

INTERIM REMEDIAL MEASURE WORK PLAN

**Hartsdale Village Square
Aristocrat Cleaners
212 East Hartsdale Avenue
Hartsdale, New York 10530**

**Brownfield Cooperative Agreement
Site #: C360111**

July 19, 2013

Prepared for:

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***A Full Service Environmental Consulting
and Contracting Firm***



EnviroTrac

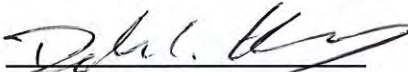
The following personnel have prepared, reviewed,
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Interim Remedial Measure Work Plan

Hartsdale Village Square, Aristocrat Cleaners
Hartsdale, New York

BCA Site #C360111


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"I Dale C. Konas, P.E. certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measure Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications."

7/19/13
Date

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1.0 INTRODUCTION

On January 12, 2010, Hartsdale Village Square, Aristocrat Cleaners (Site) located at 212 E. Hartsdale Avenue, Hartsdale, NY, was accepted into the New York State Brownfield Cleanup Program (BCP) by the New York State Department of Environmental Conservation (NYSDEC) as a Volunteer, and was assigned Brownfield Cooperative Agreement (BCA) Site #C360111. The general location of the Site is shown in Figure 1-1. In accordance with BCP requirements an evaluation of the environmental setting and conditions is being conducted in the form of a remedial investigation (RI) as described in DEC Program Policy *DER-10 – Technical Guidance for Site Investigation and Remediation*.

Based on results of testing conducted it has been determined that groundwater beneath the Site has been impacted by chemicals associated with the dry cleaning process and that remedial measures are warranted to prevent, mitigate or remedy environmental damage or the consequences of environmental damage. A priority during investigation and/or remediation at a cleanup site is to contain and/or stabilize, to the extent possible, sources of contamination identified in any media to reduce/eliminate receptor exposure to contaminants or to contain further movement of contaminants through any pathway. This will be accomplished through implementation of a non-emergency interim remedial measure (IRM). The NYSDEC encourages the use of a non-emergency IRM when a source of contamination or exposure pathway can be effectively addressed before completion of the ongoing investigation and remedy selection process.

1.1 Objectives

This IRM Work Plan was developed to address the following objectives:

- provide a brief summary of the Site, including findings pertaining to previous work performed pertinent to the proposed IRM pilot study;
- present the technical approach that will be used;
- document and describe potential full scale ISCR application options that may be implemented if warranted based on the pilot study results;
- present procedures that will be employed to address health and safety, quality assurance and potential community impacts;

- identify applicable regulatory considerations associated with the IRM and discuss their management;
- present information pertaining to a construction completion report (CCR) that will provide results of the completed IRM; and
- provide an IRM implementation schedule.

2.0 SCOPE OF WORK

2.1 Overview

The RI is being implemented using a phased approach as presented in the Amended Remedial Investigation Work Plan (Work Plan) dated August 2011, and findings pertaining to the first investigatory phase were provided in the Remedial Investigation Interim Summary Report dated June, 2012. The Interim Summary Report presented a recommendation regarding a potential groundwater treatment option that consisted of performing an augmented bioremediation pilot testing program. This approach entailed the addition of chemical degrading microbes and nutrients to the subsurface to degrade chemical compounds of interest present and consisted of laboratory bench testing followed by, if warranted by results, field application and performance monitoring. Based on the recent findings a better understanding of the distribution, fate and transport process of the chemicals of interest has been developed and an alternative approach utilizing in situ chemical reduction (ISCR) technology and constituting an Interim Remedial Measure (IRM) was proposed to the NYSDEC in correspondence dated May 22, 2013. The NYSDEC provided comments on the proposed actions in correspondence dated June 21, 2013 and requested the preparation of this IRM Work Plan.

2.2 Summary of Site Investigation Results

Results of prior testing conducted during the RI revealed the presence of chemical constituents in site media samples, most notably chlorinated volatile organic compounds (CVOCs); these “chemicals of interest” are typically associated with the dry cleaning process. A second phase of data collection has recently been conducted and included the installation of additional groundwater monitoring wells and collection and laboratory analysis of soil and groundwater samples. Full results of this new work will be provided to the NYSDEC in a future submittal as discussed in the June 2012 Report. Table 2-1 provides a summary of groundwater sampling results for the primary chemicals of interest. Well locations are provided on Figure 2-1. The results show that the maximum concentrations in groundwater are found at monitoring well MW-2. Table 2-2 provides results for these chemicals in soil.

