the NYSDEC-GWQC, consistent with the baseline event.

c. The VOC levels in cross-gradient wells (MW-70 and MW-72) were reported below the GWQC with the exception of one VOC (1,1-dichlorethane) in MW-72, marginally above the GWQC in MW-72 (Table 2).

d. The MW-71 upgradient well results reported benzene and chlorobenzene at levels above the GWQC, consistent with the baseline pre-application VOC concentrations.

e. During the post-application sampling of MW-71, a Dense Non-Aqueous Phase Liquid (DNAPL) was observed at the bottom of the well. The product was observed during extraction of the pump from the well. During the March sampling event, the DNAPL was measured and estimated to be approximately 3.5 inches in the bottom of the well. A sample of the DNAPL was collected for fingerprint analysis to identify the makeup of the material. The fingerprint analysis was submitted to the NYSDEC in the MW-71 Delineation Workplan dated August 2, 2013 and subsequently approved by the NYSDEC on August 26, 2013.

3.3 2ND QUARTERLY POST-REMEDIAL MONITORING RESULTS (MARCH 2013)

The second quarter post-remedial ground water sampling was conducted on March 12 and 13, 2013. The sampling results are presented on Table 3 and depicted on Figure 2. The results are summarized below.

a. The MW-31 VOC results were again reported as not detected or below the NYSDEC GWQC for the second quarterly ground water monitoring event. The decrease in the MW-31 VOCs levels is attributed to the RegenOx® treatment resulting in the oxidation and mass reduction of compound concentrations.

b. The results from the downgradient delineation wells MW-36 and MW-37 reported VOCs as not detected or below the NYSDEC-GWQC, consistent with the baseline and first quarter event. This is the third quarter that MW-36 and MW-37 VOCs were below the GWQC.

c. The VOC levels in cross-gradient well MW-70 were reported as not detected. Cross-gradient monitoring well MW-72 results reported five VOCs (benzene, chlorobenzene, 1,1-dichlorethane, 1,2-dichlorethane, and methylene chloride), above the GWQC. The results reported in the second quarter appear to be an anomaly and/or a spike in compounds concentrations being liberated from the soil as result of the in-situ field

RegenOx® ORC Advanced® application. This increase is common and it is expected that the ORC Advanced® applied with the RegenOx® will continue to reduce VOC levels in ground water over time.

d. The upgradient well MW-71 results reported benzene and chlorobenzene at levels that were consistent with the baseline and first quarter VOC concentrations, above the GWQC.

3.4 3RD QUARTERLY POST-REMEDIAL MONITORING RESULTS (JUNE 2013)

The third quarter post-remedial ground water sampling event was conducted on June 26 and 27, 2013. The sampling results are presented on Table 4 and depicted on Figure 2. The results are summarized below.

a. The third quarter MW-31 results reported seven VOCs (benzene, chlorobenzene, choroethane, 1,1-dichlorethane, 1,2-dichlorethane, methylene chloride, and vinyl chloride) above the GWQC. The results are typical of a rebound/upward spike in target compound concentrations, which has been observed to occur subsequent to the application of the reagent into the subsurface. This increase is common due to the temporary liberation of contaminants from the soil during the application and it is expected that the ORC Advanced® applied with the RegenOx® will continue to reduce VOC levels in ground water over time.

b. The results from the downgradient delineation wells MW-36 and MW-37 reported VOCs as not detected or below the NYSDEC-GWQC, consistent with the previous three monitoring events. This is the fourth quarterly event that MW-36 and MW-37 VOCs were below the GWQC (Table 4).

c. The results from MW-70, MW-71, and MW-72 were reported below the NYSDEC-GWQC with the exception of benzene and chlorobenzene reported in the upgradient well MW-71, consistent with the previous monitoring events.

3.5 4TH QUARTERLY POST-REMEDIAL MONITORING RESULTS (SEPTEMBER 2013)

The fourth quarter post-remedial ground water sampling event was conducted on September 17 and 18, 2013. The sampling results are presented on Table 5 and depicted on Figure 2. The results are summarized below.

a. The fourth quarter MW-31 results reported four VOCs (benzene, chlorobenzene, choroethane, 1,2-dichlorethane) above the GWQC. Three VOCs (1,1-dichlorethane, methylene chloride, and vinyl chloride) reported during the third quarter monitoring event were reported during the fourth quarter as not-detected or below the GWQC (Table 5). The fourth quarter results indicated decreasing VOC levels in MW-31. The upward spike in VOC levels observed during the third quarter appears to be abating as a downward trend was apparent in the fourth quarter sampling results (Tables 4 and 5).

b. The downgradient delineation wells (MW-36 and MW-37) results reported VOCs as not detected or below the NYSDEC-GWQC, consistent with the previous four monitoring events. This is the fourth quarterly event that the downgradient monitoring wells MW-36 and MW-37 reported VOCs below the GWQC.

c. The results from MW-70, MW-71, and MW-72, were reported below the NYSDEC-GWQC with the exception of benzene and chlorobenzene reported in the upgradient well MW-71, consistent with the previous monitoring events.

4.0 TECHNICAL CONCLUSIONS AND RECOMMENDATIONS

The NYSDEC approved the MW-31 In-Situ Workplan, entailing in-situ bioremediation, which was implemented during October and November 2012. The workplan outlined the details of the subsurface application of the chemical oxidant RegenOx® combined with ORC Advanced® to enhance ground water remediation in the area proximal to MW-31. Subsequent to the in-situ treatment application, four quarters of post-remedial ground water monitoring was conducted during December 2012 through September 2013 to evaluate the effectiveness of the in-situ remediation program. Conclusions and recommendations based on the in-situ remediation field application, inclusive of the post-remedial monitoring results, are summarized below.

The VOC results from the baseline and four post-application sampling events document relatively low levels of select VOCs reported in the monitoring wells (MW-31, MW-36, MW-37, MW-70, MW-71, and MW-72), with some minor exceptions in the levels reported in MW-31, MW-71 and MW-72. The reported results over the five quarter period, support several favorable observations relative to the effectiveness of the in-situ remediation, as outlined below.

4.1 MW-31 RESULTS

Benzene, chlorobenzene and choroethane were the only compounds reported in the baseline event above the GWQC in the primary area of concern (MW-31). The post-application sample results for MW-31 were reported below the GWQC, during the first (December 2012) and second (March 2013) quarters, which represents the first time from well installation and inception of the monitoring program that MW-31 VOCs levels were reported below the GWQC. During the third (June 2013) and fourth (September 2013) post-application monitoring period, MW-31 sampling results reported seven and three VOCs, respectively above the GWQS. The increase in VOC levels is typically observed subsequent to RegenOx® application.

Previous experience with the in-situ treatment application of RegenOx® has documented that a rebound/upward spike in target compound concentrations may occur subsequent to application of the reagent into the subsurface. Therefore, it may be expected that the VOC levels will increase in the wells as constituents are liberated in the sub-surface soil from the initial injections. However, over time, constituent levels should stabilize and begin a downward trend as the ORC Advanced® supplies a long term source of oxygen to the subsurface and biodegradation of the VOC levels in ground water. A downward trend was apparent from the observed decrease in the VOC levels reported from the third to the fourth quarter sampling event (Tables 4 and 5).

4.2 MW-36 AND MW-37 RESULTS

The results from downgradient monitoring wells MW-36 and MW-37 were reported below the GWQC in the baseline and the four post-application sampling events (Tables 1 through 5). Based on the results reported over the five quarters and historically since the inception of the monitoring program, it can be concluded that VOC constituents are localized to the MW-31 area and are not migrating in the downgradient direction.

4.3 MW-70 AND MW-72 RESULTS

The cross-gradient wells MW-70 and MW-72 results from the baseline and post-application quarterly sampling events were reported below the GWQC with the exception of MW-72 second quarter (March 2013) sampling results, which reported five VOCs above their respective GWQC (Table 3). The results reported in the second quarter appear to be an anomaly and/or a spike in compounds concentrations being liberated from the soil as result of the in-situ field RegenOx® ORC Advanced® application. During the subsequent third and fourth quarter sampling events, the VOC concentrations decreased to below the GWQC in this well.

4.4 MW-71 RESULTS

The upgradient well MW-71 results reported benzene and chlorobenzene above the GWQC during the baseline and post-application sampling events (Tables 1 through 5). The VOC levels remained consistent during the monitoring period. Further investigation of the VOC levels reported in MW-71 will be conducted as part of the DNAPL investigation and/or remedial options evaluation for this well and reported under separate cover.

4.5 CONCLUSIONS AND RECOMMENDATIONS

Overall comparison of the baseline data to the post-application data documents that the in-situ remediation was effective at reducing VOCs in ground water in the targeted MW-31 remediation area. The initial first two rounds (December 2012 and March 2013) of post-application sampling results indicated a significant reduction in the VOC levels as a result of the RegenOx® rapid and sustained oxidation of target compounds subsequent to the field application. It is expected that the ORC Advanced® will continue to supply controlled-release oxygen to the subsurface, where naturally occurring aerobic contaminant biodegradation will occur over time in ground water and

the saturated soils.

The perimeter wells (MW-36 and MW-37 [downgradient], MW-70 and MW-72 [cross-gradient], and MW-71 [upgradient]) results have demonstrated that the VOCs affecting ground water quality are not migrating away from the primary area of concern. Monitoring wells MW-36, MW-37 MW-70, and MW-72 results have been reported below the NYSDEC GWQC with the exception of select VOCs reported during the second quarter MW-72 results. The benzene and chlorobenzene reported in the upgradient well MW-71 have been consistent throughout the period.

Based upon the information presented herein, the conclusions and recommendations for the MW-31 in-situ remediation and monitoring program are presented below.

1. As a result of the overall VOC decreasing trend observed historically in MW-31 results since the inception of the monitoring program during 1997, subsequent to the RegenOx® ORC Advanced® application, and one year of post-application monitoring, the in-situ treatment was successful at further reduction of the VOCs impacting ground water surrounding MW-31. Based on the results, no further in-situ remediation is warranted at this time.

2. Review of the historical chlorinated compounds (1,1,1 trichloroethane, 1,1-dicloroethane, and chlorethane) results for MW-31 document substantial decrease in the 1,1,1 trichloroethane and 1,1-dicloroethane levels with a moderate and fluctuating increase in chloroethane levels. This trend is a strong indicator that natural reductive dechlorinization processes are occurring, resulting in the documented absence of the original chlorinated compounds and temporary increase in the chloroethane as a daughter product. Additionally, oxygen inhibitor parameters collected during the post-application monitoring (total iron, manganese, ORP, and dissolved oxygen) indicate favorable conditions for a natural attenuation scenario (reductive dechlorinization) are present at the site. The oxygen inhibitor parameter field measurements for the five sampling events, were recorded on the Ground Water Sampling Field Data Sheets presented as Appendix 3.

3. Based on the reduction in VOC levels reported subsequent to the in-situ treatment and post-application monitoring period, and the decreasing trend observed over time, it is expected that the VOC concentrations will continue to decrease as the ORC Advanced® bioremediation occurs. Based on the in-situ treatment results, and overall decreasing

trend in VOC levels effecting ground water quality, a Monitored Natural Attenuation (MNA) program is recommended and proposed for the OU1 section of the site. It is proposed to continue the monitoring program for one year (January through December 2014) with the modifications presented below. The NYSDEC response letter dated June 27, 2014, number 2) requires sampling once during the next year (June – December 2014). Please note that two sampling events were conducted during March 2014 and June 2014. Therefore, additional sampling of MW-37 and MW-70 will not be conducted, and the results reported in the 2014 PRR. One additional round of sampling in MW-31, MW-36, MW-37, MW-71, and MW-72 will be conducted during September 2014 as required by the NYSDEC. The modifications to the sampling program are presented below. The results of the monitoring program will be presented to the NYSDEC in the 2014 Periodic Review Report (PRR) during February 2015.

MW-31 In-situ Monitoring Program		
Monitoring Well	***Frequency***	***Analytical Program***
MW-31	~~Semi-Annual~~ Sample: 9/14	TCL-VOC+15 w/search MIBK, 1,4-dioxane
MW-36	~~Semi-Annual~~ Sample: 9/14	TCL-VOC+15 w/search MIBK, 1,4-dioxane
MW-37	~~Discontinue~~ Sampled:3/14,6/14	TCL-VOC+15 w/search MIBK, 1,4-dioxane
MW-70	~~Discontinue~~ Sampled:3/14,6/14	TCL-VOC+15 w/search MIBK, 1,4-dioxane
MW-71	~~Semi-Annual~~ Sample: 9/14	TCL-VOC+15 w/search MIBK, 1,4-dioxane
MW-72	Semi-Annual Sample: 9/14	TCL-VOC+15 w/search MIBK, 1,4-dioxane

4. The MW-71 DNAPL and MW-24 delineation activity was delayed as a result of weather conditions. The delineation was conducted on January 27 and 28, 2014 and the results will be evaluated and subsequently presented under separate cover during May 2014.

The in-situ ground water monitoring program is proposed to evaluate the continued effectiveness of the in-situ remediation. Based on the conclusions presented in this MW-31In-situ Results Report, the proposed semi-annual monitoring program and the forthcoming MW-71 and MW-24 delineation and remedial (if needed) activities, a comprehensive report of results and applicable conclusions and recommendations will be submitted to the NYSDEC.

TABLES

Table 1
Analytical Summary of Monitoring Results Baseline Event- August 2012
Former Kay Fries Site - Evonik Corporation, Stony Point , New York
ECM Project #1192

Sampling Location	Operable Unit 1								
Sample Identification	TB	FB	MW-31	MW-36	MW-37	MW-70	MW-71	MW-72	GWQC
Sample Date	8/1/2012	7/31/2012	8/1/2012	8/1/2012	7/31/2012	8/1/2012	8/1/2012	8/1/2012	(µg/L)
Laboratory Identification	460-43134-10	460-43134-2	460-43134-9	460-43134-7	460-43134-1	460-43134-8	460-43134-5	460-43134-6	
TCL Volatile Organics									
1,1-Dichloroethane	ND <0.13	ND <0.13	ND <0.13	ND <0.13	ND <0.13	ND <0.13	1.9	3.2	5
1,1-Dichloroethene	ND <0.090	ND <0.090	ND <0.090	ND <0.090	ND <0.090	ND <0.090	ND <0.090	0.72 J	5
1,2-Dichloroethane	ND <0.19	0.23 J	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	0.6
Benzene	ND <0.080	ND <0.080	***13***	ND <0.080	ND <0.080	ND <0.080	***13***	0.29 J	1
Carbon Disulfide	ND <0.13	ND <0.13	0.53 J	ND <0.13	ND <0.13	ND <0.13	ND <0.13	ND <0.13	60
Chlorobenzene	ND <0.11	ND <0.11	***230***	0.25 J	ND <0.11	ND <0.11	***200***	0.30 J	5
Chloroethane	ND <0.17	ND <0.17	***320***	ND <0.17	ND <0.17	ND <0.17	3.7	1.3	50
Ethylbenzene	ND <0.10	ND <0.10	0.19 J	ND <0.10	ND <0.10	ND <0.10	0.41 J	ND <0.10	5
Toluene	ND <0.15	ND <0.15	0.66 J	ND <0.15	ND <0.15	ND <0.15	0.36 J	ND <0.15	5
Xylenes, Total	ND <0.36	ND <0.36	0.40 J	ND <0.36	ND <0.36	ND <0.36	1.9 J	ND <0.36	5
Total VO	0	0.23	564.78	0.25	0	0	221.27	5.81	NA
VO-TICs	0	13	197.3	0	0	0	230	0	NA
Metals									
Iron	34,300	NT	1,590	36,000	ND <129	87,000	36,000	180,000	NA
Manganese	4,210	NT	783	3,480	ND <7.7	2,630	1,070	5,380	NA

NOTES:
All results reported in micrograms per liter (µg/L).
GWQC :Ground Water Quality Criteria; NYSEDEC, T.O.G.S. 1.1.1 (June 1998; June 2004)
*TICs :Tentatively Identified Compounds
ND<1.0 :Compound Not
BOLD :Concentration reported above the listed GWQC
J :Estimated value greater than the Method Detection Limit but lower than the reporting limit.
NA :No applicable GWQC.