The data reveal the bulk of the chemical mass is located in the upper few feet of the subsurface beneath the dry cleaner basement floor in the vicinity of SUMP 1. Notably, concentrations were

found to decline rapidly with depth based on testing conducted at the MW-2 location. For example, the soil concentration of tetrachloroethene (PCE), the primary chemical of interest, dropped sharply from 1.3 mg/kg at the 0.5-2.5 foot depth, to 0.00068 mg/kg at the 9-11 foot interval. Soil quality was monitored during the installation of monitoring well MW-2D in January 2013 through the collection and inspection of a continuous soil core to a depth of 21 feet below the basement floor and no evidence of contamination was noted beneath an organic layer found at a depth of 2.0-2.5 feet. Results for groundwater sampling revealed a similar decreasing trend with depth as PCE, detected at 13,000 ug/l in MW-2 (screened from 0.5 to 10.5 feet), declined to 42 ug/l in MW-2D (screened from 13-18 feet).

2.3 Technical Approach

2.3.1 EHC Injections

The combined effects of stimulating intrinsic biological degraders along with direct chemical destruction will be tested by injecting FMC Environmental Solutions EHC® ISCR Reagent (EHC) into the subsurface, beneath the dry cleaner basement floor in the vicinity of monitoring well MW-2 where the highest concentrations of the chemicals of interest have been detected. EHC is composed of a controlled release carbon, zero valent iron (ZVI) particles and nutrients used for stimulating in situ chemical reduction of dissolved persistent chemicals including the chemicals of interest found at the Site (e.g., tetrachloroethene, see Appendix A). Following placement, a number of physical, chemical and microbiological processes combine to create very strong reducing conditions that stimulate rapid and complete dechlorination, without the accumulation of recognized catabolites such as vinyl chloride. EHC is completely non-hazardous and safe to handle and its efficacy is long lasting with an estimated treatment life of 3 years.

The approximate location where the EHC will be injected into the subsurface will encompass a 10 ft x 10 ft area shown on Figure 2-1, and extending vertically within the saturated zone from the water table (i.e., approximately 1 foot below the floor of the basement) to a depth of approximately 6 feet below the floor in order to cover the interval where the bulk of the chemicals of interest in groundwater were found. Per FMC's recommendation based on review of provided site-specific chemical and hydrogeologic information, approximately 300 lbs of the EHC product will be used. The EHC will be delivered to the Site as a powder in 50 lb. bags and mixed on-site with

approximately 100-120 gallons of tap water to a slurry consistency. The basement floor will be opened using a concrete coring machine to access the subsurface for introduction of the slurry that will be injected at four to five locations within the targeted 500 ft³ treatment zone (i.e., 12-15 lbs EHC mass/foot will be applied at each injection point) using a portable direct-push drilling rig. Each boring location will be restored by sealing the floor penetration with cement immediately following completion of the injection process.

2.3.2 Remedial Performance Documentation/Sampling

Groundwater samples will be collected from monitoring wells MW-2, MW-2D and MW-8 at one month and four months following the EHC injections to assess performance. Proposed groundwater monitoring parameters include the following constituents that will be analyzed in the laboratory:

- Total Alkalinity
- Biological Oxygen Demand - 5 Day
- Total Metals - Calcium, Iron, Magnesium, Manganese
- Chloride
- Chemical Oxygen Demand
- Dissolved Gasses (methane, ethane, ethene)
- Dissolved Organic Carbon
- Total Hardness
- Nitrate Nitrogen
- TCL Volatile Organic Compounds
- Sulfate
- Total Organic Carbon

Sample analysis will be conducted by a laboratory certified in New York State to conduct work under the Environmental Laboratory Approval and Analytical Services Programs (ELAP/ASP) producing Category B deliverables. With the exception of dissolved gasses, all of these parameters were included in the recently completed Phase II groundwater testing and will serve as a baseline for comparison to post treatment sampling results. Summarized results of these

additional parameters that were tested during Phase II are provided in Table 2-3.

Field parameters will be recorded during groundwater sampling using a flow through cell and include dissolved oxygen, oxidation reduction potential, pH, specific conductance and temperature. See Table 2-4 for a summary of prior testing results.

The degree of success in meeting the goals of the IRM will be assessed not only through observing direct reduction in concentrations for the chemicals of interest, but also in noting changes in the geochemical environment that indicate enhancement of conditions for the reductive dechlorination of those chemicals.

2.3.3 Evaluation of Performance Testing Results and Full Scale Application Viability Assessment

Upon completion of the proposed post-application performance monitoring the IRM testing results will be compiled and evaluated to assess effectiveness and determine whether full scale application of the EHC technology would be potentially viable, and/or if the development of additional groundwater cleanup alternatives would be warranted to achieve cleanup goals in accordance with the Volunteer's obligations in the BCP.

If deemed appropriate, based on IRM testing results, full scale application of the EHC technology may include various options including, but not necessarily limited to, one or more of the following:

Option 1 (continued monitoring) - it is possible that the proposed scope of work may successfully result in sufficient concentration reductions (i.e., to within the AWQS), or exhibit significant reductions over the four month performance monitoring period which suggest that concentrations will continue to reduce as a result of ongoing effects of the initial injections. Further evaluation in the case of the latter would be conducted through additional rounds of groundwater sampling and laboratory analysis.

Option 2 (additional injections in the dry cleaner basement) - if results suggest that the selected technology is effective but that the reduction in chemical concentrations stalled (prematurely tailed off prior to achieving acceptable endpoint levels) then additional injections may be

conducted at the defined “source” area to reinvigorate the reduction process. This may include the introduction of additional EHC mass in the same 500 ft² volume as employed for the initial injections or may also proceed laterally beyond and/or to deeper intervals within that area.

Option 3 (injections in the liquor store basement) - If results do not show that concentrations at the downgradient area of the Site (beneath the liquor store) are being effectively reduced then injections at that location may be conducted to reduce concentrations and prevent additional migration to the south.

2.4 Regulatory Notifications

Depending on project specific criteria notifications to regulatory authorities may in some cases be required prior to initiation of remedial activities including the application of chemical injections. These include the following:

1. State Pollution Discharge Elimination System (SPDES) - Injections are not subject to a SPDES permit because the injected materials are not considered an industrial discharge. Therefore, no SPDES related notifications will be required.

2. Chemical Facility Anti-terrorism Standards (6 CFR Part 27) - These standards apply in the case of certain commonly used oxidants for in-situ applications (e.g., potassium permanganate and hydrogen peroxide) depending on quantity and concentrations used. Since the chemicals that will be used do not meet these criteria no related notifications will be required.

3. Underground Injection Control (UIC) -. Remediation injection wells or injection points are generally considered Class V UIC wells even if no physical well remains subsequent to the injection. As this includes direct-push injections, the UIC regulations do apply and notification will be required.

EPA's underground injection control program regulates injection remedies under 40 CFR Part 144 and requires Injection well owners/operators to provide information about the Class V injection wells to the EPA prior to their construction. The inventory form referenced in 40 CFR 144.26 [USEPA form 7520-16] will be completed and include enough details for EPA to

understand the Site and proposed process and will indicate that DEC is overseeing the project.

The completed form will be sent by mail or fax to:

Chief, Groundwater Compliance Section
U.S. EPA Region 2
290 Broadway, 20th Floor
New York, NY 10007-1866
Fax (212) 637- 3953

The notification will be made at least 30 days prior to the injections as required. The work may proceed immediately following the 30-day period as it is not necessary to wait for a response from EPA. It is assumed that the injections will be authorized by rule and the notification is all that will be required and that if EPA requires additional information or if they determine that the injection requires a permit, they will respond to the notification in writing during the interim 30-day period. The UIC program will be notified, as required, upon completion of the injections.

2.5 Quality Assurance

Procedures and requirements pertaining to the collection, laboratory analysis and reporting of results for environmental media samples that are collected at the Site are provided in the quality assurance project plan (QAPP) included in Appendix A of the Amended Remedial Investigation Work Plan, dated May, 2011, that was previously approved by the NYSDEC. These procedures will be used in the collection, analysis and reporting of results for groundwater samples during the implementation of the IRM. Table 2-5 provides a summary of analytical methods and sample handling requirements for IRM performance monitoring parameters that that were not specified in the May 2011 submittal.

2.6 Health and Safety

Health and safety procedures that will be employed during the IRM are presented in the health and safety plan (HASP) included in Appendix B of the Amended Remedial Investigation Work Plan, dated May, 2011, that was previously approved by the NYSDEC.

2.7 Community Air Monitoring

Community air monitoring procedures that will be implemented during ground intrusive activities at the Site are provided in Section 7.1 of the Amended Remedial Investigation Work Plan, dated May, 2011, that was previously approved by the NYSDEC. Considering that all of the IRM-related invasive work will be conducted within the basement of the dry cleaner, the potential impact to the local community is remote. Air quality in the work zone and nearby exterior of the dry cleaner will be monitored for organic vapors and particulates during the work to ensure worker safety (in accordance with provisions provided in the HASP) and to document that no adverse affects from the work conducted are experienced by the local community. If the exterior testing results exceed response triggers as specified in the May 2011 submittal then appropriate corrective actions will be taken.