Table 2
Analytical Summary of Monitoring Results 1st Quarter- December 2012
Former Kay Fries Site, Evonik Corporation – Stony Point, New York
ECM Project #1192

Sampling Location	Operable Unit 1								
Sample Identification	TB	FB	MW-31	MW-36	MW-37	MW-70	MW-71	MW-72	GWQC
Sample Date	212/19/2012	12/19/2012	12/20/2012	12/19/2012	12/20/2012	12/19/2012	12/20/2012	12/20/2012	(µg/L)
Laboratory Identification	460-48803-8	460-48794-8	460-48803-4	460-48794-1	460-48794-2	460-48794-3	460-48794-4	460-48794-5	
TCL Volatile Organics									
1,1-Dichloroethane	ND <0.13	ND <0.13	ND <0.13	ND <0.13	ND <0.13	ND <0.13	2.1	***6.2***	5
1,1-Dichloroethene	ND <0.090	ND <0.090	ND <0.090	ND <0.090	ND <0.090	ND <0.090	ND <0.090	2.7	5
1,2- Dichloroethane	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	0.29 J	0.6
Benzene	ND <0.080	ND <0.080	0.20 J	ND <0.080	ND <0.080	ND <0.080	***19***	0.28 J	1
Chlorobenzene	ND <0.11	ND <0.11	0.11	ND <0.11	ND <0.11	ND <0.11	***210***	ND <0.11	5
Chloroethane	ND <0.17	ND <0.17	0.17	ND <0.17	ND <0.17	ND <0.17	1.8	2.1	5
Ethylbenzene	ND <0.10	ND <0.10	ND <0.10	ND <0.10	ND <0.10	ND <0.10	0.70 J	ND <0.10	5
Toluene	ND <0.15	ND <0.15	ND <0.15	ND <0.15	ND <0.15	ND <0.15	0.33 J	ND <0.15	5
Xylenes, Total	ND <0.36	ND <0.36	ND <0.36	ND <0.36	ND <0.36	ND <0.36	2.6 J	ND <0.36	5
Total VO	0	0	5.7	0	0	0	236.53	11.57	NA
VO-TICs	0	0	0	0	8.4	0	150	0	NA
Metals									
Iron	NT	ND <129	38,300	169,000	58,200	120,000	15,000	19,800	NA
Manganese	NT	ND <7.7	3,810	6,690	4,360	3,350	616	693	NA

NOTES:
All results reported in micrograms per liter (µg/L).
GWQC :Ground Water Quality Criteria; NYSEDEC, T.O.G.S. 1.1.1 (June 1998; June 2004)
*TICs :Tentatively Identified Compounds
ND<1.0 :Compound Not
BOLD :Concentration reported above the listed GWQC
J :Estimated value greater than the Method Detection Limit but lower than the reporting limit.
NA :No applicable GWQC.

Table 3
Analytical Summary of Monitoring Results 2nd Quarter- March 2013
Former Kay Fries Site –Evonik Corporation – Stony Point, New York
ECM Project #1192

Sampling Location	Operable Unit 1								
Sample Identification	TB	FB	MW-31	MW-36	MW-37	MW-70	MW-71	MW-72	GWQC
Sample Date	3/11/2013	3/13/2013	3/13/2013	3/13/2013	3/12/2013	3/13/2013	3/13/2013	3/13/2013	(µg/L)
Laboratory Identification	460-52285-7	460-52285-6	460-52293-4	460-52285-1	460-52285-2	460-52285-3	460-52285-4	460-52285-5	
TCL Volatile Organics									
1,1,1-Trichloroethane	ND <0.060	ND <0.060	ND <0.060	ND <0.060	ND <0.060	ND <0.060	ND <0.060	1.7	5
1,1-Dichloroethane	ND <0.13	ND <0.13	3.0	ND <0.13	ND <0.13	ND <0.13	1.6	***150***	5
1,2-Dichloroethane	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	***1.8***	0.6
Benzene	ND <0.080	ND <0.080	0.15	ND <0.080	ND <0.080	ND <0.080	***15***	***24***	1
Carbon disulfide	ND <0.13	ND <0.13	0.87 J	0.87 J	ND <0.13	ND <0.13	ND <0.13	0.39 J	60
Chlorobenzene	ND <0.11	ND <0.11	0.25 J	0.25 J	0.21 J	ND <0.11	***180***	***88***	5
Chloroethane	ND <0.17	ND <0.17	ND <0.17	ND <0.17	ND <0.17	ND <0.17	1.3	***460***	5
Ethylbenzene	ND <0.10	ND <0.10	ND <0.10	ND <0.10	ND <0.10	ND <0.10	0.66 J	0.17 J	5
Methylene Chloride	ND <0.18	ND <0.18	ND <0.18	ND <0.18	ND <0.18	ND <0.18	ND <0.18	***8.5***	5
Toluene	ND <0.15	ND <0.15	ND <0.15	ND <0.15	ND <0.15	ND <0.15	0.25 J	0.88 J	5
Vinyl Chloride	ND <0.14	ND <0.14	ND <0.14	ND <0.14	ND <0.14	ND <0.14	ND <0.14	0.97 J	2
Xylenes, Total	ND <0.36	ND <0.36	ND <0.36	ND <0.36	ND <0.36	ND <0.36	2.3 J	ND <0.36	5
Total VO	0	0	4.03	1.12	0.21	0	201.11	846.41	NA
VO-TICs	0	0	0	0	6.8	0	140	72.8	NA
Metals									
Iron	NT	ND <129	111,000	210,000	104,000	38,800	14,900	663	NA
Manganese	NT	ND <7.7	3,340	11,600	5,820	1,040	552	225	NA

NOTES:
All results reported in micrograms per liter (µg/L).
GWQC :Ground Water Quality Criteria; NYSEDEC, T.O.G.S. 1.1.1 (June 1998; June 2004)
*TICs :Tentatively Identified Compounds
ND<1.0 Detected at indicated
BOLD :Concentration reported above the listed GWQC
J :Estimated value greater than the Method Detection Limit but lower than the reporting limit.
NA :No applicable GWQC.