3.0 REPORTING OF RESULTS

3.1 IRM Construction Completion Report

A Construction Completion Report (CCR) will be prepared and submitted at the completion of the IRM. The CCR will present and discuss the developed remedial action objectives, the selected remedy and the remedial actions performed. Detailed information pertaining to the CCR is provided in DER-10 subdivision 5.8(b)-(d). The CCR will take the place of a final engineering report for the IRM and will provide a certification and be stamped by a NYS registered professional engineer.

3.2 Electronic Data Deliverable

In accordance with requirements specified in DER-10, and as presented in Section 5.2.2 of the August 2011 Amended Remedial Investigation Work Plan, laboratory data developed during the IRM will be submitted to the Department in the DEC-approved Electronic Data Deliverable (EDD) format.

4.0 PROJECT SCHEDULE

The IRM will be conducted in accordance with the following schedule.

Update Document Repositories and EPA Notification

The IRM process will be initiated immediately upon receipt of approval to proceed from the NYSDEC. Copies of the approved IRM Work Plan will be placed in the following repositories:

- Greenburgh Library 300 Tarrytown Road, Elmsford, NY 10523; and
- NYSDEC Region 3 Division of Environmental Remediation, 21 South Putt Corners Road, New Paltz, NY 12561.

USEPA form 7520-16 will be completed and distributed as discussed in Section 2.6.

Conduct EHC Injections

Field work will be initiated after a minimum of 30 days following submission of form 7520-16 to EPA. The NYSDEC case manager will be notified a minimum of 7-10 days in advance of conducting the chemical injections. It is anticipated that the injections will require a day to complete.

Performance Monitoring of Groundwater Quality

As presented in Section 2.3.2, groundwater samples will be collected at one and four months following the injections to assess results. Each sampling round will be completed in one day.

IRM Completion and Reporting of Results

Findings developed through implementation of the IRM will be provided in a Construction Completion Report that will be submitted to the NYSDEC within 60 days following completion of the second round of performance sampling. This will allow for laboratory testing, data validation by a third party chemist, evaluation of results and preparation of the CCR.

5.0 REFERENCES

EnviroTrac Ltd. (August, 2011). Amended Remedial Investigation Work Plan. Hartsdale Village Square Aristocrat Cleaners. 212 East Hartsdale Avenue Hartsdale, New York 10530. Brownfield Cooperative Agreement Site #: C360111.

EnviroTrac Ltd. (June, 2012). Remedial Investigation Interim Summary Report. Hartsdale Village Square Aristocrat Cleaners. 212 East Hartsdale Avenue Hartsdale, New York 10530. Brownfield Cooperative Agreement Site #: C360111.

New York State Department of Environmental Conservation (May 3, 2010). Final Program Policy DER-10 - Technical Guidance for Site Investigation and Remediation.

Code of Federal Regulations – Title 40: Protection of the Environment 144.26 – Inventory Requirements.

FIGURES

AERIAL PHOTOGRAPH

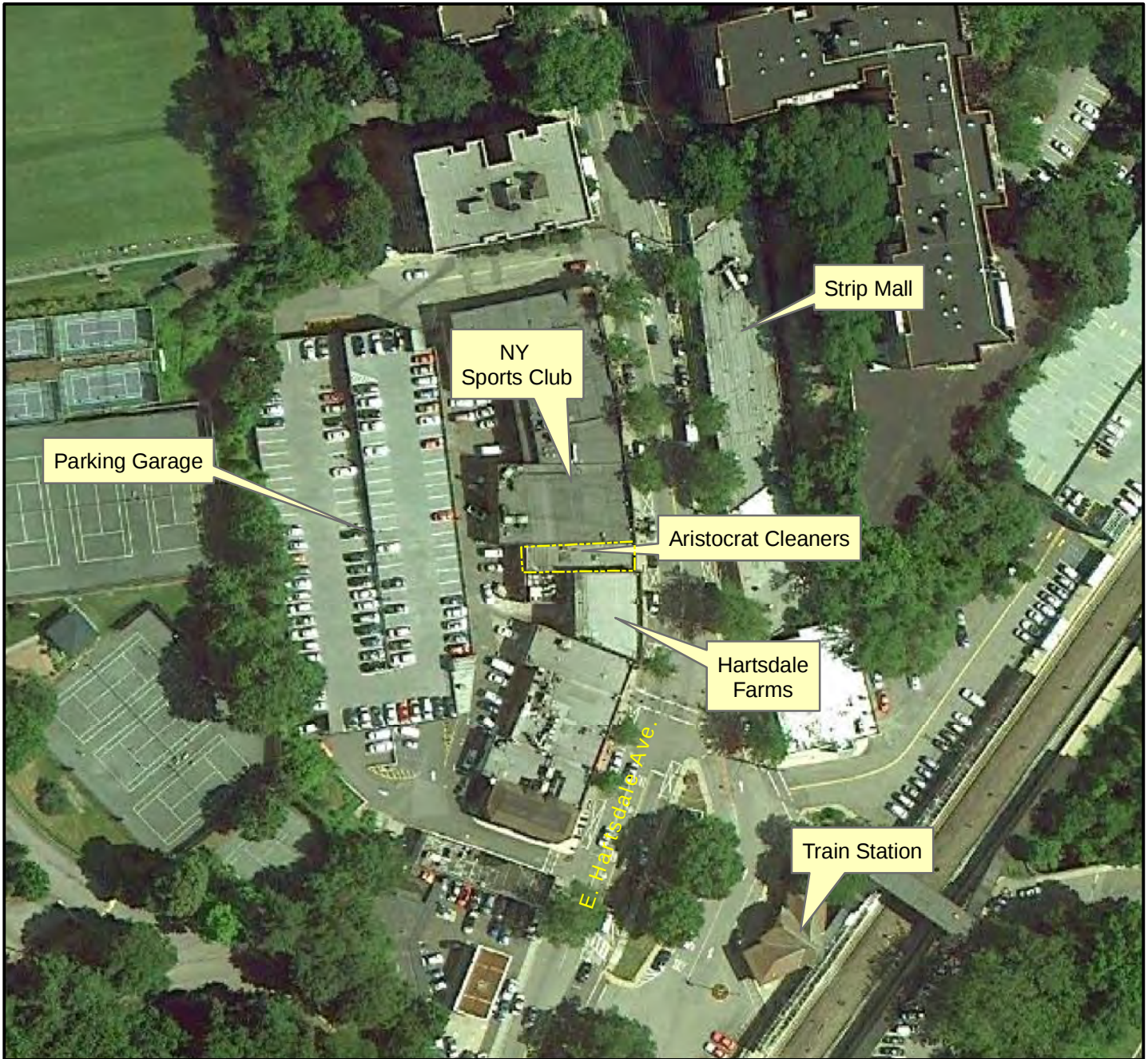


Figure 1-1
Site Location Map

Aristocrat Cleaners
212 E. Hartsdale Ave.
Hartsdale, NY



EnviroTrac
Environmental Services

5 Old Dock Road
Yaphank, NY 11980

P: 631-924-3001 F: 631-924-5001



E. HARTSDALE AVENUE

MACADAM DRIVE

MW-1

SS-1

SUMP 3
MW-3

MW-4

BASEMENT

MW-7

SSV-2
MW-2
SUMP 1
MW-2D

MW-6

PROPOSED EHC
INJECTION AREA

APPROXIMATE DIRECTION
OF GROUNDWATER FLOW

MW-5

MW-8

LEGEND:

- MONITORING WELL
- SOIL SAMPLING/SOIL VAPOR LOCATION
- SOIL SAMPLING LOCATION
- SUMP

Base map taken from GABRIEL E. SENOR, P.C. map dated OCTOBER 11, 2011



5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924-3001 FAX: (631)924-5001