Table 4
Analytical Summary of Monitoring Results 3rd Quarter- June 2013
Former Kay Fries Site – Evonik Corporation – Stony Point, New York
ECM Project #1192

Sampling Location	Operable Unit 1								
Sample Identification	TB	FB	MW-31	MW-36	MW-37	MW-70	MW-71	MW-72	GWQC
Sample Date	6/25/2013	6/26/2013	6/27/2013	6/26/2013	6/26/2013	6/26/2013	6/27/2013	6/26/2013	(µg/L)
Laboratory Identification	460-58687-1	460-58687-2	460-58687-8	460-58687-5	460-58687-6	460-58687-4	460-58687-9	460-58687-7	
TCL Volatile Organics									
1,1-Dichloroethane	ND <0.13	ND <0.13	***190***	ND <0.13	ND <0.13	ND <0.13	2.5	2.9	5
1,2-Dichloroethane	ND <0.19	ND <0.19	***3.1 J***	ND <0.19	ND <0.19	ND <0.19	ND <0.19	ND <0.19	0.6
Acetone	ND <2.7	ND <2.7	ND <13	ND <2.7	14	ND <2.7	ND <2.7	ND <2.7	50
Benzene	ND <0.080	ND <0.080	***61***	ND <0.080	ND <0.080	ND <0.080	***11***	0.12 J	1
Chlorobenzene	ND <0.11	ND <0.11	***200***	0.39 J	ND <0.11	ND <0.11	***120***	ND <0.11	5
Chloroethane	ND <0.17	ND <0.17	***1,100***	ND <0.17	ND <0.17	ND <0.17	1.8	ND <0.17	5
Ethylbenzene	ND <0.10	ND <0.10	ND <0.50	ND <0.10	ND <0.10	ND <0.10	0.33 J	ND <0.10	5
Methylene Chloride	ND <0.18	ND <0.18	***12***	ND <0.18	ND <0.18	ND <0.18	ND <0.18	ND <0.18	5
Toluene	ND <0.15	ND <0.15	4.9 J	ND <0.15	ND <0.15	ND <0.15	0.16 J	ND <0.15	5
Vinyl Chloride	ND <0.14	ND <0.14	***3.3 J***	ND <0.14	ND <0.14	ND <0.14	ND <0.14	ND <0.14	2
Xylenes, Total	ND <0.36	ND <0.36	ND <1.8	ND <0.36	ND <0.36	ND <0.36	1.3 J	ND <0.36	5
Total VO	0	0	1574.3	0.39	14	0	137.09	3.59	NA
VO-TICs	0	0	116	0	0	0	55.1	0	NA
Metals									
Iron	NT	ND <129	1,400	90,300	26,200	58,300	3,300	105,000	NA
Manganese	NT	ND <7.7	606	2,980	4,900	1,560	1,090	2,830	NA

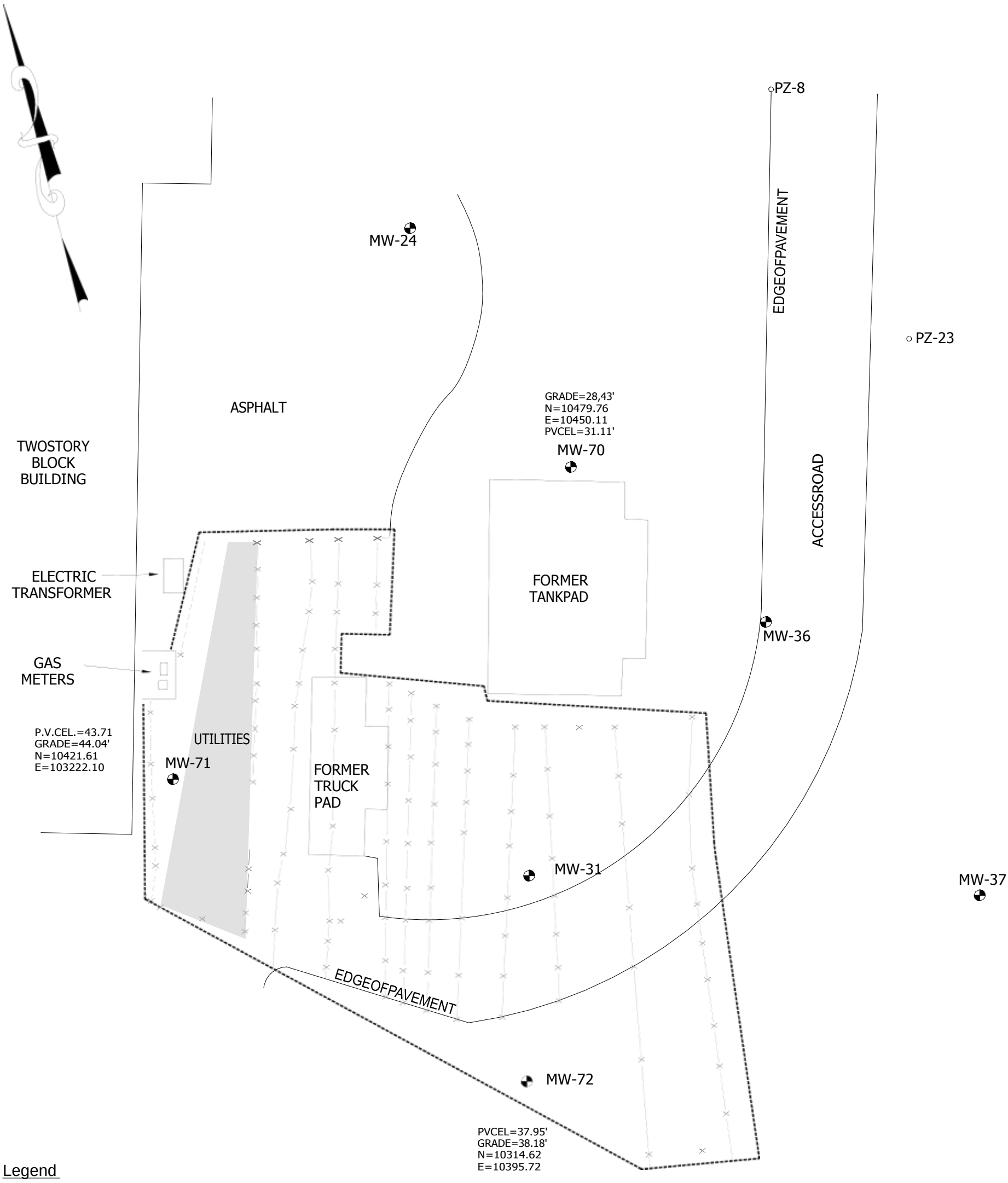
NOTES:
All results reported in micrograms per liter (µg/L).
GWQC :Ground Water Quality Criteria; NYSEDEC, T.O.G.S. 1.1.1 (June 1998; June 2004)
*TICs :Tentatively Identified Compounds
ND<1.0 :Compound Not Detected at indicated method detection limit.
BOLD :Concentration reported above the listed GWQC
J :Estimated value greater than the Method Detection Limit but lower than the reporting limit.
NA :No applicable GWQC.

Table 5
Analytical Summary of Monitoring Results 4th Quarter- September 2013
Former Kay Fries Site – Evonik Corporation – Stony Point, New York
ECM Project #1192

Sampling Location	Operable Unit 1								
Sample Identification	TB	FB	MW-31	MW-36	MW-37	MW-70	MW-71	MW-72	GWQC
Sample Date	9/18/2013	9/18/2013	9/18/2013	9/17/2013	9/18/2013	9/17/2013	9/18/2013	9/18/2013	(µg/L)
Laboratory Identification	460-63324-1	460-63324-8	460-63324-2	460-63324-3	460-63324-4	460-63324-5	460-63324-6	460-63324-7	
TCL Volatile Organics									
1,1- Dichloroethane	ND <0.13	ND <0.13	0.59 J	ND <0.13	ND <0.13	0.30 J	2.7	3.5	5
1,2-Dichloroethane	ND <0.19	ND <0.19	***0.82 J***	ND <0.19	0.34 J	ND <0.19	ND <0.19	0.31 J	0.6
2- Butanone	ND <2.3	ND <2.3	4.2 J	ND <2.3	ND <2.3	ND <2.3	ND <2.3	ND <2.3	50
Acetone	ND <2.7	ND <2.7	ND <2.7	ND <2.7	17	ND <2.7	ND <2.7	ND <2.7	50
Benzene	ND <0.080	ND <0.080	***33***	ND <0.080	ND <0.080	ND <0.080	***12***	0.26 J	1
Carbon Disulfide	ND <0.13	ND <0.13	0.51 J	ND <0.13	ND <0.13	0.25 J	ND <0.13	0.50 J	60
Chlorobenzene	ND <0.11	ND <0.11	***270***	ND <0.11	ND <0.11	ND <0.11	***190***	ND <0.11	5
Chloroethane	ND <0.17	ND <0.17	***210***	ND <0.17	ND <0.17	ND <0.17	3	ND <0.17	5
Ethylbenzene	ND <0.10	ND <0.10	0.39 J	ND <0.10	ND <0.10	ND <0.10	0.57 J	ND <0.10	5
Methylene Chloride	ND <0.18	0.51 J	0.92 J	ND <0.18	ND <0.18	ND <0.18	ND <0.18	ND <0.18	5
Toluene	ND <0.15	ND <0.15	1.1	ND <0.15	ND <0.15	ND <0.15	0.27 J	ND <0.15	5
Xylenes, Total	ND <0.36	ND <0.36	ND <0.36	ND <0.36	ND <0.36	ND <0.36	2.0 J	ND <0.36	5
Total VO	0	0.51	521.53	0	17.34	0.55	210.54	4.57	NA
VO-TICs	0	0	155	3.7	6.4	0	110	0	NA
Metals									
Iron	NT	ND <129	4,090	62,300	14,500	43,900	22,200	144,000	NA
Manganese	NT	ND <7.7	1,140	4,270	7,620	1,270	744	4,610	NA