0 5 FT 10

REVISION DATE:
JULY 9, 2013

SCALE:
1" = 10 FEET

REVISED BY: TB

ARISTOCRAT CLEANERS
212 E. HARTSDALE AVENUE
HARTSDALE, NEW YORK

RI TESTING LOCATIONS AND
PROPOSED EHC INJECTION AREA

FIGURE #

2-1

TABLES

Table 2-1: Summary of Groundwater Sampling - PCE and Related VOCs

Aristocrat Cleaners

212 E. Hartsdale Ave., Hartsdale, NY

BCA Site #C360111

WELL DESIGNATION		MW-1	MW-2		MW-2D	MW-3	MW-4	MW-5	MW-7	MW-8
SCREEN INTERVAL (ft msl)		151-161	152-162		144-149	152-162	152-162	151-161	152-162	153-158
SCREEN INTERVAL (ft bbf)		0-10	0.5-10.5		13-18	0.5-10.5	0.5-10.5	0-10	0.5-10.5	3-8
LOCATION		OUTDOOR	DRY CLEANER BASEMENT		DRY CLEANER BASEMENT	DRY CLEANER BASEMENT	DRY CLEANER BASEMENT	OUTDOOR	DRY CLEANER BASEMENT	LIQUOR STORE BASEMENT
SAMPLING DATE		27-Feb-13	11-Oct-11	27-Feb-13	27-Feb-13	11-Oct-11	27-Feb-13	27-Feb-13	11-Oct-11	27-Feb-13
Volatile Organics	NY-AWQS	Result								
Tetrachloroethene	5	170	13,000 J	13,000	42	3.8	0.5 U	160	98	2,000
Trichloroethene	5	40	4,800 J	5,400	23	2	0.46	24	20	760
cis-1,2-Dichloroethene	5	310	5,500 J	6,000	800	9.9	10	60	160	1,200
trans-1,2-Dichloroethene	5	12 U	300 U	620 U	25 U	0.39	2.5 U	6.2 U	1.2	120 U
1,1-Dichloroethene	5	2.5 U	200 U	120 U	5 U	0.5 U	0.5 U	1.2 U	0.22	25 U
Vinyl chloride	2	57	580 J	470	18	3.2	0.83	0.97	0.26	230
Total VOCs (1)		577	23,880	24,870	883	19	11	245	280	4,190

Notes:

(1) - Based on listed compounds.

All results in ug/l.

U - Compound was not detected relative to the indicated limit.

J - Estimated value.

NY-AWQS - New York State Ambient Water Quality Standard, TOGS 1.1.1.

msl - Mean sea level.

bbf - Below the elevation of the basement floor.

Table 2-2: Summary of Soil Sampling - PCE and Related VOCs in the Vicinity of MW-2

Aristocrat Cleaners
212 E. Hartsdale Ave., Hartsdale, NY
BCA Site #C360111

LOCATION		SSV-2	MW-2D@9-11 FBG	MW-2D@19-21 FBG	DUPLICATE (1)
SAMPLING DEPTH (ft bbf)		0.5-2.5	9-11	19-21	19-21
SAMPLING DATE		11-OCT-11	29-JAN-13	29-JAN-13	29-JAN-13
Compound Name	NY-UNRES	Result	Result	Result	Result
Tetrachloroethene	1.3	1.3	0.00068	0.0059	0.0035
Trichloroethene	0.47	0.016 U	0.00096 U	0.002	0.00077
cis-1,2-Dichloroethene	0.25	0.016 U	0.00061	0.009	0.0032
trans-1,2-Dichloroethene	0.19	0.025 U	0.0014 U	0.0015 U	0.0017 U
1,1-Dichloroethene	0.33	0.016 U	0.00096 U	0.001 U	0.0011 U
Vinyl Chloride	0.02	0.033 U	0.0019 U	0.002 U	0.0022 U

Notes:

All results in mg/kg.

(1) - Duplicate of MW-2D@19-21 FBG

bbf - Below the elevation of the basement floor.

U - Compound was not detected relative to the indicated limit.

NY-UNRES - 6NYCRR Part 375 -Table 375-6.8(a): Unrestricted Use Soil Cleanup Objectives.

Table 2-3: Summary of Phase II Groundwater Sampling - Additional Parameters

Airstocrat Cleaners
212 E. Hartsdale Ave., Hartsdale, NY
BCA Site #C360111

LOCATION		MW-2	MW-2D	MW-8
SAMPLING DATE		27-FEB-13	27-FEB-13	27-FEB-13
Constituent	NY-AWQS	Result	Result	Result
Chloride	250,000	98,000	130,000	28,000
Iron, Total	300	296	1,760	3,370
Magnesium, Total	35,000	4,750	23,300	4,050
Manganese, Total	300	178.2	804	727.5
Nitrogen, Nitrate	10,000	469	205	102
Sulfate	250,000	35,000	58,000	8,800 J
Alkalinity, Total (mg CaCO3/L)	NA	115	211	105
Biological Oxygen Demand, 5 day	NA	2,000 U	5,400	2,000
Calcium, Total	NA	59,400	91,800	43,400
Chemical Oxygen Demand	NA	9,100 J	21,000	37,000
Dissolved Organic Carbon	NA	3,700	3,800	4,600
Hardness	NA	170,000	300,000	110,000
Total Organic Carbon	NA	4,400	3,500	5,300

Notes:

All results in ug/l.

U - Compound was not detected relative to the indicated limit.

J - Estimated value.