NOTES:
All results reported in micrograms per liter (µg/L).
GWQC :Ground Water Quality Criteria; NYSEDEC, T.O.G.S. 1.1.1 (June 1998; June 2004)
*TICs :Tentatively Identified Compounds
ND<1.0 :Compound Not
BOLD :Concentration reported above the listed GWQC
J :Estimated value greater than the Method Detection Limit but lower than the reporting limit.
NA No applicable GWQC.

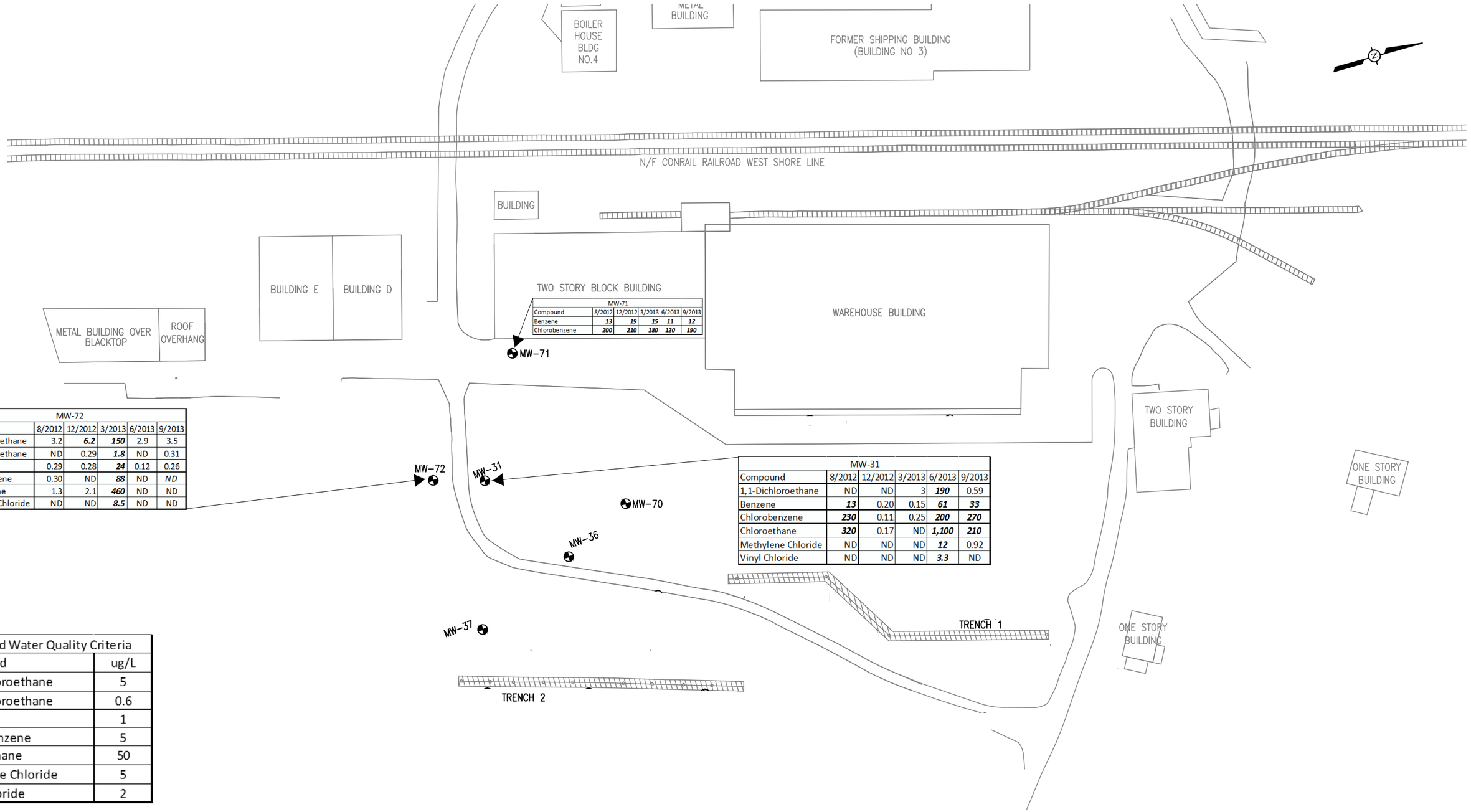
FIGURES



Legend

- × RegenoxOrcInjectionPoint
- ------- TreatmentArea
- ◓ MonitoringWell
- ○ Piezometer

SCALE:	CHECKEDBY:		
1"=23'	CB	*ECM* environmental compliance monitoring, inc. 349 Route 206, Hillsborough, New Jersey, 08844 908-874-0990	FIGURE 1 Monitoring Well Locations & Regenox/ORC Treatment Area
DATE:	PROJECTNO:		
1262013	1192		



MW-71

Compound	8/2012	12/2012	3/2013	6/2013	9/2013
Benzene	***13***	***19***	***15***	***11***	***12***
Chlorobenzene	***200***	***210***	***180***	***120***	***190***

MW-72

Compound	8/2012	12/2012	3/2013	6/2013	9/2013
1,1-Dichloroethane	3.2	***6.2***	***150***	2.9	3.5
1,2-Dichloroethane	ND	0.29	***1.8***	ND	0.31
Benzene	0.29	0.28	***24***	0.12	0.26
Chlorobenzene	0.30	ND	***88***	ND	***ND***
Chloroethane	1.3	2.1	***460***	ND	ND
Methylene Chloride	ND	ND	***8.5***	ND	ND

MW-31

Compound	8/2012	12/2012	3/2013	6/2013	9/2013
1,1-Dichloroethane	ND	ND	3	***190***	0.59
Benzene	***13***	0.20	0.15	***61***	***33***
Chlorobenzene	***230***	0.11	0.25	***200***	***270***
Chloroethane	***320***	0.17	ND	***1,100***	***210***
Methylene Chloride	ND	ND	ND	***12***	0.92
Vinyl Chloride	ND	ND	ND	***3.3***	ND

Ground Water Quality Criteria	
Compound	ug/L
1,1-Dichloroethane	5
1,2-Dichloroethane	0.6
Benzene	1
Chlorobenzene	5
Chloroethane	50
Methylene Chloride	5
Vinyl Chloride	2

Legend:

Monitoring Wells

SCALE:	CHECKED BY:
1" = 64'	CB
DATE:	PROJECT NO:
12/2013	-1192

Former Kay Fries Site
50 Holt Drive
Stony Point, NY

ECM
environmental compliance monitoring, inc.
349 Route 206, Hillsborough, New Jersey, 08844 908-874-0990