NA - Not applicable, no criteria provided.

NY-AWQS - New York State Ambient Water Quality Standard, TOGS 1.1.1.

Table 2-4: Summary of Groundwater Sampling Field Parameters

Airstocrat Cleaners
212 E. Hartsdale Ave., Hartsdale, NY
BCA Site #C360111

WELL NO.		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
SAMPLING DATE		10/11/2011	10/11/2011	10/11/2011	10/11/2011	10/11/2011	10/11/2011	10/11/2011
FIELD PARAMETER	UNITS	RESULTS (1)						
Turbidity	NTU	NS	5	13	NS	NS	NS	9
Specific Conductance	uS/cm	NS	655	641	NS	NS	NS	1046
pH	standard units	NS	11.7	9.1	NS	NS	NS	9.1
ORP	mV	NS	-82	-90	NS	NS	NS	-102
Temperature	°C	NS	22.2	20.4	NS	NS	NS	21.1
Dissolved Oxygen	mg/l	NS	1.5	0.5	NS	NS	NS	5.0

WELL NO.		MW-1	MW-2	MW-2D	MW-4	MW-5	MW-8
SAMPLING DATE		2/27/2013	2/27/2013	2/27/2013	2/27/2013	2/27/2013	2/27/2013
FIELD PARAMETER	UNITS	RESULTS (1)					
Turbidity	NTU	7	11	15	10	10	37
Specific Conductance	uS/cm	735	518	1050	1750	418	373
pH	standard units	6.8	7.2	7.3	7.0	7.0	7.4
ORP	mV	-14	78	-68	-69	-5	-93
Temperature	°C	12.5	17.0	18.9	16.4	11.3	15.5
Dissolved Oxygen	mg/l	0.5	1.1	0.7	0.2	0.5	0.3

Notes:

NS - Well was not sampled.

NA - Not analyzed.

(1) - Measurements represent final set taken prior to sample collection.

Table 2-5: IRM Performance Monitoring Analytical Methods and Sample Management Summary

Aristocrat Cleaners
212 E. Hartsdale Ave., Hartsdale, NY
BCA Site #C360111

	Analytical Parameter										
	Alkalinity	BOD	Chloride	COD	Dissolved Gases	DOC	Hardness	Metals (1)	Nitrate Nitrogen	Sulfate	TOC
Analytical Method	SM2320B	SM5210B	300.0, SM4500Cl-E	SM5220D	RSKSOP-175	SM5310C	200.7, SM2340B	6010C, 6020A	SM4500NO ₃ -F	SM4500SO ₄ -E, 300	SM5310C
Sample Container	Plastic, no headspace	Plastic	Plastic	Plastic	Amber Glass, Teflon Lined	Amber Glass	Plastic	Plastic	Plastic	Plastic	Amber Glass
Sample Quantity	250 ml	500 ml	250 ml	250 ml	(2) 20 ml VOA Vials	(2) 40 ml VOA Vials	500 ml	500 ml	250 ml	250 ml	(2) 40 ml VOA Vials
Sample Preservation	4° C	4° C	4° C	H ₂ SO ₄ , pH<2, 4° C	HCL, pH<2, 4° C. If CO ₂ , 4° C.	H ₂ SO ₄ , pH<2, 4° C	HNO ₃ , pH<2, 4° C	HNO ₃ , pH<2, 4° C	4° C	4° C	H ₂ SO ₄ , pH<2, 4° C
Sample Holding Time	14 Days	48 Hours	28 Days	28 Days	14 Days preserved; 7 Days Unpreserved	28 Days	180 Days	180 Days	48 Hours	28 Days	28 Days

Notes:

BOD - biological oxygen demand.

COD - chemical oxygen demand.

DOC - dissolved organic carbon.

TOC - total organic carbon.

(1) Total Metals - calcium, iron, magnesium, manganese.