Figure 2
MW-31 In-situ Results Report
Baseline and Quarterly Analytical Results Summary

APPENDICES

Appendix 1

RegenOx® ORC Advanced® Field Injection Logs

RegenOx/ORC Injection - Stony Point, October-November, 2012 ECM Project #1192					
Date	Point	Interval	Pump Rate (gpm)	Volume (gals.)	Comments
10/22/2012	1	17'-10'	9	63	
10/22/2012	2	17'-10'	9	63	
10/22/2012	3	17'-10'	9	63	
10/22/2012	4	17'-10'	9	63	
10/22/2012	5	17'-10'	9	63	
10/22/2012	6	15'-8'	9	63	
10/23/2012	7	17'-9'	9	63	
10/23/2012	8	17'-9'	9	63	
10/23/2012	9	17'-9'	9	63	Minor surfacing last 2' of injection
10/23/2012	10	10'-3'	3-9	63	Reduced flow rate b/c of surfacing
10/23/2012	11	10'-3'	1-3	63	
10/23/2012	12	10'-3'	1-3	63	
10/23/2012	13	14'-7'	3	63	
10/24/2012	14	14'-7'	3	63	
10/24/2012	15	14'-7'	3	63	
10/24/2012	16	14'-7'	3	63	
10/24/2012	17	14'-7'	3	63	
10/24/2012	18	14'-7'	3	63	
10/24/2012	19	14'-7'	3	63	
10/24/2012	20	14'-7'	1-3	63	
10/25/2012	21	13.5'-6.5	3	63	Refusal at 13.5' BGS
10/25/2012	22	13.5'-6.5	3	63	Refusal at 13.5' BGS
10/25/2012	23	14'-7'	3	63	
10/25/2012	24	14'-7'	3	63	
10/25/2012	25	14'-7'	3	63	
10/25/2012	26	14'-7'	3	63	
10/25/2012	27	14'-7'	3	63	
10/25/2012	28	14'-7'	3	63	
10/25/2012	29	14'-7'	3	63	
10/26/2012	30	14'-7'	3	63	
10/26/2012	31	10'-3'	3	63	
10/26/2012	32	10'-3'	1'-3	63	Surfacing
10/26/2012	33	10'-3'	2	63	Surfacing from injection point from 5'-3'
10/26/2012	34	12'-7'	4	63	
10/26/2012	35	12'-7'	4	63	
10/26/2012	36	12'-7'	4	63	
10/31/2012	37	14'-7'	3	63	
10/31/2012	38	14'-7'	3	63	
10/31/2012	39	14'-7'	3	63	
10/31/2012	40	14'-7'	3	63	
10/31/2012	41	14'-7'	3	63	
10/31/2012	42	14'-7'	3	63	

RegenOx/ORC Injection - Stony Point, October-November, 2012 ECM Project #1192					
Date	Point	Depth	Pump Rate (gpm)	Volume	Comments
10/31/2012	43	14'-7'	3	63	
11/1/2012	44	17'-10'	4	63	
11/1/2012	45	17'-10'	4	63	
11/1/2012	46	17'-10'	4	63	
11/1/2012	47	17'-10'	4	63	
11/1/2012	48	17'-10'	4	63	
11/1/2012	49	14'-7'	4	63	
11/1/2012	50	14'-13'	1-4	63	Received back pressure. Minor amount of surfacing through rod.
11/1/2012	51	14'-7'	4	63	
11/1/2012	52	14'-12'	1-4	63	Received back pressure. Minor amount of surfacing through rod. Had to leave rod in ground for approximately 15 minutes to reduce pressure.
11/1/2012	53	14'-7'	4	63	
11/1/2012	54	14'-7'	4	63	
11/2/2012	55	12'-5'	4.5	63	
11/2/2012	56	12'-5'	4.5	63	
11/2/2012	57	12'-5'	4	63	
11/2/2012	58	12'-5'	4	63	Minor resurfacing through point minutes after rod removal.
11/2/2012	59	12'-6' 6'-5'	4 0-1	63	Resurfacing around boring rod out point. Had to have flow on/off last foot.
11/2/2012	60	12'-10'	1-4	63	At 10', not taking anymore product. Moved boring 1' south and took product 10'-5' varying from 2-4 gpm
11/5/2012	61	12'-5'	4	63	
11/5/2012	62	12'-5'	4	63	
11/5/2012	63	12'-5'	4	63	
11/5/2012	64	12'-10 10'-5'	4 1-4	63	
11/5/2012	65	12'-5'	4	63	
11/5/2012	66	12'-5'	4	63	
11/5/2012	67	12'-5'	3-Feb	63	
11/5/2012	68	12'-5'	2	63	
11/6/2012	69	10'-3'	4	63	
11/6/2012	70	10'-3'	4	63	
11/6/2012	71	10'-5' 5'-3'	4 2	63	
11/6/2012	72	10'-3'	3	63	
11/6/2012	73	10'-3'	3	63	
11/6/2012	74	12'-5'	2	63	
11/6/2012	75	10'-3'	3	63	Last 2' injected at 2 gpm

RegenOx/ORC Injection - Stony Point, October-November, 2012 ECM Project #1192					
Date	Point	Depth	Pump Rate (gpm)	Volume	Comments
11/6/2012	76	10'-3'	3	63	
11/6/2012	77	10'-3'	1-3	63	
11/6/2012	78	10'-3'	1-3	63	
11/7/2012	79	14'-7'	4	63	
11/7/2012	80	14'-7'	4	63	
11/7/2012	81	14'-7'	4	63	
11/7/2012	82	14'-7'	2-4	63	
11/7/2012	83	14'-7'	4	63	
11/7/2012	84	14'-7'	4	63	
11/7/2012	85	14'-7'	4	63	
11/7/2012	86	14'-7'	4	63	
11/7/2012	87	14'-7'	4	63	Surfacing downgradient of injection point
11/7/2012	88	14'-7'	4	63	
11/8/2012	89	10'-3'	1-2	63	
11/8/2012	90	10'-3'	1-2	63	
11/8/2012	91	10'-3'	2	63	
11/8/2012	92	10'-3'	2	63	
11/8/2012	93	11'-4'	2	63	
11/8/2012	94	10'-3'	1-2	63	
11/8/2012	95	10'-5'	1-2	45	Surfacing through rod at 7'-5' BGS
11/8/2012	96	10'-3'	1	63	Surfacing from rod at 7'-3' BGS;
11/9/2012	97	10'-3'	2	63	
11/9/2012	98	10'-3'	2	63	
11/9/2012	99	10'-3'	2	63	
11/9/2012	100	10'-3'	2	63	
11/9/2012	101	10'-3'	1-2	63	
11/9/2012	102	10'-3'	1-2	63	Surfacing after injection of material
11/9/2012	103	10'-3'	2	63	Minor surfacing after injection of material
11/9/2012	104	10'-3'	2	63	
11/12/2012	105	11'-6'	2	63	Slight surfacing
11/12/2012	106	11'-3'	1	63	
11/12/2012	107	10'-3'	2	63	
11/12/2012	108	10'-3'	2	63	
11/12/2012	109	10'-3'	1-2	63	Surfacing last 3' feet of boring
11/12/2012	110	11'-4'	2	63	Surfacing from rod at 6'-5'; reduced gpm
11/12/2012	111	12'-5'	2	63	
11/12/2012	112	12'-5'	2	63	
11/13/2012	113	10'-3'	2	63	
11/13/2012	114	10'-3'	1-2	63	Slight surfacing south of boring
11/13/2012	115	10'-3'	1-2	63	Slight surfacing south of boring
11/13/2012	116	10'-3'	1'-2	63	Slight surfacing south of boring