APPENDICES

APPENDIX A

FMC Environmental Solutions - Contaminants Treated Matrix

▼ Contaminant	Klozur® Persulfate	EHC® ISCR Reagent	EHC® -L	EHC® -M	Daramend® Reagent	PermeOx® Plus
Chlorinated Solvents						
Tetrachloroethene (PCE)	✓	✓	✓		✓	
Trichloroethene (TCE)	✓	✓	✓		✓	
Dichloroethene (<i>cis</i> and <i>trans</i> DCE)	✓	✓	✓		✓	✓
Trichloroethane (TCA)	✓	✓	✓		✓	
Dichloroethane (DCA)	✓	✓	✓		✓	
Carbon tetrachloride	✓	✓	✓		✓	
Chloroethane	✓	✓	✓		✓	
Chloroform	✓	✓	✓		✓	
Chloromethane	✓	✓	✓		✓	
Chlorotoluene	✓	✓	✓		✓	
Methylene chloride	✓	✓	✓		✓	
Vinyl chloride	✓	✓	✓		✓	✓
Dichloropropane	✓	✓	✓		✓	
Dichloropropene	✓	✓	✓		✓	
Hexachlorobutadiene	✓	✓	✓		✓	
Tetrachloroethane	✓	✓	✓		✓	
Trichloropropane	✓	✓	✓		✓	
BCEE	✓	✓	✓		✓	
BCEM	✓	✓	✓		✓	
BTEX						
Benzene	✓					✓
Toluene	✓					✓
Ethylbenzene	✓					✓
Xylenes	✓					✓
PAHs						
Acenaphthene	✓					✓
Acenaphthylene	✓					✓
Anthracene	✓					✓
Benzo(a)anthracene	✓					
Benzo(a)pyrene	✓					
Benzo(b)fluoranthene	✓					
Benzo(ghi)perylene	✓					
Chrysene	✓					
Dibenzo(ah)anthracene	✓					
Fluorene	✓					✓
Naphthalene	✓					✓
Phenathrene	✓					✓
Pyrene	✓					
Oxygenates						
Methyl tert-butyl ether (MTBE)	✓					✓
Tert-butyl alcohol (TBA)	✓					✓
Petroleum Hydrocarbons						
GRO (octane)	✓					✓
DRO (dodecane)	✓					✓
ORO (C20 alkane)	✓					✓
Creosote (coal tar)	✓					✓
Phenols						
Phenol	✓				✓	✓
4-chloro-3-methyl phenol	✓				✓	✓
2-chlorophenol	✓				✓	✓
2,4-dichlorophenol	✓				✓	✓
2,4-dinitrophenol	✓				✓	✓
4-nitrophenol	✓				✓	✓
Pentachlorophenol	✓	✓	✓		✓	

▼ Contaminant	Klozur® Persulfate	EHC® ISCR Reagent	EHC® -L	EHC® -M	Daramend® Reagent	PermeOx® Plus
Chlorobenzenes						
Chlorobenzene	✓	✓	✓		✓	✓
Dichlorobenzene	✓	✓	✓		✓	
Trichlorobenzene	✓	✓	✓		✓	
Haloalkanes						
Dichlorodifluoromethane (Freon 12)	✓	✓	✓		✓	
Trichlorofluoromethane (Freon 11)	✓	✓	✓		✓	
Trichlorotrifluoroethane (Freon 113)	✓	✓	✓		✓	
PFOS	✓					
PFOA	✓					
Pesticides & Herbicides						
α-Chlordane	✓	✓	✓		✓	
Heptachlor Epoxide	✓					
Lindane (hexachlorocyclohexane)	✓	✓	✓		✓	
DDT, DDD, DDE	✓	✓	✓		✓	
Toxaphene	✓	✓	✓		✓	
Dieldrin	✓	✓	✓		✓	
2,4-D	✓	✓	✓		✓	
2,4,5-T	✓	✓	✓		✓	
Endrin	✓	✓	✓			
Energetics						
TNT	✓	✓	✓		✓	
DNT	✓	✓	✓		✓	
Nitroglycerine	✓	✓	✓		✓	
HMX	✓	✓	✓		✓	
RDX	✓	✓	✓		✓	
Perchlorate		✓	✓		✓	
Miscellaneous						
Acetone	✓					✓
4-methyl-2-pentanone	✓					✓
1,4-dioxane	✓					✓
Perchlorate		✓	✓		✓	
Polychlorinated biphenyls (PCBs)	✓					
Nitrates		✓	✓		✓	
Bis(2-ethylhexyl)phthalate	✓					
Nitrobenzene	✓					✓
Propylbenzene	✓					✓
4-iso-propyltoluene	✓					✓
Styrene	✓					✓
Trimethylbenzene	✓					✓
n-butylbenzene	✓					✓
Carbon Disulfide (CS ₂)	✓					
Heavy Metals						
Antimony				✓		
Arsenic				✓		
Barium				✓		
Chromium				✓		
Cobalt				✓		
Copper				✓		
Lead				✓		
Nickel				✓		
Selenium				✓		
Zinc				✓		

The Contaminants Treated Guide is for guidance only. It is recommended that a suitable treatability study be performed to verify applicability to you specific contaminant and site conditions.

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