RegenOx/ORC Injection - Stony Point, October-November, 2012 ECM Project #1192					
Date	Point	Depth	Pump Rate (gpm)	Volume	Comments
11/13/2012	117	12'-5'	2	63	
11/13/2012	118	12'-5'	2	63	

Appendix 2

Analytical Data Packages – August 2012, December 2012, March 2013, June 2013, and September 2013

Appendix 3

Ground Water Sampling Field Data Sheets

August 2012, December 2012, March 2013, June 2013, and September 2013

ECM

GROUND WATER SAMPLING FIELD DATA SHEET

Project Name : Stony Point | Project Number : 1192 | Date : July 31- August 1, 2012

Location : Stony Point, NY | Weather : 70's, Overcast | Page : 1 of 1

Sampling Team : Christopher Basile | Sampl. Reason : MW-31 Area

Well ID Permit No.	*	Depth to GW from TOC (feet)	Well: Total Depth (feet)	Well: Depth to TOS from TOC (feet)	Well: Diameter (inches)	Well: Volume (gallons)	Purge: Duration (minutes)	Purge: Volume (gallons)	Purge: Rate (gpm)	Purge: Method	Ground Water: pH (units)	Ground Water: Cond. (umhos)	Ground Water: DO (mg/L)	Ground Water: ORP (mV)	Ground Water: Temp. (C)	Sampling: Time	Sampling: Method	Comments
	A	7.71								Submersible	6.61	2.33*	0.57	-221	19.4		Disposable	
MW-31	B	13.00	14.43	--	4	4.39	7	14	2	Pump	6.63	2.45*	0.64	-222	19.6	11:53	Bailer	PID = NIR
8/1/2013	C	11.21									6.67	2.48*	0.88	-230	19.6			
	A	13.78								Submersible	6.69	1830	0.84	-108	16.9		Disposable	
MW-24	B	19.21	21.20	--	4	4.84	8	16	2	Pump	6.76	1797	0.60	-117	16.8	8:34	Bailer	PID = NIR
8/1/2013	C	18.11									6.77	1811	0.99	-121	17.1			
	A	1.48								Submersible	6.94	1434	0.79	-80	20.8		Disposable	
MW-36	B	7.10	8.35	--	4	4.49	7	14	2	Pump	7.14	2.10*	1.21	-61	20.7	10:44	Bailer	PID = NIR
8/1/2013	C	6.74									7.17	1931	1.11	-81	19.9			
	A	3.53								Submersible	6.57	729	0.18	-225	19.6		Disposable	
MW-37	B	7.88	9.65	--	4	4.00	6	12	2	Pump	6.58	2.15*	0.16	-233	19.9	13:30	Bailer	PID = NIR
7/31/2013	C	7.01									6.51	1.45	0.32	-241	19.9			
	A	5.25								Submersible	6.38	782	0.70	-184	18.5		Disposable	
PZ-23	B	10.83	13.70	--	2	1.38	3	6	2	Pump	6.51	1.99*	1.33	-176	17.7	14:08	Bailer	PID = NIR
7/31/2013	C	9.83									6.37	1081	0.71	-184	17.7			
	A	6.78								Submersible	7.43	1413	0.80	-56	20.0		Disposable	
MW-70	B	12.80	16.74	--	2	1.62	3	6	2	Pump	7.48	1553	1.48	-60	20.1	11:19	Bailer	PID = NIR
8/1/2013	C	10.97									7.59	955	1.10	-79	19.0			
	A	8.74								Submersible	6.71	2.17*	2.01	-101	18.0		Disposable	
MW-71	B	15.40	19.36	--	2	1.73	3	6	2	Pump	6.67	2.49*	2.57	-100	17.7	9:14	Bailer	PID = NIR
8/1/2013	C	11.51									6.91	2.26*	1.73	-84	16.4			
	A	15.21								Submersible	6.96	230	0.91	-84	17.3		Disposable	
MW-72	B	23.44	27.78	--	2	2.05	3.5	7	2	Pump	7.17	294	1.10	-113	16.2	9:55	Bailer	PID = NIR
8/1/2013	C	20.08									7.06	322	2.22	-61	15.8			

Field Blank Taken : Yes X No | Location : PZ-23 | Time : 7/31/13 1359

Trip Blank Taken : Yes X No

Duplicate Sample Taken : Yes No X | Well Number : | Duplicate ID :

Notes:

* : A = Pre-Purging B = Post-Purging C = Post-Sampling

gpm : Gallons Per Minute PID : Photoionization Instrument

GW : Ground Water NIR : No Instrument Response

TOC : Top Of Casing TOS : Top Of Screen

Field Notes:

4" - 0.653

2" - 0.163

*Conductivity in mS/cm

ECM

GROUND WATER SAMPLING FIELD DATA SHEET

Project Name : Stony Point | Project Number : 1192 | Date : December 19-20, 2013

Location : Stony Point, NY | Weather : 50's, Sunny | Page : 1 of 1

Sampling Team : Christopher Basile/Keith Conlin | Sampl. Reason : MW-31 RAW GWM

Well ID Permit No.	*	Depth to GW from TOC (feet)	Well: Total Depth (feet)	Well: Depth to TOS from TOC (feet)	Well: Diameter (inches)	Well: Volume (gallons)	Purge: Duration (minutes)	Purge: Volume (gallons)	Purge: Rate (gpm)	Purge: Method	Ground Water: pH (units)	Ground Water: Cond. (S/m)	Ground Water: DO (mg/L)	Ground Water: ORP (mV)	Ground Water: Temp. (C)	Sampling: Time	Sampling: Method	Comments
	A	14.06								Submersible	6.90	0.138	1.52	-114	15.95		Disposable	
MW-24	B	16.28	21.20	--	4	4.6	7	14	2	Pump	6.89	0.137	0.51	-125	17.26	9:55	Bailer	PID = NIR
12/20/2013	C	12.19									6.89	0.134	0.22	-129	17.73			
	A	8.99								Submersible	6.43	0.146	0.28	-163	15.11		Disposable	
MW-71*	B	15.46	19.36	--	2	1.6	3	6	2	Pump	6.54	0.133	0.00	-162	15.30	9:00	Bailer	PID = NIR
12/20/2013	C	12.18									6.72	0.166	0.00	-186	15.52			
	A	15.19								Submersible	7.47	32.9*	3.82	-49	14.47		Disposable	
MW-72	B	22.17	27.78	--	2	2.0	3	6	2	Pump	7.37	31.4*	2.71	-59	14.95	10:10	Bailer	PID = NIR
12/20/2013	C	20.15									7.22	33.1*	2.65	-100	15.56			
	A	1.14								Submersible	7.98	63.8*	5.25	-43	11.67		Disposable	
MW-36	B	7.83	8.35	--	4	4.7	7	14	2	Pump	7.93	70.2*	3.05	-31	12.53	10:50	Bailer	PID = NIR
12/19/2013	C	7.21									7.91	70.5*	3.21	-40	12.10			
	A	6.93								Submersible	7.51	48.6*	0.00	-135	14.47		Disposable	
MW-70	B	14.22	16.74	--	2	1.6	3	6	2	Pump	7.50	49.4*	0.32	-142	14.82	10:10	Bailer	PID = NIR
12/19/2013	C	10.10									7.62	52.5*	3.71	-97	15.10			
	A	8.34								Submersible	11.50	1.40	>19.99	-178	12.14		Disposable	
MW-31	B	12.95	14.43	--	4	3.9	4	12	2	Pump	12.05	1.36	>19.99	-150	11.52	10:40	Bailer	PID = NIR
12/20/2013	C	10.84									12.20	1.30	>19.99	-142	11.63			

Field Blank Taken : Yes X No | Location : MW-24 | Time : 12/20/2012 9:50

Trip Blank Taken : Yes X No

Duplicate Sample Taken : Yes No X | Well Number : | Duplicate ID :

Notes:

* : A = Pre-Purging B = Post-Purging C = Post-Sampling

gpm : Gallons Per Minute PID : Photoionization Instrument

GW : Ground Water NIR : No Instrument Response

TOC : Top Of Casing TOS : Top Of Screen

Field Notes:

4" - 0.653

2" - 0.163

*Conductivity in mS/m

*MW-71 DNAPL Noted (Tar-like substance with solvent odor)

ECM

GROUND WATER SAMPLING FIELD DATA SHEET

Project Name : Stony Point | Project Number : 1192 | Date : March 12-13, 2013

Location : Stony Point, NY | Weather : 30's, Sunny | Page : 1 of 1

Sampling Team : Christopher Basile/Keith Conlin | Sampl. Reason : MW-31 RAW GWM

Well ID Permit No.	*	Depth to GW from TOC (feet)	Well: Total Depth (feet)	Well: Depth to TOS from TOC (feet)	Well: Diameter (inches)	Well: Volume (gallons)	Purge: Duration (minutes)	Purge: Volume (gallons)	Purge: Rate (gpm)	Purge: Method	Ground Water: pH (units)	Ground Water: Cond. (mS/m)	Ground Water: DO (mg/L)	Ground Water: ORP (mV)	Ground Water: Temp. (C)	Sampling: Time	Sampling: Method	Comments
	A	8.76								Submersible	8.11	87.5	0.34	-217	11.86		Disposable	
MW-71	B	12.35	19.36	--	2	1.73	3	6	2	Pump	7.28	95.5	0.34	-200	12.32	11:40	Bailer	PID = NIR
3/13/2013	C	11.30									7.18	125	1.10	-164	12.82			*Sheen
	A	14.42								Submersible	7.47	24.4	2.44	-61	12.71		Disposable	
MW-72	B	23.32	27.78	--	2	2.17	3	6	2	Pump	7.25	26.3	0.70	-148	13.48	9:40	Bailer	PID = NIR
3/13/2013	C	20.17									7.29	24.3	2.11	-149	14.02			
	A	1.06								Submersible	7.46	44.4	5.71	41	8.20		Disposable	
MW-36	B	7.70	8.35	--	4	4.76	7	14	2	Pump	7.28	46.7	4.01	51	8.52	9:15	Bailer	PID = NIR
3/13/2013	C	4.12									7.20	52.4	2.11	3	8.89			
	A	6.95								Submersible	7.88	35.6	0.89	-105	11.59		Disposable	
MW-70	B	13.82	16.74	--	2	1.60	3	6	2	Pump	7.56	38.4	0.14	-135	11.41	8:45	Bailer	PID = NIR
3/13/2013	C	11.72									7.57	36.3	4.07	-89	11.78			
	A	7.58								Submersible	11.20	0.930*	>19.99	120	8.83		Disposable	
MW-31	B	10.89	14.43	--	4	4.50	7	14	2	Pump	11.66	0.303*	>19.99	-55	9.30	10:15	Bailer	PID = NIR
3/13/2013	C	9.33									10.68	0.155	>19.99	35	9.56			
	A	2.42								Submersible	7.22	0.127*	3.14	20	7.34		Disposable	
MW-37	B	8.10	9.65	--	4	4.72	7	14	2	Pump	6.96	0.122*	2.40	-102	7.71	10:45	Bailer	PID = NIR
3/12/2013	C	5.72									6.71	0.125*	2.57	-103	7.91			

Field Blank Taken : Yes X No | Location : MW-70 | Time : 3/13/2013 8:40

Trip Blank Taken : Yes X No

Duplicate Sample Taken : Yes | No X | Well Number : | Duplicate ID :

Notes:

* : A = Pre-Purging B = Post-Purging C = Post-Sampling

gpm : Gallons Per Minute PID : Photoionization Instrument

GW : Ground Water NIR : No Instrument Response

TOC : Top Of Casing TOS : Top Of Screen

Field Notes:

4" - 0.653

2" - 0.163

*Conductivity in S/m

ECM

GROUND WATER SAMPLING FIELD DATA SHEET

Project Name : Stony Point | Project Number : 1192 | Date : June 26-27, 2013

Location : Stony Point, NY | Weather : 90's, Sunny | Page : 1 of 1

Sampling Team : Christopher Basile | Sampl. Reason : MW-31 RAW GWM

Well ID Permit No.	*	Depth to GW from TOC (feet)	Well: Total Depth (feet)	Well: Depth to TOS from TOC (feet)	Well: Diameter (inches)	Well: Volume (gallons)	Purge: Duration (minutes)	Purge: Volume (gallons)	Purge: Rate (gpm)	Purge: Method	Ground Water: pH (units)	Ground Water: Cond. (mS/m)	Ground Water: DO (mg/L)	Ground Water: ORP (mV)	Ground Water: Temp. (C)	Sampling: Time	Sampling: Method	Comments
	A	2.75								Submersible	6.91	144	0.00	-102	15.91		Disposable	
MW-37	B	9.10	9.65	--	4	4.50	7	14	2	Pump	7.03	145	1.21	-131	16.39	11:10	Bailer	PID = NIR
6/26/2013	C	7.63									6.88	160	2.10	-106	17.30			
	A	8.96								Submersible	8.00	80.3	0.21	-195	15.75		Disposable	
MW-71	B	16.21	19.36	--	2	1.70	3	6	2	Pump	7.64	85.1	0.00	-196	15.07	9:07	Bailer	PID = NIR
6/27/2013	C	11.11									7.57	99.2	0.00	-158	14.79			
	A	14.67								Submersible	7.97	26.0	0.11	-159	14.97		Disposable	
MW-72	B	25.68	27.78	--	2	2.14	4	8	2	Pump	7.68	27.8	0.21	-158	14.12	11:55	Bailer	PID = NIR
6/26/2013	C	23.21									7.89	25.1	0.00	-186	14.71			
	A	1.68								Submersible	7.27	40.3	0.90	-34	16.83		Disposable	
MW-36	B	7.63	8.35	--	4	4.36	7	14	2	Pump	7.21	43.4	0.93	-43	16.95	10:23	Bailer	PID = NIR
6/26/2013	C	6.53									7.20	46.0	0.87	-44	16.70			
	A	6.72								Submersible	7.20	42.3	0.00	-173	17.03		Disposable	
MW-70	B	13.05	16.74	--	2	1.63	3	6	2	Pump	7.31	41.5	0.00	-155	17.64	9:50	Bailer	PID = NIR
6/26/2013	C	11.62									7.39	46.1	0.00	-161	16.60			
	A	7.79								Submersible	11.07	99.0	16.53	-101	17.21		Disposable	
MW-31	B	10.98	14.43	--	4	4.34	7	14	2	Pump	9.70	135	8.31	-16	17.17	8:37	Bailer	PID = NIR
6/27/2013	C	9.58									9.08	149	5.18	28	16.67			
	A	5.62								Submersible	5.69	59.9	0.00	-125	16.08		Disposable	
PZ-23	B	9.68	13.70	--	2	1.32	2	4	2	Pump	6.30	77.3	0.00	-160	16.30	9:02	Bailer	PID = NIR
6/26/2013	C	6.79									6.51	83.2	0.00	-159	15.40			

Field Blank Taken : Yes X No | Location : PZ- 23 | Time : 6/26/2013 8:50

Trip Blank Taken : Yes X No

Duplicate Sample Taken : Yes | No X | Well Number : | Duplicate ID :

Notes:

* : A = Pre-Purging B = Post-Purging C = Post-Sampling

gpm : Gallons Per Minute PID : Photoionization Instrument

GW : Ground Water NIR : No Instrument Response

TOC : Top Of Casing TOS : Top Of Screen

Field Notes:

4" - 0.653

2" - 0.163